

Sources of Agricultural Information for Women Farmers in Hai and Kilosa Districts,  
Tanzania

THESIS

Presented in Partial Fulfillment of the Requirements for the Degree Master of Science in  
the Graduate School of The Ohio State University

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2015

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## ABSTRACT

This study investigated sources of agricultural information used by women farmers in Tanzania. Women farmers constitute the majority of farmers in Tanzania. Enabling them to increase food production will help achieve the government's goals of achieving food security and agro-based industrialization. However, it is not clear where women farmers obtain information on modern farming methods. Knowing these sources will enable the Tanzanian government and international aid organizations channel information directed toward women farmers through those sources. Therefore, the purpose of this study was to identify women farmer's sources of information in agriculture. Due to limited funding and time constraints, the study involved a survey of 300 women farmers in Hai and Kilosa districts of Kilimanjaro and Morogoro Regions, respectively. The survey was completed using an interview schedule. Of the 300 respondents sampled, 288 provided usable data for the study yielding a response rate of 96%.

Six research objectives guided this study, namely: (a) examine the demographic characteristics of women farmers in Tanzania; (b) describe sources of information on modern farming methods for women farmers; (c) assess innovative farming methods adopted by women farmers; (d) examine women farmers' access to and use of ICTs; (e) examine women farmers' access to and use of agricultural extension agents; and (f) examine other challenges facing women farmers in Tanzania.

Key findings from this study were as follows: First, the demographic characteristics showed that the vast majority of women farmers in Tanzania aged 23 – 53

years, placing them in an age category whereby they are capable of making strong contributions to agricultural growth. Most women farmers had completed their primary education, which suggests that they can benefit from vocational education opportunities. The second finding was that radio and agricultural extension workers constituted the primary sources of agricultural information for women farmers in Tanzania. Swahili is the national language of Tanzania; therefore, broadcasting agricultural information in the national language will enhance the likelihood of reaching almost of the women farmers in the country. Radio also overcomes barriers of distance and poor road infrastructure. Therefore, providing radio sets at a subsidized cost, especially solar-powered radios, may be an effective strategy for disseminating information to women farmers. Also, contrary to conventional cultural wisdom, women farmers in Tanzania can interact with male extension workers and do not need to get permission from their husbands. However, the number of female extension workers in Tanzania is small, relative to male extension workers and there may be a need to recruit more females into the service.

Another finding from this study is that virtually all women farmers in the study had access to a cell phone. However, they used them primarily for personal purposes, not for accessing agricultural information. This is probably because the Ministry of Agriculture, Food Security and Cooperatives have not yet set up a system whereby farmers can use the telephone to obtain agricultural information. A number of non-profit organizations are beginning to provide this service and, therefore, cell phones may become a very convenient tool for accessing farming information by farmers.

Overall, the study revealed that women farmers are capable of making a significant contribution to agricultural growth in Tanzania. However, they face major

challenges, such as limited access to land and credit to purchase modern farming inputs.

It is important for the government to address these concerns.

Key words: women farmers, agricultural information, agricultural communication, adoption of innovations, communication for development

## ACKNOWLEDGEMENTS

The Innovative Agricultural Research Initiative (IAGRI) is acknowledged for providing funding for this study. Special thanks go to the people of Hai and Kilosa Districts and particularly the respondents, whose time and input into the discussions made the study a reality.

I would like to express my gratitude to my advisor, Dr. Robert Agunga, associate professor; my committee member, Dr. Robert Birkenholz, professor; and my Tanzania supervisor, Dr. Camilius Sanga, professor; for their support and guidance throughout the course of my work. I sincerely thank the staff and graduate students in the Department of Agricultural Communication, Education and Leadership at The Ohio State University for their kindness and co-operation during my one-year stay in the U.S.

Special thanks also goes to my family and friends for providing advice, moral support and their prayers. Lastly, I thank Sokoine University of Agriculture members for their support. With all these people I share the credit for what is good in the thesis while all responsibility for any weaknesses is mine.

Above all I thank God for the life and the capacity to undertake the study

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## CHAPTER 1: INTRODUCTION

Agriculture provides food for Tanzania's estimated 42 million populations and a means of livelihood for over 80 percent of them directly working on the land (URT, 2013). The vast majority of these rural agricultural producers are women and they cultivate the land using traditional methods (Leavens and Anderson, 2011). Thus, their productivity can be increased and their economic incomes doubled if they are encouraged to practice modern farming methods.

This thesis introductory chapter describes women in Tanzania as they are pictured in the agricultural sector. In particular, it describes the problems they face, and how their plight can be overcome. Overall the study investigates Tanzanian women farmers' sources of information on modern agricultural practices as the necessary first step to empowering women's productivity in the agricultural sector.

### Study background

Agriculture is backbone of Tanzania's economy; the source of food for the population; contributes about 50% to national income; and provides employment for about 80% of the Tanzanian population (MAFC, 2012; Oreku, Mtenzi and Ali, 2013). It is also a source of raw materials for industries and accounts for 75% of foreign exchange earnings (MAFC, 2012). Agriculture is the main source of economic activity for the majority of people in rural areas. It is dominated by small-holder producers, who cultivate various types of cash and food crops on small pieces of land averaging 0.9 and

3.0 hectares (MAFC, 2011a). Therefore, agricultural production in Tanzania is largely on subsistence basis.

The agricultural sector in Tanzania is female dominated, meaning that women comprise about 54% of the labor force (Leavens and Anderson, 2011). Agriculture also comprises a greater part of women's economic activity than men. For example, 81% of women, compared to 73% of men, are engaged in agricultural activities. In rural areas, that number rises to 98% for women (Ellis et al, 2007).

Women in Tanzania are involved in various agricultural activities, such as crop and livestock production. However, they are also engaged in home activities, such as cooking and childcare. The main food crops grown in Tanzania are maize, rice, sorghum, wheat, pulses, cassava, millet and sweet potatoes. The cash crops include coffee, cashew nut and sisal (MAFC, 2012). A project conducted by Food and Agriculture Organization of the United Nations (FAO) in Mogabiri Mara region, found that men and women participated fairly equally in land clearance, land preparation and planting, while women took more responsibility for weeding, harvesting, transportation, threshing, processing and storage than men (Leavens and Anderson, 2011).

Apart from their efforts in agriculture, women are responsible for domestic activities that are often time and energy consuming. These include preparing food, fetching water and firewood, and caring for their husbands, children, the elderly and the sick (Meinzen-Dick et al, 2010). Also, women spend much time traveling to distant areas to mill the corn for food preparation. Most household chores are predominantly female tasks and are a determining factor in how women use their time (Meinzen-Dick et al, 2010; Joel, 2013).

Given the important roles women play in agriculture, focusing on challenges that they face and the resources they need would be key to increasing overall agricultural productivity (Meinzen-Dick et.al. 2010). Women have limited access to a wide range of physical assets including agricultural inputs, such as technological resources, land, improved seed and chemical fertilizers. For example, women may have access to land but lack access to fertilizer needed to render the land more productive or lack knowledge and skills of how to properly apply the fertilizer. Furthermore, many assets, such as capital, rights, and decision-making power, rest more with men not women. Yet women in Tanzania's agriculture can be more productive but for the problems they face. Women can accomplish a lot when modern agricultural information is made available to them. This means that information is a useful resource for socio-economic development because it empowers people to make well-informed decisions leading to attaining better livelihoods. Information is essential for planning, decision-making and the execution of programs (Olorunda and Oyelude 2008). The value of information, however, can only be realized if it is accessed, understood and used.

The experience of some growing economies, such as China, has shown that improvement in information services is among the strategies used to achieve agricultural transformation (Delman, 1991; Xu, 2001). Also, studies in Nigeria showed that agriculture cannot be improved if the stakeholders, especially small-scale farmers, are not aware of information sources and how these needs can be brought to their doorsteps (Ogunlade & Falaki 2006). Likewise in Tanzania, Mchombu (2003) showed how farmers' access to information can improve agricultural practices.

To speed up agricultural development, crucial information needs to be made accessible, particularly to women farmers. Therefore, the study examined: a) sources of information of women farmers in Tanzania; b) types of information they acquired via these sources; and c) innovations they have adopted as a result of information acquired.

#### Agricultural extension in Tanzania

Many countries have agricultural extension systems to help farmers advance their agricultural productivity and improve their standard of living and Tanzania is no exception (Wambura, Acker & Mwasyete, 2012). The improvement of agricultural science and technology has brought about dramatic changes in the agricultural sector (Nagel, 1997). This has led to the increased need and opportunity for investigating the effectiveness of agricultural extension services in various parts of the world. East Africa is among the places with active extension systems (Morris, 1991) and studies indicate that the agricultural sector in this part of Africa has not shown significant improvement in increasing production and improving human lives in rural areas (Kyaruzi, Mlozi and Busindi, 2010; Wambura et al, 2012; Kasie, Jaleta, Shiferaw, Mmbando and Mekuria, 2012).

The delivery of a sustainable agricultural extension service in Tanzania has been a major focus for a long time so as to help farmers increase agricultural productivity and to reduce poverty among farmers. Efforts of the government have been geared towards improving production and productivity so as to achieve food security and sovereignty at household and national levels (URT, 2006). The efforts made are in conjunction with the targets of the National Development Vision 2025, which envisions achieving high living standards, food self-sufficiency and food security (URT, 1996) with the government

providing these services through the Ministry of Agriculture and Cooperative (MAC), now known as the Ministry of Agriculture Food-Security and Cooperatives (MAFC). MAFC had the mandate for providing extension services for the entire country. In recent years, around 2000, the agricultural extension services in the country was handed over to local government authorities, through decentralization, to ensure effective participation of a wide variety of stakeholders, such as farmers, extension agents, research institutions and the private sector (Kimaro et al., 2010). The extension services uses a combination of dissemination pathways such as demonstration plots, farmer field days, exchange visits/study tours, technology transfer model, technical publications, training manuals/guidelines, radio/TV programs, cinema shows, agricultural shows/exhibitions, ICT facilities including mobile phones, website and emails to get information to farmers. Other methods include focus farmer groups and stakeholder platforms.

Changes in the agricultural extension system in Tanzania was aimed at transforming the agricultural sector into a more efficient, competitive and profitable sector. The government's target is to employ 15,082 extension officers by the end of 2015 (MAFC, 2009). The extension agents' population is less than the farmers' population (Sanga, Kalungwizi and Msuya, 2013). The farmers-extension worker ratio ranges from 10,000 to 20,000:1 (Rukonge *et al.*, 2008). Farmers in more remote areas are least likely to see an extension worker due to poor transportation infrastructure in those areas (Msuya, Ndamugoba, Wanga and Henjewe, 2008). Many extension agents are male and female extension agents in Tanzania number only a third of the extension agents in the country (Magayane and Temu (1997). However, the authors found that 40 percent of women farmers preferred to work with female extension agents, compared to

26 percent who preferred male extension agents. The remaining 34 percent had no preference. This means more female extension agents are needed to serve the preferences of a sizable portion of Tanzanian women engaged in agriculture. Women farmers prefer to work with female extension agents due to a comfortable environment between them as compared to male extension agents. Studies have also shown that many men do not want their wives to be extension workers because they are hardly home.

Other issues affecting efficiency of the extension system include the lack of clientele involvement in extension program planning and untimely the provision of extension services (Campbell, 1999; Rutatora and Mattee, 2001; Swanson and Samy, 2002). In general, there are no records showing smallholder farmers have adopted modern farming innovations or whether extension information is reaching smallholder farmers (Mwaseba, 2005; Jeannie, 2012).

#### Information and Communication Technologies (ICTs) for Agriculture

For many years, Tanzanian farmers accessed agricultural information from extension workers mainly through face-to-face contact (Wambura et al, 2012). However, this seems to be difficult, if not impossible, given that smallholder farmers are scattered across the rural landscape, absence of penetrable roads, and lack of transport for extension workers. Finding innovative ways to reach farmers, such as the use of community radio and the emerging Information and Communication Technologies (ICTs), such as the cellphone, offer great possibilities (Wambura et al, 2012).

In general, ICTs refer to hardware, software, networks and media for collection, storage, processing, transmission and presentation of information in the format of voice, data, text and images (World Bank, 2002). The potential of ICT to contribute to



agricultural and rural development in Tanzania has been well recognized (Singh, 2006). ICTs can play a significant role in rural development by empowering rural farmers with new knowledge, up-to-date information and entrepreneurship skills. ICTs in the forms of computers, Internet, geographical information systems, mobile phones and even traditional media, such as radio and television can be used to deliver information to smallholder farmers (Stienen *et al.*, 2007). Likewise, smallholder farmers, such as women farmers, can use ICTs, such as the cell phone, to access information on market prices so that they can take their produce to where they can obtain the best price for their produce (Mittal, Gandhi, Tripath, 2010). Individuals can also benefit from the availability and use of ICTs in other ways. For example, by substituting phone calls for travel this cost time and money.

The question is whether Tanzanian women farmers avail themselves to ICTs as a source of information. Are low cost ICTs, such as radio, cell phones, and the media provided by telecenters, providing possibilities for closing up the digital divide between the information haves and have-nots in Tanzania, especially women farmers (Lwoga and Ngulube, 2008)? It is important to investigate the potential of these new media tools as vehicles for channeling information to women farmers in Tanzania.

#### Problem statement

Regardless of the types of techniques and technologies used by the Tanzanian government to deliver agricultural information to her small farmers since independence, agricultural productivity has remained low. The reason for this low productivity may well be contributed with constraints, women farmers, the majority of smallholder farming population, in accessing information and/or the challenges they face in applying the

information so acquired in increasing production. Thus, it would seem that the necessary first step in meeting the challenges of women farmers' needs in Tanzania, is examining whether they have access to information on modern farming methods and through what sources do they get this information.

### Purpose and Objectives

The main purpose of this study was to examine the challenges facing women farmers in Tanzania increasing agricultural productivity by focusing on their sources of information on agricultural innovations, which the researcher believes, is the first step to innovation adoption. The specific research objectives are to:

1. Examine the demographic characteristics of women farmers in Tanzania;
2. Describe sources of information on modern farming methods for women farmers;
3. Assess innovative farming methods adopted by women farmers;
4. Examine women farmers' access to and use of ICTs;
5. Examine women farmers' access to and use of agricultural extension agents;
6. Examine other challenges facing women farmers in Tanzania.

### Definition of terms

The following are terms used in the study and their operational meanings are, therefore, provided:

1. Woman farmers: A woman farmer refers to a female farmer who cultivates a piece of land and is responsible for determining how the farm output is used (Swaminathan, 2013).

2. ICTs: This is an abbreviated form for “Information and Communication Technologies” and refers to a range of communication technologies for delivering information (Rao, 2006).
3. Adoption: It refers to a farmer’s decision on whether or not to apply new techniques or technologies in his or her farming practice (Seevers & Graham, 2012).
4. Innovation: It is an idea or practice perceived as new by the clientele or person(s) receiving it (Seevers & Graham, 2012).
5. Agricultural extension: It refers to an arm of the government or Ministry of Agriculture responsible for helping farmers increase productivity (Seevers & Graham, 2012.)
6. Communication: It is the exchange of information through verbal or non-verbal, such as print and television (Berger & Luckmann, 1967; Davenport & Hall, 2002).
7. Stakeholders: It refers to farmers and other individuals or organizations supporting the farming industry, such as inputs distributors and marketing agents (Leeuwis, 2004).

#### Significance of the study

Significance of the study asks the question: Why is this study important? Or, what will happen if this study is not done? The significance of the study lies in the fact that women, the vast majority of Tanzanian farmers, operate on a subsistence basis, that is, they produce just enough to feed themselves and their families. Given the primitive tools or the small pieces of land they cultivate, they are often unable to grow enough to feed themselves and have to rely on subsidized imported foods. For a rich agricultural

country like Tanzania, importing staple foods, such as rice and maize, which can be easily grown in the country, is unacceptable. Tanzania aspires to be a Middle Income Nation by 2025 and this goal cannot be achieved if its agriculture remains at the subsistence level. Also, smallholder farmers, especially women farmers, are capable of increasing productivity even on their small land holdings, simply by intensifying productivity that is, using modern farming methods to increase yields on the same piece of land.

Therefore, Tanzania can produce more food and achieve food security and sovereignty by helping women farmers adopt agricultural innovations. According to Rogers (1995) the adoption process begins with these farmers gaining access to information on available innovations they can adopt and adapt for increasing productivity. Therefore, the main challenge and the necessary first step, is to understand the sources through which women farmers obtain productivity innovations. This is because by knowing the sources accessible to them government can channel more information through those sources. Alternatively, by knowing that women farmers do not use cell phones the government can design an educational campaign to teach them how to use cell phones and, if necessary, subsidize the price of cell phones for these farmers.

Rogers' (1962, 1995) and Rogers & Shoemaker (1971) present the “diffusion of innovations” theory or model as a way of understanding how new information spreads among members of a farming community. The diffusion model is called the “SMCRE” or “Source-Message-Channel-Receiver-Effect” model—a description of how new farming innovation spreads. For example, the “S” or Source, such as the Ministry of Agriculture has an innovation or Message (such as the use of fertilizer), which is disseminated

through Channels, such as radio or extension agents, to Receivers or farmers, for an Effect , say acceptance, adoption or rejection by the farmers or receivers.

The SMCRE model offers the framework for the study and will form the basis for a literature review in Chapter Two. The Channel or “C” in the SMCRE refers to the Channels as the “sources” of information for farmers. What are the main sources of information for women farmers? Is it radio, ICTs or extension workers? From this study knowing women farmers’ information sources will enable development agents, such as governmental and non-governmental agencies channel innovative information through those sources. This study is conducted in the context of an emerging academic discipline called “agricultural communication” or the application of communication skills (written and oral) and technologies, such as radio, print and ICTs to enable farmers’ access to and adoption of innovations to increase productivity. In fact, agricultural communication is part of a wider communication specialization called Communication for Development (C4D), which argues that gaining access to innovative information is not enough; farmers must have access to a comprehensive set of inputs needed to make innovation adoption possible, such as credit, fertilizers, and markets. The communication in development challenge, therefore, is ensuring the availability and timely delivery of these inputs by building strong partnerships with agencies that provide these services.

### Summary

This introductory chapter argues that women farmers make up a large majority of the farming population in Tanzania. Therefore, the government’s goal of achieving food security will be difficult if not impossible without examining constraints women farmers

face, particularly, their access to innovative farming information. This study, conducted in the context of agricultural communication research, therefore, examines women farmers' access to or sources of information on modern farming methods. This study is significant because by knowing the sources women farmers use, new information can be passed to them through these sources. In essence, the study investigates the need for agricultural communication professionals in Tanzania.

## CHAPTER 2: LITERATURE REVIEW

### Introduction

This chapter is a review of the literature on agricultural communication, namely, that aspect of communication studies related to agricultural development. Essentially, it focuses on how new ideas, practices and technologies are applied to increase agricultural production, processing or even eating habits. The general body of research is called “diffusion of innovations” and Everett M. Rogers is generally credit as the founder of modern diffusion of innovations research. Of particular interest to the study is how the literature on diffusion of innovations applies to the study of women farmers in Tanzania.

### Diffusion of agricultural innovations in history

Agricultural development is essentially about the study of changes or improvements in agriculture. These changes date back to the hunter/gatherer society when people lived in balance with nature. In good years harvest was plentiful; however, in bad years, they starved. People in hunter/gatherer society also lacked the tools to exploit the land. However, the agricultural revolution changed all that. With the invention of the plough sedentary agriculture was began and farmers in Western societies no longer depended on the vagaries of the weather. Ralph Linton (1935) in his book, *The Study of Man*, showed that progress in agriculture, the world over, was made possible by the adoption of innovations, across nations.

In modern times, Diffusion of Innovation research was rendered more popular by Everett M. Rogers with the first edition of his book, *Diffusion of Innovations* (1962), which has gone through several editions because of its success (Leeuwis, 2004). Rogers and Scott (1997) defined diffusion as a process of communication through which an innovation is spread via communication channels to members of a community over time. The main elements of diffusion process are: a) an innovation, b) communicated through channels, c) over time, and d) to members of a given community or system.

Although the diffusion of innovation theory was founded in the communication of agricultural innovations, it has since been applied in other disciplines, such as, pharmacy and marketing. Surry & Farquhar (1997) applied the theory to instructional technology while Clarke (1999) applied it to information and communication technology.

#### The S-M-C-R-E Model

Harold Lasswell (1948) may have developed the S-M-C-R-E communication model; however, it is Rogers (1995) who gained fame for promoting it. Rogers is generally credited with the S-M-C-R-E or “Source-Message-Channel-Receiver-Effect” model of communication for spreading new innovations. In their book, *Communication of Innovations: A Cross Cultural Approach* Rogers & Shoemaker (1971) adapted the model as a communication process for extension practice in developing countries. In that context, a sender (S) or “Source” can be the Ministry of Agriculture and Food Cooperatives of Tanzania, with a message (M), such as use of fertilizer, which is sent through a channel C, such as radio or an extension agent, to a receiver R, which can be



farmers, for the purpose of adoption or rejection (E) or effect. Although rejection is possible, it is always hoped that farmers will adopt the innovations promoted.

#### Elements of diffusion

Again, the four main elements of diffusion process are: the innovation, communication channels, time, and the social system (Rogers, 1962, 1995).

- a. An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003). An innovation may take the form of ideas, objects, practices (Rogers, 2003), creation, learning, events, trajectories, processes, or contexts (Gripenberg, Sveiby, & Segercrantz, 2012). The perceived newness of the idea for the individual determines his or her reaction to it. If the idea is new to the individual, it is an innovation. The newness of an innovation does not only involve new knowledge; someone may have known about an innovation for some time but not yet developed a favorable or unfavorable attitude towards it, nor have adopted or rejected it.
- b. Next is the channel that can be either a mass medium or an interpersonal channel. A communication channel is the means through which messages get from one individual to another (Rogers, 2003). The nature of the information-exchange relationship between a pair of individuals determines the conditions under which a source will or will not transmit the innovation to the receiver, and the effect of the transfer.

For example, mass media channels are often the most rapid means to inform an audience of potential adopters about the existence of an innovation, that is, to create awareness-knowledge (Rogers, 2003). Mass media channels are all means

of transmitting messages that involve a mass medium, such as radio, television, newspapers, etc., which enable a source of one or a few individuals to reach an audience of many. On the other hand, interpersonal channels are more effective in persuading an individual to adopt a new idea, especially if the interpersonal channel links two or more individuals who are near peers (Rogers, 2003). For example, through farm visit an extension worker is likely to convince a farmer to adopt a new farming method rather than a farmer having got the news via the radio or television. Interpersonal channels involve a face-to-face exchange between two or more individuals such as when an extension agent visits a farmer or farmer to farmer communication is a form of interpersonal communication.

- c. Time is the third element in the diffusion process. According to Rogers (1995), the time variable is involved in diffusion in the innovation-decision process; innovativeness; and an innovation's rate of adoption. The innovation-decision process is the process through which an individual passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision (Rogers, 1995).

Based on time, there are five main steps in the diffusion process: knowledge, persuasion, decision, implementation, and confirmation. Innovativeness is “the degree to which an individual is relatively earlier in adopting new ideas than the other members of his social system” (Rogers, 1995, p. 40). Based on innovativeness, adopters are grouped into five categories: innovators, early adopters, early majority, late majority and laggards (Rogers, 1995) that

consecutively adopted an innovation. Innovators are active information seekers about new ideas. The adoption process begins with a small number of visionary, imaginative innovators. They often spend a great time, energy and creativity on developing new ideas. And they love to talk about them. Early adopters are the socially respectable members of a social system. They are always on the lookout for a strategic leap forward in their lives or businesses. Early adopters tend to be more economically successful, well connected and well informed. They are an easy audience. They don't need much persuading because they are on the lookout for anything that could give them a social or economic edge. The early majority is individuals, comfortable with moderately progressive ideas, but won't act without solid proof of benefits. The late majority are conservative individuals who hate risk and are uncomfortable with new idea. Lastly, laggards are persons who perceive a high risk in adopting a particular product or behavior.

- d. The names of the adopter categories reflect the rate of adoption, which is the relative speed of adopting an innovation by individuals in a social system. A social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. The members or units of a social system may be individuals, informal groups, organizations, and/or subsystems. The adopter categories begin with the most progressive, followed by the least progressive ones when adopting the innovation. The most rapid adopter group is known as an innovator (as much as 2.5% of the community). The next adopter category is the early adopters (13.5%), early majority (13.5%), and late majority

(34%). Laggard (16%) is the last group to receive the innovation (Rogers, 2003).

It can be seen from the percentages that initially there are only a small number of individuals who adopt the innovation. Over time, this number increases up to a certain point in time, and then decreases, forming a normal bell curve.

There are five basic attributes of an innovation which affect its diffusion and adoption in society. These are relative advantage, compatibility, complexity, triability and observability of the innovation.

Relative advantage is the degree to which an innovation is perceived as being better than the existing idea measured in economic terms, social prestige, convenience, and satisfaction. The study sought to establish that although a number of modern agricultural information sources exist, do the respondents have knowledge of the sources to meet their agricultural information need; implying that there is much benefit derived due to utilization.

Compatibility refers to the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. An idea that is incompatible with the culture of a social system will not be immediately adopted. It is necessary to establish if the available information sources are relevant to the needs of the respondents against competition from indigenous practices and cultural beliefs.

Complexity implies the degree to which an innovation is perceived as difficult to understand and use. Simple ideas are adopted more rapidly than innovations that require the adopter to develop new skills and understandings. A major challenge of information sources especially written materials is the assumption that the

consumer has an ability to read. These skills lack among the farmers in most parts of the developing world including Tanzania. This makes access, application and adoption of some sources a challenge. Triability is the degree to which an innovation may be experimented with. An innovation that is testable represents less uncertainty to the individual who is considering it for adoption. It is easier to learn by doing because it gives opportunity to test the new innovation which influences decisions for adoption.

Observability relates to the degree to which the adopter has had the opportunity to see the results of the implemented innovation. The researcher will find out whether farmers who receive training in agriculture are often role models for those who do not and are often consulted based on their observable successes. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it because such visibility stimulates peer discussion of the advantages and disadvantages hence informed decision making.

#### Criticisms to the theory

Rogers' diffusion model was applied in developing countries to help smallholder farmers, described as traditionalists or subsistence farmers, to abandon their traditional practices and accept modern farming methods as a way of increasing productivity. However, after many years, even decades of promotion, the model failed to get these farmers to change. If anything, it was discovered that the gap between large-scale and small-scale farmers was growing wider and wider. It was found that those farmers who were wealthy and educated adopted the new farming methods whereas those who were poor and uneducated did not adopt the innovations. A general conclusion was that

promoting awareness of innovations alone was not enough to cause adoption. Instead, other factors or resources must be present, such as credit, availability of inputs, and markets (Rogers, 1995).

Another finding that rendered the diffusion model unacceptable to many scholars was that it was the source or government that dictated what innovations to diffuse and smallholder farmers were simply told to adopt them without questioning. It was criticized as “top-down” whereby recipients had no way to talk up or express their interests. The only way they showed their rejection of government messages was non-adoption.

Thus, some scholars called the diffusion process a “pro-innovation bias” whereby extension workers simply did the bidding of their bosses, namely, the Ministry of Agriculture and donor agencies, by urging smallholder farmers to adopt innovations, without understanding the circumstances that prevented these farmers even if they wanted to adopt the innovations. In a 1976 article called the “Rise and fall of the dominant paradigm” Rogers himself became aware of the criticism of his model and offered explanations and revisions to the model. For example, he redefined communication from the “transfer of information (Rogers, 1962) to a process ‘of sharing or exchange of information (Rogers, 1995).

Also, his S-M-C-R-E model was criticized as “one-way,” meaning decisions are made by the source, donor agency or government and pushed down to smallholder farmers through one-way communication. Needed was a process whereby farmers at the bottom of the heap could talk back to governments and donors at the top. Since extension workers served as the mouthpieces of the government they could not at the same time represent smallholder farmers. As Leeuwis (2004) noted, when there is a conflict of

interest between donors and the farmers, extension workers cited with the donors or government who paid their salaries, even if they support the vies of the farmers. This led Ascroft & Agunga (1994) to conclude that while Rogers may have seen the weakness of his S-M-C-R-E model he failed to provide an alternative model of how “bottom-up” communication can take place. In other words, he probably knew what not to do but he may not have known what to do next.

This issue of equality in diffusion criticism is most often reflective of research which impacts gaps in socioeconomic backgrounds. Research has been inattentive to the issue of how the socioeconomic benefits of innovation are distributed within a social system. When the issue of equality has been investigated, it has often been found that the diffusion of innovations usually widens the socioeconomic gap between the higher and the lower status segments of a system.

#### Relevance of theory to the study

It is a fact, that increased agricultural production may be realized through integrated knowledge applications such as greater use of biotechnology, and effective irrigation management. This creates the need for the timely adoption and absorption of new technologies and innovations particularly in agriculture. The relevance of this is supported by Balit (2006) who points out that the least expensive input for rural development is knowledge. This awareness is echoed by Muvezwa (2006) who suggests that information is now a factor of production in addition to land, capital, labor, and technology.

#### Communication for Development

Communication is a key to human development that binds people together in development programs (Frazer & Villet, 1994). The 2004 session of the 9<sup>th</sup> UN Roundtable on Communication for Sustainable Development in Rome confirmed that communication is the center of development (The Communication Initiative, 2007). Communication helps “to develop awareness and trust, to coordinate dialogue and information, to inform and empower, and to stimulate citizen action” (p.75). Most of the population in developing countries, such as Tanzania, is engaged in the agricultural sector, communication is central in the coordination of farmers, extension, research centers, NGOs and public sector.

The Rome Round Table redefined communication as the process of information exchange among context-based individuals and institutions (Ninth UN C4D Roundtable, 2004). Under this new definition, local communities have privileges to determine the information they need, as well as the kinds of communication methods and tools used in the process. This explains the rationale for a two-way communication approach.

Two-way communication enhances sharing knowledge and enables people to make informed decisions (FAO ECCRD, 2011). It increases individuals’ chances to identify problems, analyze, plan, and implement development projects in accordance with their local needs and social context (knowledge, values, culture, etc.) (UNESCO, 2007). It creates an atmosphere of “openness, diversity, and flexibility in its methods and techniques” of communication (The Communication Initiative, 2007, p. 222).

Communication for Development (C4D) is a communication framework for development that applies two-way communication principles. The framework emphasizes a people-centered decision making process, dialogue among stakeholders, and capacity



building (Agunga, 2012). The following are some of the definitions of C4D from various sources: World Congress on Communication for Development: “A social process based on dialogue using a broad range of tools and methods. It is also about seeking change at different levels including listening, building trust, sharing knowledge and skills, building policies, debating and learning for sustained and meaningful change. It is not public relations or corporate communication” (World Bank, 2007, p. xxxiii). Radtke (1998) and Patterson and Radtke (2009): They refer to C4D as strategic communication, which is, employing a set of communication techniques and technologies to enable a development project or program to achieve its goals. Thus, C4D is a holistic communication framework based on stakeholders’ participation and partnership, using a combination of methods and tools of communication for sustainable social transformation, through the change of knowledge, attitude, motivation, and practices of the community (Claycomb, 2009). In Agunga’s (2012) paper on “Communication for Development: A Personal Experience with Implications for Development Policy,” he explains that C4D was referred to in various terms as Development Communication (DevCom) and Development Support Communication (DSC). Erskine Childers (1976) defined development support communications as a discipline in development planning and implementation in which more adequate account is taken of human behavioral factors in the design of development projects and their objectives. DSC was launched in the late 1960s by UNDP where by Erskine Childers was the key person in inventing it (Colle, 2002). Colle (2002) explains that Childers was the Director of the UNDP/UNICEF Regional Development Support Communication Service (Asia-Pacific), and he urged the

UN Specialized Agencies and national governments to put more resources into communication.

Kumar (2011) explains the difference between DSC and DevCom terms that are most of the times used interchangeably. DevCom communicates development messages to people for betterment of their economic and social conditions, whereas DSC addresses development planning and the plan of operation for implementation. Thus DSC is used for persuasion, transmission of knowledge and information, for personal expression, and as a vital instrument for social and political change associated with sectorial development. Ngugi (1995) explains further that DSC is a subset of DevCom. However, DSC and DevCom are all forms of what is known today as C4D.

Agunga (2012) proposed a C4D framework (figure 2.3) that works best in developing countries such as Tanzania. The framework consists of creating a C4D unit at the national and/or regional level to support development activities at that particular level. A National C4D Center can be created followed by regional branches, depending on the size of the country. The heart of the C4D center is the C4D strategist or expert.

The author further explains that, the national C4D coordinator will be trained, followed by the regional coordinators. He advises that the experts should have a graduate level education and thus it is essential that the C4D centers be linked to a post-graduate degree program at a university. For easy implementation of the framework, the author proposes that the existing extension centers be turned into C4D centers at various levels.

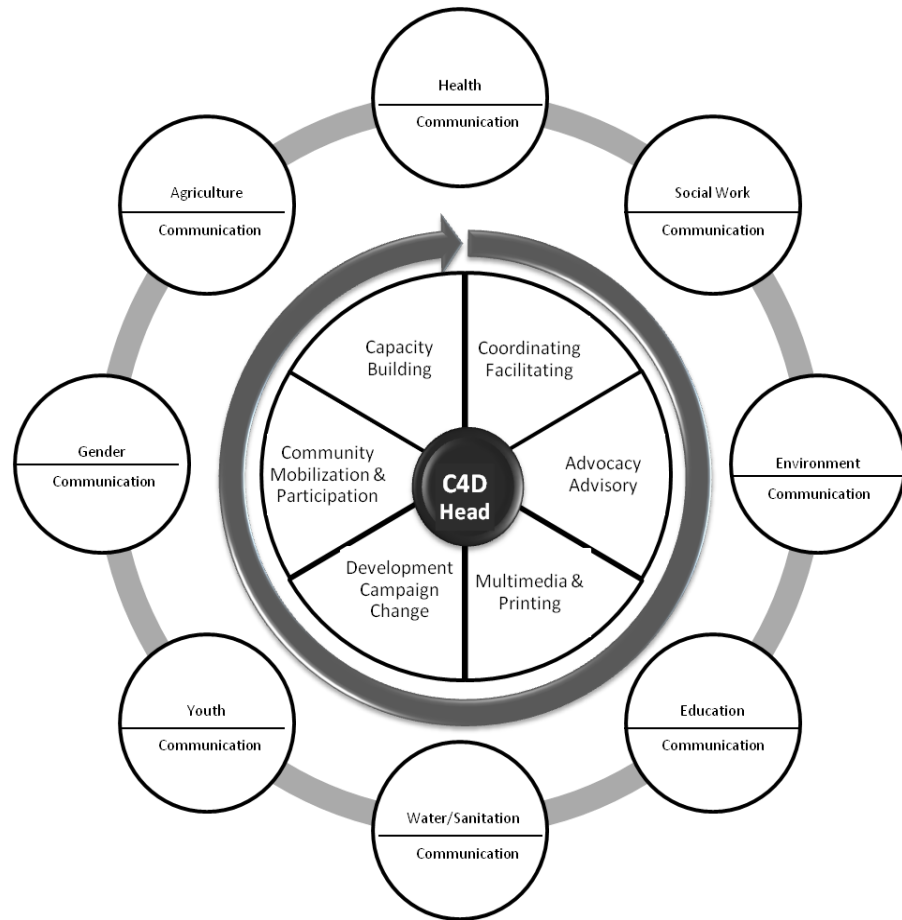


Figure 2.3: The Communication for Development (C4D) Model (Agunga, 2012)

The targets of service in the C4D are varied, such as individuals (children, youth, and adults), households, groups, institutions, or communities. The channels of communication are also varied (traditional, interpersonal, mass media, the Internet) and these can be combined in usage. Through C4D, the extension can coordinate people and compile information from various sources (public agencies, non-profit organizations, community-based organizations, program donors, service providers, media agencies, key farmers, etc.). Shortly, a C4D center can serve as a hub of information, knowledge exchange, and extension activities.

## Conceptual framework for the Study

In this chapter, the researcher has tried to provide an up-to-date review of the literature on communication and development. However, the conceptual framework for the study is drawn from Rogers's S-M-C-R-E model. Applying the "C" in the S-M-C-R-E to Tanzania, the research question is: What are the channels or "sources" through which women farmers get information on modern farming methods? The researcher recognizes that a lot more needs to be done for farmers to be able to adopt innovations. However, perhaps, the necessary first step is finding out where they get their information on modern farming practices.

## CHAPTER 3: RESEARCH METHODS

This chapter describes the methodology for the study, which is survey research using an interview schedule. It explains the research design as well as the data collection and analysis processes.

### Study population and study area

This is a study of women farmers in Morogoro and Kilimanjaro Regions, two of the 28 regions of Tanzania. They were chosen based on convenience. The researcher resides at Sokoine University of Agriculture, which is located in Morogoro Region, so it offered a cost-saving measure. Secondly, Kilimanjaro Region is the hometown of the researcher and where she has widespread knowledge. These are also rich agricultural areas. Morogoro region has six districts and only one district was chosen for the study, Kilosa district. Likewise, Kilimanjaro region has seven districts and one district was selected for the study, Hai district (URT, 2013). Details of the participants selection process is presented below.

### Kilosa district

Kilosa district, as noted earlier, is located in Morogoro Region. It is bordered to the north by the Manyara Region, to the northeast by the Tanga Region, to the east by Mvomero District, to the southeast by Morogoro Rural District, to the south by Kilombero District, to the southwest by the Iringa Region and to the west by the Dodoma Region.

According to the 2012 national census, Kilosa district had a total population of 438,175 of which females accounted for 219,797 and males, 218,278 (URT, 2013). Kilosa district is, in turn, divided into 35 wards (URT, 2013). Of these, 10 wards were randomly selected for the study. The wards are further divided into villages and one village from each ward was randomly selected for the study.

Kilosa district lies in close proximity to Dar es Salaam, a major metropolitan and industrial city, formerly the capital city of Tanzania. Thus, another reason for selecting Kilosa was whether farmers in the district were influenced in the use of ICTs from Dar es Salaam.

#### Hai district

Hai District is one of the seven districts of Kilimanjaro Region of Tanzania. It is bordered to the south and west by Arusha Region; to the west by Siha District; to the north by Kenya; and to the east by Moshi Rural and Rombo Districts. The western breach part of Mount Kilimanjaro is located in Hai District.

According to the 2012 national census, Hai district had a total of 210,533 population of whom 102,457 were male and 108,076, female (URT, 2013). The district has a total of 14 wards and only six wards were randomly selected for the study. The wards were further divided into villages, and one village was randomly selected for the study.

#### Study sample

Due to financial and time limitations, a total of 300 women farmers, 150 from each district, were purposively selected for the study. The selection was done by the

researcher with the help of the village extension agent and ward and village officers. The reason for drawing a purposive sample was to conduct a base study that focused on characteristics of women farmers and their sources of agricultural information, which best answered the questions. Given the small sample size, only 300 women, the study cannot be generalized to the country or even the two regions. However, it does help answer the research question: What are the sources of information for women farmers in Tanzania?

In total, roughly 25 women per village in Hai and 15 per village in Kilosa were interviewed. The study was approved by the Ohio State University Institutional Review Board (IRB) on March 18, 2014 with protocol number 2013B0629 (Appendix B).

#### Instrumentation

An interview schedule was used to collect data (Appendix A). Interviewers working individually administered the questionnaire to respondents. The questionnaire was divided into six sections, corresponding to the objectives. Section one captured the demographic characteristics of the farmers. Section two described the sources of information on modern farming methods. Section three assessed innovative farming methods adopted/practiced by women farmers. Section four assessed the extent to which women farmers were exposed to ICTs. Section five determined whether women had access to extension services. It also addressed the forms of contact women farmers had with the extension agents. Lastly, section six examined other challenges women farmers faced.

#### Validity

Validity determines whether the instrument measures that which it was intended to measure (Joppe, 2000). To determine the validity of the questionnaire, the researcher used a panel of experts, consisting of two members: Drs. Robert Agunga and Camilius Sanga. Dr. Robert Agunga is associate professor in agricultural communication and director of the Center of African Studies at The Ohio State University. He is my academic advisor and an expert in Communication for Development (C4D). Prof. Camillius Sanga is head of Informatics department at the Sokoine University of Agriculture, is an expert on ICTs for development (ICT4D) and also my academic supervisor.

### Reliability

Reliability is the extent to which results of a study are consistent over time and an accurate representation of the total population and the results can be reproduced under a similar methodology (Joppe, 2000). Reliability of the instrument was improved through a number of ways. First, a pilot test was performed on a selected group of 20 respondents in Morogoro urban district in Tanzania. Second, the data collectors were given training on the questionnaire in each district before the data collection process. The training gave the data collectors a uniform understanding of the questions and how they should ask the questions to be understood by the respondents.

Also the research statistic of Cronbach's Alpha was used to assess the internal consistency of Likert scale questions that were used to assess the awareness of ICTs by the respondents. An alpha coefficient of 0.7 was obtained. According to George and Mallery (2003), they provide the following rules of thumb: “ $\alpha > .9$  – Excellent,  $\alpha > .8$  –



Good,  $\alpha > .7$  – Acceptable,  $\alpha > .6$  – Questionable,  $\alpha > .5$  – Poor and  $\alpha < .5$  – Unacceptable” (p. 231).

### Data collection

Data were collected using an interview schedule. Six interviewers, three in each district working independently, and who spoke Swahili and English, were required. The questionnaire was developed in English. The questions were *ad lipped*, that is, asked the questions in the local language and recorded the responses in English.

The researcher and data collection assistants travelled to each ward in vehicle, which travel frequently from Morogoro to Kilosa via the different wards frequently and the same applied to Hai. In other cases motorcycles were used. Respondents were notified, at least a day in advance of the interview, on where to meet. Also, heads of these households, who were largely their husbands, were informed where their wives would be the next day. Respondents were asked to gather in village offices where a one on one interview was conducted with each of them that managed to attend. Because it was a rainy season at that time, it was difficult for the researcher and the data collectors to move from one household to another.

Three interviews were going on concurrently because there were three data collectors working individually. The researcher was assisting the data collectors to explain questions that were not clear to respondents.

Before the interview in each village, the researcher gave a briefing of what the study was about to the respondents, and then the data collectors began the interview. It took 20 minutes to administer each questionnaire; 4 days in Kilosa district to collect the data; and 3 days in Hai district. Kilosa had more wards to visit than Hai district that is

why it took longer. The data collectors interviewed 150 respondents in Kilosa district but only 138 respondents in Hai district. This happened because in some villages in Hai some respondents did not come to the interviewing centers. Therefore, a total of 288 respondents were interviewed yielding a response rate of 96%.

#### Data analysis

The SPSS was used for data analysis. Four data entry assistants were employed; two entered Kilosa data while the other two did Hai data. It took four days to enter the data for each of the districts. Descriptive statistics consisting of mean, frequency and percentage were reported.

## Summary

This chapter presented the research method used. It was a descriptive survey research employing an interview schedule, where the data collector asked questions and recorded the responses. The study was conducted in Kilosa and Hai districts where 300 women farmers were selected; however, only 288 were interviewed giving a response rate of 96%. Although the data cannot be generalized to all of Tanzania it does provide an indication of women farmers' sources of information on agricultural innovations.

## CHAPTER 4: FINDINGS

This chapter presents findings from the study. The purpose of the study is to identify sources of agricultural information for women farmers in Tanzania in Hai and Kilosa districts. The study further investigates innovative farming practices adopted by women farmers in Hai and Kilosa districts. Research objectives that guided the study are as follows:

1. To examine the demographic characteristics of women farmers;
2. To describe sources of information on modern farming methods for women farmers;
3. To assess innovative farming methods adopted by women farmers;
4. To examine women farmers' access to and use of ICTs;
5. To examine women farmers' access to and use of agricultural extension agents;
6. To examine other challenges facing women farmers apart from information access.

The study population comprised women farmers in Kilosa and Hai districts of Tanzania. Purposive sampling was used to select 300 women farmers in the two districts. Data were collected from 288 women farmers. The data were analyzed using SPSS statistical package. The data from this study were reported in percentages. The findings are organized and presented based on the research objectives.

Objective 1 – Demographic characteristics of women farmers in Kilosa and Hai districts in Tanzania

This objective described the demographic characteristics of women farmer respondents, including age, marital status, level of education and level of household

development. The results reveal that a large number of women in both districts were between the ages of 30-41 and 42-53 (table 4.1).

Demographic Characteristic		Kilosa		Hai		Overall	
		n	%	n	%	n	%
Age	18-29	26.0	17.2	23.0	16.8	49.0	17.0
	30-41	60.0	40.4	38.0	27.0	98.0	34.0
	42-53	43.0	28.5	46.0	33.6	89.0	30.9
	54-65	19.0	12.6	20.0	14.6	39.0	13.5
	66-77	2.0	1.3	10.0	7.3	12.0	4.2
	78-89	0.0	0.0	1.0	0.7	1.0	0.3
Marital status	Single	25.0	16.6	12.0	8.8	37.0	12.8
	Cohabitated	12.0	8.6	3.0	1.5	15.0	5.2
	Married	88.0	58.3	110.0	80.3	198.0	68.8
	Divorced	12.0	7.9	5.0	3.6	17.0	5.9
	Widowed	13.0	8.6	8.0	5.8	21.0	7.3
Number of people in the household	1-3	29.0	19.2	31.0	22.6	60.0	20.8
	4-6	95.0	62.9	78.0	56.9	173.0	60.1
	7-9	22.0	15.2	24.0	16.8	46.0	16
	10-12	4.0	2.6	5.0	3.6	9.0	3.1

Continued

Table 4.1. Demographic Characteristics of Women Farmers in Kilosa and Hai Districts

Table 4.1: Continued

Level of school attended	Never been to school	13.0	8.7	10.0	7.2	23.0	8.0
	Started but did not complete primary school	16.0	10.7	21.0	15.2	37.0	12.8
	Completed primary school	112	74.7	77.0	55.8	189.0	65.6
	Started but did not complete secondary school	1.0	0.7	5.0	3.6	6.0	2.1
	Completed secondary school	8.0	5.3	14.0	10.1	22.0	7.6
	Completed vocational school	0.0	0.0	11.0	8.0	11.0	3.8
Languages spoken	Kiswahili	147.0	98.0	138.0	100.0	285.0	99.0
	English	4.0	2.7	17.0	12.3	21.0	7.3
Possessions	Hand hoe	147.0	98.0	131.0	94.9	278.0	96.5
	Ox-plough	0.0	0.0	8.0	5.8	8.0	2.8
	Back pack sprayer	19.0	12.7	35.0	25.4	54.0	18.8
	Tractor	37.0	24.7	37.0	26.8	74.0	25.7
	Bicycle	101.0	67.3	57.0	41.3	158.0	54.9
	Vehicle	2.0	1.3	4.0	2.9	6.0	2.1
	Motorcycle	11.0	7.3	16.0	11.6	27.0	9.4

Continued

Table 4.1: Continued

	Clock	19.0	12.7	20.0	14.5	39.0	13.5
	Electricity	39.0	26.0	59.0	42.8	98.0	34.0
	Bank account	8.0	5.3	37.0	26.8	45.0	15.6
Cooking	Gas	2.0	1.3	15.0	10.9	17.0	5.9
energy							
	Kerosene	7.0	4.7	48.0	34.8	55.0	19.1
	Charcoal	126.0	84.0	35.0	25.4	161.0	55.9
	Wood	110.0	73.3	124.0	89.9	234.0	81.3
Water and	In house pipe water	19.0	12.7	51.0	37.0	70.0	24.3
sanitation							
	Community piped water	93.0	62.0	75.0	54.3	168.0	58.3
	Water from the well	48.0	32.0	8.0	5.8	56.0	19.4
	Flushing toilet	20.0	13.3	40.0	29.0	60.0	20.8
	Family latrine	80.0	53.3	92.0	66.7	172.0	59.7
	Grass roofed house	11.0	7.3	3.0	2.2	14.0	4.9
	Aluminum roofed house	99.0	66.0	129.0	93.5	228.0	79.2
Business or	Business farming	103.0	68.7	67.0	48.6	170.0	59.0
subsistence							
farming	Subsistence	142.0	94.7	129.0	93.5	271.0	94.1

Continued

Table 4.1: Continued

Mode of transporting farm produce	Carry on the head	19.0	12.7	23.0	16.7	42.0	14.6
	Bicycle	86.0	57.3	3.0	2.2	89.0	30.9
	Vehicle	12.0	8.0	85.0	61.6	97.0	33.7
	Motorcycle	47.0	31.3	7.0	5.1	54.0	18.8
	Sell on the farm	12.0	8.0	2.0	1.4	14.0	4.9
	Sell at home	23.0	15.3	43.0	31.2	66.0	22.9
Farm size(in acres)	Not own farms	16.0	10.7	28.0	20.3	44.0	15.3
	0-3	98.0	65.3	100.0	72.5	198.0	68.8
	4-7	23.0	15.3	8.0	5.8	31.0	10.8
	8-11	7.0	4.7	2.0	1.4	9.0	3.1
	12-15	6.0	4.0	0.0	0.0	6.0	2.1
Level of income from the farm	100000-600000	110.0	73.3	90.0	63.2	200.0	68.3
	700000-1200000	9.0	6.0	2.0	1.4	11.0	3.7
	Above 4900000	12.0	8.0	3.0	2.2	15.0	5.1

Continued



Table 4.1: Continued

Extra income earning activity	Nothing	44.0	29.3	20.0	14.5	64.0	22.2
	Charcoal burning	1.0	0.7	0.0	0.0	1.0	0.3
	Day worker	0.0	0.0	15.0	10.9	15.0	5.2
	Local beer brewing	60.0	40.0	65.0	47.1	125.0	43.4
	‘Mama lishe’	10.0	6.7	0.0	0.0	10.0	3.5
	Shoes and clothes business	11.0	7.3	2.0	1.4	13.0	4.5
	Making mats	3.0	2.0	0.0	0.0	3.0	1.0
	Animal product business	20.0	13.3	34.0	24.6	54.0	18.8
	Carpentry	1.0	0.7	2.0	1.4	3.0	1.0

Among the 150 respondents in Kilosa district, slightly more than half, 58.3% were married. Comparatively, of the 138 respondents in Hai district, more than three fourths (80.3%) were married. Overall, the majority of women farmers in this study were married.

The results showed a majority of the respondents lived with 4-6 people in their household. Kilosa had 62.9% respondents with 4-6 people in their households while Hai had 56.9% respondents with 4-6 people in their households. The overall results showed

that, of 288 respondents, 92% had attended some level of school, while 8% had not attended school. The majority of respondents in both districts had completed primary school, which was the highest level of education attainment for the majority of respondents from both districts.

The National language in Tanzania was Kiswahili. English was used as a medium of instruction in secondary and university levels as well as in some private primary schools. Apart from these two languages, there were also mother tongues that were spoken by people within the same community, such as Chaga, Sukuma, and Hehe. Most of the respondents in Kilosa district spoke Kiswahili in addition to their mother tongue. Only 2% of the respondents in Kilosa district were not familiar with the language. Conversely, all respondents in Hai district were familiar with Kiswahili and spoke that language in addition to other languages.

Table 4.1 summarizes the proportion of respondents in both districts that owned hand hoes, tractors, clocks, vehicles, and motorcycles. The proportion of these items for each district was almost the same. However, none of the respondents in Kilosa owned an ox-plough. Nearly twice as many respondents in Hai district owned backpack sprayers (25.4%) compared to respondents in Kilosa (12.7%). Also, almost twice as many respondents in Hai had electricity in their homes (42.8%) compared to Kilosa district where only 26% had electricity in their home. Over one quarter of the respondents in Hai owned a bank account (26.8%) in contrast with Kilosa where only 5.3% had a bank account. Also, two thirds of the respondents in Kilosa had bicycles (67.3%) while only 41.3% of the respondents in Hai had bicycles.

Table 4.1 further shows results based upon the form of cooking energy that women farmers used in their home. Most respondents in both districts used wood for cooking. One difference was in the use of charcoal where most respondents in Kilosa (84%) used it compared to only about 25.4% in Hai. The use of kerosene and gas was higher in Hai district compared to Kilosa. Hai respondents reported 10.9% of them using gas energy and 34.8%, kerosene as energy source while in Kilosa 1.3% of respondents reported using gas and 4.7% using kerosene as energy sources.

Hai district had more respondents with in-house piped water (37%), flushed toilet (29%), family latrine (66.7%) and aluminum roofed house (93.5%) compared to Kilosa district where the percentages were 12.7%, 13.3%, 53.3% and 66%, respectively. On the other hand, a large number of the respondents in Kilosa district had access to community piped water (62%), well water (32%), and grass roofed homes (7.3%) whereas Hai district respondents had 54.3%, 5.8%, and 2.2%, respectively.

Most of the respondents in Hai and Kilosa districts owned the land they cultivated. Approximately two-thirds of respondents reported having an average farm size of 0-3 acres. For Kilosa, the percentage was 65.3 and Hai, 72.5%. What was produced was mostly used for subsistence but any excess was sold for income. In Kilosa district, about 94.7% of respondents use their produce for mainly subsistence while 68.7% also sell some of their produce. A similar situation prevailed in Hai district where 94.1% of farmers reported using their harvest for subsistence and 48.6% of them sold a portion of their produce.

After harvest, women farmers transported their farm produce either directly to the market or at home for storage depending on the type of produce. Table 4.1 above shows results based on the different modes of transport that women farmers in Kilosa and Hai districts used. Most women in Kilosa district used bicycles (57.3%) to transport their farm produce while in Hai district majority of the respondents used vehicles (61.6%) to transport their agricultural produce.

Table 4.1 also shows annual income levels of respondents. More than 60% of respondents in both districts reported annual incomes of 100,000 to 600, 000 in Tanzanian shillings (Tshs.). Kilosa district had relatively more farmers (73.3%) with incomes in this range while only 65.2% of Hai district had this level of income. Kilosa district had more respondents (6%) with income levels of 700,000 to 1,200,000 Tshs. and 8% above 4,900,000 as compared to Hai district that had 1.4% and 2.2% respectively. Many respondents in both districts, (43.4%) brewed and sold local beer as an additional source of income.

#### Objective 2 - Sources of information on modern farming methods for women farmers in Hai and Kilosa Districts

This objective focused on determining agricultural information sources used by Tanzanian women farmers. Information sources were listed such as television, radio, cell phones, newspapers etc. and the aim was to assess which sources women used or accessed to obtain agricultural information. The results for this objective are presented in Table 4.2 below:

Source of agricultural information	Kilosa		Hai		Overall	
	n	%	N	%	n	%
Television	39.0	26.0	43.0	31.2	82.0	28.5
Radio	87.0	58.0	96.0	69.6	183.0	63.5
Newspaper	3.0	2.0	16.0	11.6	19.0	6.6
Neighbors	58.0	38.7	61.0	44.2	119.0	41.3
Farm input distributors	2.0	1.3	22.0	15.9	24.0	8.3
Extension agents	70.0	46.7	96.0	69.9	166.0	57.6
Local government officials	2.0	1.3	35.0	25.4	37.0	12.8
Fellow farmers	39.0	26.0	54.0	39.1	93.0	32.3
Farmers training institutes	4.0	2.7	19.0	13.8	23.0	8.0

Table 4.2. Sources of Agricultural Information Used by Women Farmers

Radio was the primary source of information identified by 58% of respondents in Kilosa and 69.9% of respondents in Hai district. Also, in the Hai district, 69.9% of the respondents identified extension agents as sources of agricultural information, and neighbors (55.8%). In Kilosa extension workers were identified by 46.7% of respondents and neighbors were identified by 38.7% of the respondents. In general, radio, television, extension workers and neighbors were named as sources of information; whereas newspapers, farm input distributors and local government officials were identified as limited sources of information for women farmers.

Objective 3 - Innovative farming methods adopted by women farmers

This objective aimed at measuring the extent to which women farmers had adopted improved farming methods such as improved seeds, tractors and fertilizer. The results reported in Table 4.3 revealed that majority of respondents in Kilosa and Hai districts used improved seed varieties. It also showed that respondents used both improved and local seed varieties.

Innovative farming method		Kilosa		Hai		Overall	
		n	%	n	%	n	%
Seed variety	Improved	103.0	68.7	118.0	85.4	221.0	76.7
	Local	57.0	38.0	14	10.2	71.0	24.7
Cultivation method	Hand hoe	140.0	93.3	84.0	60.6	224.0	77.8
	Ox-plough	4.0	2.7	14.0	10.2	18.0	6.3
	Tractor	102.0	68.0	97.0	70.1	199.0	69.1
Storage of farm produce	Bag	147.0	98.0	39.0	28.5	186.0	64.6
	Container	5.0	3.3	110.0	79.6	115.0	39.9
Fertilizer use		28.0	18.7	98.0	70.8	126.0	44.8

Table 4.3. Innovative Farming Methods Adopted by Women Farmers

Cultivation methods investigated in the study were: hand-hoe, ox-plough, and tractor. In both districts the results of cultivation methods were as follows:

i. Hand hoe cultivation

In both districts, an average of 77.7% of the 288 respondents used a hand hoe for cultivation, especially during weeding. Respondents with small areas of land of less than an acre used hand hoes for land preparation as well.

ii. Ox-plough cultivation

Ox-plough was used mostly for land preparation on small farms ranging from one acre and below. Some respondents owned an ox-plough while others that did not own an ox-plough, often rented one. The results show that an ox-plough was not used as much for cultivation as the hand hoe and tractor. In the Kilosa district only 2.7% of the respondents reported using an ox-plough for cultivation while Hai district had 10.2%.

iii. Tractor cultivation

The results show more than half of the respondents (69.1%) in each district use tractors for cultivation.

Storage of farm produce depends on the type of the produce. Farm produce like vegetables are usually picked and sent to the market after harvest, but other products like maize and beans are usually dried and stored either in bags or containers. The vast majority the respondents in the Kilosa district (98%) stored their produce in bags while the majority in Hai (79.6%) used containers.

Respondents were also asked if they applied fertilizer on their farms. In Kilosa district, almost three quarters (81.3%) of the respondents did not use fertilizer due to reasons that will be discussed in the next chapter. Unlike in Kilosa, most respondents (70.8%) in Hai district used fertilizer.

## Objective 4 - Women farmers' access to and use of Information and Communication

### Technologies

This objective investigated the ICT tools women own or have access to for potential use in obtaining agricultural information. Several ICTs were examined including mobile phones, printing facility, access to the internet, television, radio and the use of social media. The results are summarized in Table 4.4.

ICT tool		Kilosa		Hai		Overall	
		n	%	N	%	n	%
Mobile phones	Ownership	130.0	86.7	119.0	86.1	249	86.4
Mobile Agricultural Information services	Tigo Kilimo	62.0	41.3	16.0	11.6	78.0	27.1
	Voda Kilimo	5.0	3.3	5.0	3.6	10.0	3.5
	Z-kilimo	4.0	2.7	2.0	1.4	6.0	2.1
Laptop ownership		2.0	1.3	2.0	1.5	4.0	1.4
Access to internet at home		1.0	0.7	3.0	2.2	4.0	1.4
Access to a printer		1.0	0.7	0.0	0.0	1.0	0.3

Continued

Table 4.4. ICT Tools Owned and Accessed by Women Farmers



Table 4.4: Continued

Programs watched on television	News bulletin	51.0	34.0	47.0	34.1	98	34.0
	Religious programs	3.0	2.1	1.0	0.7	4.0	1.4
	Agricultural programs	22.0	14.7	37	26.8	59.0	20.5
Programs listened on the radio	Entertainment	43.0	28.7	58.0	42.0	101.0	35.1
	Sports	56.0	37.3	28.0	20.3	84.0	29.2
	Agricultural	53.0	35.3	42.0	30.4	95.0	33.0
Best time to listen to the radio	Morning	46.0	30.9	68.0	49.3	114.0	39.7
	Afternoon	17.0	11.3	37.0	26.8	54.0	18.8
	Evening	69.0	46.0	63.0	45.7	132	45.8
	At night	81.0	54.0	87.0	63.0	168.0	58.3

There were respondents who owned mobile phones while others did not have mobile phones but could use their neighbors' or relatives' phones. More than 80% of the respondents in both districts owned and had access to a mobile phone.

Various mobile operators in Tanzania started an agricultural information system that enabled farmers to access agricultural information through their mobile phones. Such information systems include Tigo Kilimo, Voda Kilimo and Z-kilimo that are offered by

Tigo, Vodacom and Zantel mobile operators, respectively. Respondents were asked if they were familiar with and had used any of these systems. The results show that respondents in Kilosa district were somewhat more familiar Tigo Kilimo (41.3%) as compared to the other systems, 3.3% and 2.7% for Voda Kilimo and Z-kilimo, respectively.

Few respondents owned laptops in either district. Kilosa district had 1.3% respondents with laptops while Hai district had 1.5%. The same situation was observed for printer and internet access where by an overall percentage of 1.4 and 0.3 was reported, respectively.

Another ICT tool that was examined in this study was access to a television. Relatively few respondents in either district had access to a television. Respondents were also asked to identify their favorite show on TV. Most respondents watched news bulletins and a small number of respondents watched religious programs. Agricultural programs were not identified as favorite, but some respondents reported watching such programs whenever they came across them accidentally.

The last ICT tool surveyed was radio. Most of the respondents reported listening to a radio at night when they returned home from their farms. Some respondents preferred listening to the radio early in the morning when performing household chores before leaving for the farm or other activities. Relatively few respondents listened to agricultural programs on the radio.

#### Objective 5 - Women farmers' access to and use of agricultural extension agents

This objective examined women farmers' awareness of extension agents in providing information for farmers. Also the objective sought to determine the frequency of contact

women farmers had with extension agents annually. Respondents were asked if they were aware of extension services offered by the Ministry of Agriculture. The results (Table 4.5) revealed that a most respondents in both districts were aware of the extension service.

		Kilosa		Hai		Overall	
		n	%	n	%	n	%
Are you aware of extension service provided		123.0	82.0	120.0	87.0	243.0	84.4
Do you know you extension agents		135.0	90.0	120.0	87.0	255.0	88.5
Is your local extension work male or female?	Male	53.0	35.3	76.0	55.4	129.0	44.8
	Female	83.0	55.3	61.0	44.2	144.0	50.0
	Don't know	14.0	9.3	1.0	0.7	15.0	5.2
Do you have a preference for a male or female extension worker?	Male	23.0	15.3	21.0	15.2	44.0	15.3
	Female	66.0	44.1	30.1	21.7	96	33.3
	Doesn't matter	53.0	35.3	87.0	63.0	140.0	48.6
	Both	8.0	5.3	0.0	0.0	8.0	2.8

Continued

Table 4.5. Contact of Extension Agents with Women Farmers

Table 4.5: Continued

Does your culture forbid women from talking to male strangers?	Yes	1.0	0.7	15.0	10.9	16.0	5.6
	No	149.0	99.3	123.0	89.1	272.0	94.4
Does your husband forbid you from talking to a male extension worker?	Yes	3.0	2.0	5.0	3.6	8.0	2.8
	No	141.0	94.0	133.0	96.4	274.0	95.1
	Don't know	3.0	2.0	0.0	0.0	3	1.0

Women farmer respondents were asked if they knew their extension agents. In both districts, 88.5% of respondents said they knew their extension agent. The respondents were further asked to report the sex/gender of their extension agent. In Kilosa district more than 50% of respondents reported that their extension agent was female while in Hai district respondents reported 55.1% male extension agents.

Respondents were also asked whether they preferred to work with a female or male extension agent. In Kilosa district, many respondents preferred female extension agents; however, respondents in Hai district had no preference. A general belief was that women in some parts of Tanzania can neither talk to male strangers nor can they talk to male extension agents. However, the majority of respondents in both districts disagreed that married women are forbidden from talking to male strangers. As shown in Table 4.5 above, more than 80% of women in both districts reported that their culture did not forbid

them from talking to male strangers. Also respondents were asked whether their husbands forbid them from talking to male extension agents for agricultural information. Again, more than 90% of the respondents, in both districts disagreed that their husbands forbid them from talking with male extension workers.

#### Objective 6 - General challenges facing women farmers

This objective aimed at investigating various challenges women potentially face in life generally apart from access to agricultural information. Land access, attendance at field trainings and having an opportunity to become a member of various agricultural or women groups were investigated.

	Kilosa		Hai		Overall	
	n	%	n	%	n	%
Are women allowed to own land?	18.0	12.0	50.0	36.2	68.0	24.1
Do you belong to an agricultural association?	108.0	72.0	121.0	88.0	229.0	80.0
Do you attend agricultural field training?	51.0	34.0	61.0	44.2	112.0	38.9

Table 4.6. Elements of the Challenges Facing Women Farmers

Respondents were asked whether women owned land. More than 70% of them in both districts said women do not own land, 23.3% said they can own land, while 0.3% were not sure. The results show that, in Kilosa, 88% said women did not own land, compared to 63.8% in Hai district who said women could own land.

Most respondents in both districts belonged to one or more women's group in their areas. Hai district reported a larger number of women that belonged to one or more women's groups than women in Kilosa district. Women were organized to perform agricultural activities such as growing vegetables and keeping animals such as cows for milk and chickens for their eggs.

Agricultural field trainings are normally offered by extension agents, government officials or agricultural NGO's to village farmers. The respondents were asked whether they had attended field training within the past year and the results revealed less than half of the respondents had attended.

#### Key findings

Based on the results of the study, the following are the key findings:

- Most women farmers in the study were between 30 and 65 years of age.
- Most women farmers are married.
- Most women farmers had completed primary school.
- Respondents in Hai district were more likely to have amenities such as electricity, in-house piped water, and gas for cooking.
- Respondents in Kilosa district earn more annual income than respondents in Hai district.
- Bicycles were used by respondents in Kilosa district for transportation of farm produce whereas respondents in Hai district used vehicles.
- Radio is the major source of information used by Tanzanian women farmers.
- Fertilizer use on farms is greater in Hai district.
- Most women farmers own or have access to a mobile phone

- Most women farmers do not generally have access to laptops, printers or the internet
- Few women farmers watch agricultural shows on television.
- Women farmers are not forbidden from talking to male extension agents for agricultural information.
- Majority of women farmers do not own land.

### Summary

This chapter presented findings based on data that were collected and analyzed in this study. Six research objectives provided a framework for the study. Findings related to demographic characteristics of women farmers, sources of agricultural information used by women farmers, innovative farming methods adopted by women farmers, women farmers' access to and use of ICTs, women farmers access to extension agents and general challenges facing women farmers were examined and reported in this chapter. Descriptive statistics were used to present the results of the two districts in the study.

## CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

### Introduction

This chapter discusses the results of this research, draws conclusions based on the research objectives and makes recommendations for addressing the needs of women farmers in Tanzania. It also draws conclusions about agricultural communication research in Tanzania and the need to promote agricultural communication professionalism in the country.

### Overview

Despite Tanzanian women's major responsibility in caring for the household, they are also active players in the agricultural arena. They produce food crops, livestock and they fish (Matthew-Njoku, Adesope and Iruba 2009). The level of contribution women farmers can make to Tanzania's agriculture depends largely upon their gaining access to accurate and sufficient information. An improved information flow among farmers, extension agents and researchers is key to improving small-scale agricultural production by Tanzanian women.

This study was conducted to assess the sources of agricultural information for women farmers in Tanzania, particularly those in Hai and Kilosa districts. The study further examined women farmers' information needs spanning from land preparation to storage. It also investigated innovative farming practices adopted by women farmers.

A research questionnaire was developed and used in the data collection process. Data were collected via face-to-face interviews with each respondent. Two hundred and



eighty-eight out of 300 women sampled responded to the study yielding a response rate of 96%. Study findings presented in Chapter 4 addressed the six research objectives outlined in Chapters One, Three and Four. What follows is a discussion of the main objectives.

## Discussion

This section discusses the findings to the main research objectives, followed by main conclusions and recommendations to each objective. The main objectives are restated as follows: a) To examine the demographic characteristics of women farmers; b) To describe sources of information on modern farming methods for women farmers; c) To assess innovative farming methods adopted by women farmers; d) To examine women farmers' access to and use of ICTs; e) To examine women farmers' access to and use of agricultural extension agents; and f) To examine other challenges facing women farmers apart from information access.

### Demographic characteristics of women farmers

Analysis of the demographic data showed that, a large number of women in Kilosa and Hai districts were between the ages of 30 to 65 years and many of them were married. In Kilosa district the average family size was 4-6 people, representing 62.9% of respondents. The next family size was 7 to 9 people, which accounted for 15.2% of respondents. Ten to twelve person households accounted for 2.6% of respondents while 1 – 3 person households was 19.2% of respondents. In Hai district, 56.9% of respondents had 1-3 people households; followed by 22.6% with 4-6 persons; 16.8% with 7 to 9 people and 3.6% with 10 to 12 people per household.

Respondents reported different levels of educational attainment. The majority had completed primary school (65.6%). However, many of them could not advance beyond primary school education. This is because whereas primary school education is free in Tanzania, attending secondary school or higher has to be paid for. The tuition for secondary school education in Tanzania is about 20,000 Tanzanian Shillings (Tsh) per year (or roughly US\$12.00) may seem easily affordable by U.S. standards, not so in Tanzania (Wedgwood, 2005). Tuition and other fees pose a burden to many families, especially large families, single parent families, and orphans. Education enables women farmers to understand what is written and to use such information for their benefit. Therefore low levels of education will likely serve as a barrier to agricultural information flow and utilization.

Very few respondents used gas and kerosene for cooking. This is likely because gas and kerosene are relatively expensive compared to wood or charcoal for cooking. Wood and charcoal are more readily available in the rural areas, although continuous harvesting of wood for cooking can lead to global warming and climate change (Biomass Technology Group, 2010). From the results presented in chapter 4, many respondents in Hai used gas energy for cooking in their homes. The results also showed a large percentage of respondents in Hai district (42.8) had electricity in their homes compared to respondents in Kilosa where only 26% had electricity. The same was observed with bank accounts, Hai had 26.8% of the respondents with bank accounts while in Kilosa only 5.3% had bank accounts.

Kilosa district had 73.3% of respondents with annual incomes of 100,000 to 600,000 TSH), 6% with incomes of 700,000 to 1,200,000, and 8% with incomes of above

4,900,000 TSH. Hai district on the other hand had 65.2% of respondents with income levels of 100,000 to 600,000 TSH; 1.4% with incomes of 700,000-1,200,000 and 2.2% with incomes above 4,900,000 TSH. The figures indicate that Kilosa district had more wealthy respondents than Hai district. This could be contributed to the fact that Kilosa district is close to Dar es Salaam that most of the agricultural harvest is sent to a large market in Dar es Salaam.

#### Sources of information on modern farming methods for women farmers

The study found radio to be the main source of agricultural information used by women farmers. About 63.8 % of respondents mentioned radio. Extension agents as a source were rated second at 58.2% and neighbors third at 47.3%. Lwoga, Stilwell & Ngulube (2011) found that many farmers (96.3%) use radio to access information on farming. Radio seems to be a useful channel for rural dwellers because of its oral nature (messages can be received and understood in the national language, Swahili), its low cost nature; and and it does not require electricity (Lwoga, Stilwell & Ngulube 2011).

A small number of respondents in Kilosa used television for acquiring agricultural information. This may be due to a lack of electricity in their homes as well as not being able to afford it. The impact of television on providing access to information could be enhanced if access to electrical power was improved in the rural areas (Lwoga, Stilwell & Ngulube 2011). The results show that respondents in Hai read newspapers more than in Kilosa. This may be due to the fact that in Kilosa the respondents cannot afford to buy newspapers. The cheapest newspaper in Tanzania costs about 500Tshs. Overall, 6.6% respondents use newspapers for acquiring agricultural information while 93.4% do not.

Some farmers obtain agricultural information about new seed varieties and fertilizer use from farm distributors. Farm distributors are dealers that provide farming inputs and equipment such seed, fertilizer, power tillers, tractors, etc. Most women said their husbands get the farm inputs so they rarely had a chance to meet the distributors. Farmers also get agricultural information from their local government offices via the village officer or ward officers. Farmer training institutes that are conducted in villages may also provide a source of agricultural information for women farmers living nearby. These training institutes can be government owned or private. In Kilosa district there was a government agricultural institute called MATI Ilonga where farmers can get field trainings (Daniel, 2013).

The study found that male and female extension agents serve women farmers in the study areas. About 49.8% of respondents reported interacting with female extension agents compared to 45.2% respondents who indicated receiving information from male extension agents. The data were similar in both districts. Much literature shows that male extension agents are in large number as compared to female extension agents (Due, Magayane and Temu 1997; Mwaseba 2005). Since the sample for this study was not representative of the entire country it cannot be said that the findings is representative of the entire country, it can not be said that the situation is like that in other districts in Tanzania. The number of times that a woman farmer was visited by an extension worker in the study for the past year was investigated. It was found that in Kilosa district many farmers were not visited by their extension agents. The reason for this was the extension agents were not available when needed. Also some women farmers didn't know how to get in contact with the extension agent. The extension agents in Hai district visited their

women farmers up to three to five times over the past year. On visiting farmers, the extension agent either gave advice on choosing new seed varieties or brought some printed materials to the farmers. Mostly, the extension agents gave advice to the farmers depending on the states of their farms.

Overall, 15.3% respondents preferred male extension agents while 33.3% preferred female extension agents while 51.4% had no preference. These results are similar to results found in a study conducted by Due, Magayane and Temu (1997). Those authors found that 40% of women farmers preferred to work with female extension agents (compared to 26% who preferred male extension agents; the remaining 34% had no preference). Many respondents prefer to work with female extension agents because they felt they were able to more freely talk to them as compared to talking with a male extension worker. Those who preferred to work with male extension agents said that male extension workers are hardworking and usually willing to help. Also they believe that the difference in gender between them creates a harmonic situation between them and thus good communication.

Innovative farming methods adopted by women farmers;

The adoption of fertilizer use was found to be high in Hai district (70.8%) as compared to Kilosa (18.7%). Respondents in Kilosa district gave the following reasons for not using fertilizer on their farms: fertilizer was too expensive to afford, fertilizer made their land unproductive in the long run, some respondents used animal manure, some respondents didn't know where to get fertilizer and some respondents believed that their soils are fertile so it does not need fertilizer. There was high adoption on the use of fertilizer in Hai district because of the high extension intensity in the area. Kaliba,

Verkuijl and Mwangi (2000) found that high extension presence in an area contributed to adoption of fertilizer use by farmers. The results showed more than 80% of respondents in the two districts owned mobile phones; however, it was for personal use only, not for accessing farm information.

Women farmers' access to and use of ICTs;

Various mobile service providers, such as Tigo Kilimo, Voda Kilimo and Z-Kilimo operate in Tanzania. Therefore, this study sought to determine whether they served women farmers, that is, allowed them to access farm information via their mobile phones. The study found that very few respondents knew the existence of the systems. Many respondents had awareness of Tigo Kilimo as compared to Voda Kilimo and Z-Kilimo. This may be because Tigo mobile operators normally send text messages to its subscribers that promote the system. Many respondents felt the text messages were not useful. In Kilosa district, 7.4% respondents had sought market, weather and planting information from Tigo Kilimo but none did from Voda and Z-kilimo. Likewise, 7.9% respondents in Hai district requested market, weather and planting information from Tigo Kilimo but not from Voda Kilimo and Z-kilimo.

Challenges facing women farmers apart from information access;

One of the challenges women farmers face in Tanzania is land ownership. Success in agriculture rests with land ownership, whether it is men or women. Mutangadura (2004) suggested that land was considered the most fundamental resource to women's living conditions, economic empowerment and, to some extent, their struggle for equality. The results of this study showed a very small number of women owned land in both districts. Those who owned land were mostly married so they most likely got the

land from their husbands. Some women farmers owned land through inheritance from their parents and husbands. The study found out that majority of women farmers rented the land they cultivated. When the respondents were asked why women don't own land in their areas, they gave reasons such as: the societies they live in are male dominated that the culture does not allow women to inherit land while others do not have money to buy land.

The study also found out that women farmers' attendance to agricultural field trainings was very low. A number of reasons were given: there had never been training in their area, some respondents did not have time to attend field training, and location of field training was too far from respondents' villages. Those who did not have time to attend training may have been overloaded with household chores that kept them busy throughout the day.

In general the main challenge women farmers face is land ownership. Many women in the study rented the land that they cultivated. Mutangadura (2004) acknowledged that land is the most fundamental resource to women's living conditions and economic empowerment. Therefore, giving women the opportunity to purchase and inherit land will increase their productivity.

## Recommendations

This study set out to examine the sources of information for women farmers in Tanzania. A survey of 288 women farmers in Kilosa and Hai district in Morogoro and Kilimanjaro Regions, respectively, showed that radio and extension workers constitute the main sources of their access to agricultural innovations. The study also showed that although the majority of women farm on subsistence basis they are able to sell, what is more than they can consume. Therefore, they are capable of producing for the market. The study also showed that Tanzanian women farmers are adopting farming innovations, such as fertilizer, improved seed and even tractor cultivation. Many Tanzanian women farmers are also at their prime, namely, between 30 and 53 years old, therefore, they are capable of contributing to increased agricultural production. Another significant finding is that the majority of women farmers have cell phones. While their limited literacy may prevent them from accessing written information they can easily call in for information using their cell phones. Given these findings and conclusions, the researcher offers the following recommendations.

1. Establishing regional farm radio networks across the country

Tanzania has a common language and women farmers listen to the radio. Therefore, it is possible to reach farmers, women as well as men, through radio. Language is not a problem in radio communication nor is distance and lack of transportation. Establishing regional radio stations will ensure that information out of the radio stations is relevant and pertinent to the geographic area. With rural radio stations across the country there may be no need to recruit 15,000 extension workers, given the huge logistical support needed for these workers, such as motorcycles, fuel, and housing



deed in rural areas. There is however, a need to have a minimal number of extension agents to conduct farm visits and demonstrations for farmers.

## 2. Need to recruit female extension workers

The research does not support the general contention that women farmers prefer female extension workers or that many husbands do not like male extension workers talking to their wives. In general, female extension workers are fewer than male extension workers and there is a need to make the numbers more equitable; however, the reason for recruiting female extension workers is not so that they can serve as agents for female farmers.

## 3. Vocational Educational Programs for Women

The study found that the vast majority of Tanzanian women farmers, especially in the Kilosa and Hai Districts, have basic primary education and therefore, are more likely to be interested in furthering their education through vocational training programs. Therefore, the researcher recommends that the government provides these opportunities. For example, programs for child care and value-added agricultural processing, such as canning tomatoes, may be of interest to these women.

## 4. Farm credit for innovation adoption

It was clear in the study that women farmers are aware of the value of using agricultural innovations such as improved seed and fertilizer. However, their low incomes prefer them from adopting these innovations or doing so in recommended quantities. Therefore, providing credit services for these women is strongly

recommended. Given that women farmers do not own land they may not have the collateral needed for bank loans. However, they can form cooperatives and use membership as a means of getting small farm loans. The idea is for members to serve as collateral for their peers by agreeing to pay their loans if they fault.

#### 5. Incorporating agricultural communication in Tanzanian extension

Agricultural communication as a field of study and a profession in the United States is well known and agricultural communication graduates are employed in agricultural organizations, such as seed companies and dairy production associations to help educate the public about the importance of agriculture as well as help market agricultural products to consumers. The iAGRI Project and the Ohio State University, especially the Department of Agricultural Communication, education and Leadership (DACELE) can assist the SUA in this effort.

## 6. Replicating the study

Lastly, it is recommended that this study be replicated in other regions of Tanzania to determine if the findings hold true, which could encourage the government to make policy in support of women farmers.

### Summary

This chapter presented a discussion based on the objectives of the study. Conclusions were drawn and recommendations made. Overall, the research was interested in finding out if women farmers have access to farming innovations. If so, what were these sources? By knowing the sources, it was possible to channel innovative information to women farmers through these sources, thus enhancing the practice of agricultural communication in Tanzania. Contrary to popular belief, the study found extension workers to be a major source of information for women farmers. They were highly respected and appreciated by women farmers. Therefore, it is strongly recommended that extension should strive to reach more women farmers. Radio also proved to be a popular medium for reaching women farmers and should be used more often. Lastly, as a student of agricultural communication, the researcher found her knowledge and skills more useful for Tanzania and feel that promoting agricultural communication as a discipline at the SUA and/or providing communication skills training to extension workers at the agricultural training institutes are effective ways for disseminating agricultural information to Tanzanian farmers, and thus, increasing their productivity.

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## APPENDIX A: RESEARCH QUESTIONNAIRE

### Sources of Agricultural Information for Women Farmers in Tanzania

#### Questionnaire for Conducting the Study

Elizabeth Isaya

#### Purpose and Objectives

The purpose of this study is to identify sources of agricultural information for women farmers in Tanzania. Specific objectives of the study are:

1. To describe the demographic characteristics of women farmers in Tanzania and how these characteristics limit their access to farming information;
2. To describe sources of information on modern farming methods for women farmers in Tanzania;
3. To describe innovative farming methods adopted by women farmers;
4. To describe women farmers' access to and use of ICTs;
5. To describe women farmers' access to and use of agricultural extension workers;
6. To describe general challenges facing women farmers apart from information access.

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You may contact him with questions or if you feel you have been harmed as a result of your participation.

For questions about your rights as someone taking part in this study, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at +1-614-688-4792 or +1-800-678-6251. You may call this number to discuss concerns or complaints about the study with someone who is not part of the research team.

Section 1: Demographic characteristics [Enter, circle or check your response as appropriate]

1. Your:

- a. Region \_\_\_\_\_
  - b. District \_\_\_\_\_
  - c. Ward \_\_\_\_\_
  - d. Village \_\_\_\_\_
2. Age: \_\_\_\_\_(years)
3. Marital status:
- a. Single
  - b. Cohabitated
  - c. Married
  - d. Divorced
  - e. Widowed
4. How many people are in your household?
- 
- 
5. Have you ever attended school?
- a. Yes
  - b. No
6. If yes, what was the highest level of education you attained?
- a. I never attended school
  - b. Started but did not complete primary school
  - c. Completed primary school
  - d. Started but did not complete secondary school
  - e. Completed secondary school
  - f. Started but did not complete vocational school
  - g. Completed vocational school
  - h. Attended college/University
  - i. Other specify \_\_\_\_\_
7. What language(s) do you speak? (Circle as many as may apply).
- a. Kiswahili
  - b. English
8. Which of the following items do you own? (check all that apply)
- \_\_\_\_\_ Hand hoe
  - \_\_\_\_\_ Ox plough
  - \_\_\_\_\_ Backpack sprayer
  - \_\_\_\_\_ Tractor
  - \_\_\_\_\_ Bicycle
  - \_\_\_\_\_ Motorcycle
  - \_\_\_\_\_ Vehicle
  - \_\_\_\_\_ Clock
  - \_\_\_\_\_ Electricity at home
  - \_\_\_\_\_ Bank account
9. What is your source of energy for cooking? (check all that apply)
- \_\_\_\_\_ Gas
  - \_\_\_\_\_ Kerosine
  - \_\_\_\_\_ Charcoal
  - \_\_\_\_\_ Wood
10. Water and sanitation. Please check all that apply
- \_\_\_\_\_ Access to piped water in the house
  - \_\_\_\_\_ Access to community piped water
  - \_\_\_\_\_ Water from a well
  - \_\_\_\_\_ Flushing toilet
  - \_\_\_\_\_ Family latrine outside home
  - \_\_\_\_\_ Grass roofed house
  - \_\_\_\_\_ Aluminum roofed house
11. Do you farm for business or subsistence?

- a. Business
  - b. Subsistence
12. If you farm for business, what is the most common household mode of transporting farm produce to the market (circle as many as may apply)?
- a. Carrying on head
  - b. Vehicle
  - c. Bicycle
  - d. Motor cycle
  - e. Sell on the farm
  - f. Sell at home

Section 2: Sources of agricultural information

1. What are your information needs? (circle as many as may apply)
  - a. Farm preparation
  - b. Planting
  - c. Weeding
  - d. Marketing and pricing
  - e. Harvest management
  - f. Storage
  - g. Pest management
  - h. Livestock management
  - i. Fertilizer use
  - j. Seed variety
2. Have you ever accessed any source of agricultural information?
  - a. Yes                      b. No
3. If yes to the previous question, which of the following has been your source of information on agriculture? Circle as many as may apply.
  - a. Media sources
    - i. Television
    - ii. Radio
    - iii. Newspapers
  - b. People/Organizational sources
    - i. My neighbors
    - ii. Farm input distributors
    - iii. Extension agents
    - iv. Local government officials
    - v. Fellow farmers
    - vi. Farmers training centers/institutes
4. List sources of information that are in your preference
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
5. Do you use the above source(s) to access agricultural information?
  - a. Yes                      b. No
6. If yes, how often do you use the information that you access from the above sources?
  - a. Always
  - b. Sometimes
  - c. Never
7. Have you heard or used Tigo kilimo service that is offered by Tigo Tanzania?
  - a. Yes                      b. No
8. Have you heard or used Z-kilimo service that is offered by Zantel Tanzania?
  - a. Yes                      b. No
9. Have you heard or used Voda kilimo service offered by Vodacom Tanzania?
  - a. Yes                      b. No
10. If yes to the previous three questions, what information did you enquire?
  - a. Market

- b. Weather
- c. Planting and spacing
- d. Never requested information

Section 3: Innovative farming practices

1. Do you own a farm?
  - a. Yes
  - b. No
  
2. If yes to the above question, how did you obtain the farm?
  - a. Bought
  - b. Rented
  - c. Inherited
  - d. Given by family
3. What is the size of the farm?
  - a. I don't know
  - b. 1 acre or less
  - c. 2 – 3 acres
  - d. 4 – 5 acres
  - e. 6 -10 acres
  - f. More than 10 acres
  
4. Do you have a family farm?
  - a. Yes
  - b. No
  
5. If yes to question 4, who owns the family farm?
  - a. Husband
  - b. Parents
  - c. Husband's parents
  - d. Nuclear family
  - e. Extended family
  - f. Other specify \_\_\_\_\_
6. What is the size of the family farm?
  - g. I don't know
  - h. 1 acre or less
  - i. 2 – 3 acres
  - j. 4 – 5 acres
  - k. 6 -10 acres
  - l. More than 10 acres
  
7. If yes to question 1, what is the level of income from your farm annually?
  - a. 100,000-600,000 Tshs
  - b. 700,000-1,200,000 Tshs.
  - c. 1,300,000-1,800,000 Tshs.
  - d. 1,900,000 – 2,400,000 Tshs.
  - e. 2,500,000 – 3,000,000 Tshs.
  - f. 3,100,000 – 3,600,000 Tshs
  - g. 3,700,000 - 4,200,000 Tshs
  - h. 4,300,000 – 4,800,000 Tshs
  - i. Above 4,900,000 Tshs
  
8. If yes to question 4, what is the level of income from the family farm annually?
  - a. 100,000-600,000 Tshs
  - b. 700,000-1,200,000 Tshs.
  - c. 1,300,000-1,800,000 Tshs.
  - d. 1,900,000 – 2,400,000 Tshs.
  - e. 2,500,000 – 3,000,000 Tshs.
  - f. 3,100,000 – 3,600,000 Tshs

- g. 3,700,000 - 4,200,000 Tshs
- h. 4,300,000 – 4,800,000 Tshs
- i. Above 4,900,000 Tshs

9. What else do you do to earn income?

- a. \_\_\_\_\_
- b. \_\_\_\_\_

10. Who makes management decisions for the family farm?

- a. Self
- b. Husband
- c. Both of us (husband and me)
- d. The family members
- e. Other specify \_\_\_\_\_

11. Who makes management decisions on your own farm?

- a. Self
- b. Husband
- c. Both of us (husband and me)
- d. The family
- e. Other specify \_\_\_\_\_

12. Which crops do you grow on your farm? (check all that apply)

Maize \_\_\_\_\_

Beans \_\_\_\_\_

Sweet potatoes \_\_\_\_\_

Sunflower \_\_\_\_\_

Cassava \_\_\_\_\_

Rice \_\_\_\_\_

Kunde \_\_\_\_\_

Mbaazi \_\_\_\_\_

Groundnuts \_\_\_\_\_

Choroko \_\_\_\_\_

Banana \_\_\_\_\_

Coffee \_\_\_\_\_

Tomatoes \_\_\_\_\_

Vegetables \_\_\_\_\_

13. What do you do with the produce from your farm?

- a. I use to feed my family
- b. Sell to buy personal needs
- c. Sell to buy household needs
- d. Sell to buy things for the children
- e. Sell to pay school expenses

14. Looking back at your farm yield over the years, which of these statements is true?

- a. It has been increasing.
- b. It has been decreasing
- c. It has remained the same.
- d. It is unpredictable because of the weather

15. If your farm yield is increasing what is the reason?

16. If your farm yield is decreasing what is the reason?

17. If your farm yield fluctuates what is the reason?

18. What seed variety do you use?

- a. Local
- b. Improved
- c. I don't know

19. What cultivation method do you deploy in your farm?

- a. Hand hoe
- b. Ox-plough
- c. Tractor

20. Where do you store your farm produce?

- a. Bags
- b. Containers

21. Which of these livestock do you own?(Indicate all that do apply)

Type of animals	Chicken	Cattle	Goats	Sheep	Pigs	Ducks

22. How many bags of chemical fertilizer did you apply on your own farm last year?

- a. None
- b. 1
- c. 2
- d. 3
- e. More than 3

23. If you did not use chemical fertilizer on your own farm, why not?

- a. I could not afford
- b. It was not available
- c. I preferred to use farm manure.
- d. My soil is good and does not need fertilizer.

#### Section 4: ICT exposure, usage and challenges

1. Please check as appropriate;

Own	Have Access	Item	since when? (Enter in years)
_____	_____	Cell phone:	_____
_____	_____	Computer (lap top)	_____
_____	_____	Internet access at home	_____
_____	_____	Printer	_____

2. If you own a mobile phone, how did you get it?

- a. Bought
- b. Given
- c. Other \_\_\_\_\_

3. Do you have access to a Television?

- a. Yes
- b. No

4. If yes, what is your favorite show on TV?

5. Do you watch agricultural shows?



- a. Yes                      b. No
6. What is your favorite agricultural show on TV?
- 
7. Do you have access to a radio?  
a. Yes                      b. No
8. If you had the opportunity to listen to radio, when will be the best time?  
a. Morning  
b. Afternoon  
c. Evening  
d. Night (before bed time)
9. What programs are available on the radio?  
a. Entertainment programs  
b. Sports  
c. Agricultural programs
10. Do you use social media?  
a. Yes  
b. No
11. If yes to the above question, what do you use the social media for?  
a. Communication with family and friends  
b. Farming business (specify the business: \_\_\_\_\_)  
c. Other businesses, such as , \_\_\_\_\_  
d. Other specify \_\_\_\_\_
12. Which mobile network provider do you use? (check all that apply)
- a. Vodacom  
b. Airtel  
c. Tigo  
d. Zantel  
e. TTCL  
f. Other \_\_\_\_\_
13. Which of the following factors was most important in your choice of mobile network provider?  
a. The price/cost  
b. Network availability  
c. Have great offers  
d. Family and friends use the network  
e. Other \_\_\_\_\_
11. ICTs are a range of technologies that integrate information technology devices like personal computers with communication technologies such as telephones and telecommunication networks (Perron et al, 2010).  
What is your level of agreement with the following statements?  
From 1 being “agree” (A) to three being “I don’t know” (DK). Indicate your level of agreement to the following statements.
- 1 = Agree (A)  
2= Disagree (D)  
3= Don’t know (DK)

Statement	A	D	DK
Cell phones are too expensive for me to afford.	1	2	3
With ICT I can access agricultural information	1	2	3
ICT will help me get a better price for my produce by examining prices at different markets.	1	2	3
Young people use cellphones more than old people	1	2	3
I do not have the education needed to use a cellphone.	1	2	3
My husband will not allow me to use a cellphone.	1	2	3
Lack of electricity in my area is a constraint to using a cellphone.	1	2	3
I can get a computer if I have the money.	1	2	3
I need training on how to use a computer.	1	2	3
I know where the nearest Internet café is in this area.	1	2	3
It is expensive to use the Internet café.	1	2	3
I don't know where to call for agricultural information.	1	2	3
Forming farmers' groups will give us a better market.	1	2	3

#### Section 5: Extension service contact

1. Are you aware of the extension service offered by the government under the Ministry of Agriculture and Food Corporation?  
Yes No
2. Do you know where the nearest extension office is in your area?  
Yes No don't know
3. Do you know your extension worker?  
Yes No Not sure
4. If yes, is your extension worker male or female?  
b. Male  
c. Female
5. How many times did an extension agent contact you over the past year?  
a. None  
b. Once  
c. Twice  
d. Three – five times  
e. More than five times
6. If you have been visited by your extension agent, what do they do when they come?  
a. Advice depending on the state of the farm  
b. Bring printed material on new farming methods and discoveries  
c. Other specify \_\_\_\_\_
7. If you could choose, will you like your extension worker to be male or female?  
a. Male  
b. Female  
c. It doesn't matter

8. Why? \_\_\_\_\_  
9. Does your culture forbid married women from talking to male strangers?  
\_\_\_\_\_

10. Will your husband disapprove if he found you communicating with a male extension worker for farm information?  
a. Yes  
b. No  
c. I don't know  
d. It has never happened so I don't know
11. If you were asked to pay for extension information, how much will you be willing to pay per year?  
a. Nothing ( I don't have money)  
b. 5000-50000 Tshs  
c. 55,000 – 100000 Tshs  
d. More than 100000

Section 6: Other Challenges women farmers face

1. Do women in your area own land?  
a. Yes  
b. No
2. If they do not own land, why not?  
\_\_\_\_\_
3. Are you a member of any women group?  
a. Yes  
b. No
4. Mention the women group(s) that you belong to  
a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_
5. Are you a member of any agricultural group?  
a. Yes  
b. No
6. Mention the agricultural group(s)  
a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_
7. Have you attended any agricultural field training?  
a. Yes  
b. No
8. If yes, how many times?  
a. None  
b. Once  
c. Twice  
d. Thrice  
e. More than three times
9. If no to 7 above why have you not attended any agricultural training?  
a. There has never been an agricultural training in my area  
b. I don't have the time to attend  
c. I can't attend due to distance factor  
d. I was not informed  
e. I was not selected  
f. Financial constraints

## APPENDIX B: INITIAL REVIEW BOARD APPROVAL



### Behavioral and Social Sciences Institutional Review Board

Office of Responsible Research Practices  
300 Research Administration Building  
1960 Kenny Road  
Columbus, OH 43210-1063

Phone (614) 688-8457  
Fax (614) 688-0366  
[www.orrp.osu.edu](http://www.orrp.osu.edu)

March 18, 2014

Protocol Number: 2013B0629  
Protocol Title: SOURCES OF AGRICULTURAL INFORMATION FOR WOMEN FARMERS IN TANZANIA, Robert Agunga, Elizabeth Isaya, Agricultural Communication, Education, and Leadership  
Type of Review: Initial Review—Expedited  
IRB Staff Contact: Jacob R. Stoddard  
Phone: 614-292-0526  
Email: [stoddard.13@osu.edu](mailto:stoddard.13@osu.edu)

Dear Dr. Agunga,

The Behavioral and Social Sciences IRB **APPROVED BY EXPEDITED REVIEW** the above referenced research. The Board was able to provide expedited approval under 45 CFR 46.110(b)(1) because the research meets the applicability criteria and one or more categories of research eligible for expedited review, as indicated below.

Date of IRB Approval: March 18, 2014  
Date of IRB Approval Expiration: March 18, 2015  
Expedited Review Category: 7

In addition, the research was approved for the inclusion of non-English speaking participants and for a waiver of documentation of the consent process.

If applicable, informed consent (and HIPAA research authorization) must be obtained from subjects or their legally authorized representatives and documented prior to research involvement. The IRB-approved consent form and process must be used. Changes in the research (e.g., recruitment procedures, advertisements, enrollment numbers, etc.) or informed consent process must be approved by the IRB before they are implemented (except where necessary to eliminate apparent immediate hazards to subjects).

This approval is valid for **one year** from the date of IRB review when approval is granted or modifications are required. The approval will no longer be in effect on the date listed above as the IRB expiration date. A Continuing Review application must be approved within this interval to avoid expiration of IRB approval and cessation of all research activities. A final report must be provided to the IRB and all records relating to the research (including signed consent forms) must be retained and available for audit for at least 3 years after the research has ended.

It is the responsibility of all investigators and research staff to promptly report to the IRB any serious, unexpected and related adverse events and potential unanticipated problems involving risks to subjects or others.

This approval is issued under The Ohio State University's OHRP Federalwide Assurance #00006378.


All forms and procedures can be found on the ORRP website – [www.orrp.osu.edu](http://www.orrp.osu.edu). Please feel free to contact the IRB staff contact listed above with any questions or concerns.

Michael Edwards, PhD, Chair  
Behavioral and Social Sciences Institutional Review Board

hs-017-06 Exp Approval New CR  
Version 01/13/09



## APPENDIX C: INTRODUCTION LETTERS

	<p><b>SOKOINE UNIVERSITY OF AGRICULTURE</b> <b>Faculty of Sciences</b> <b>DEPARTMENT OF INFORMATICS</b> P.O. Box 3038 MOROGORO - TANZANIA Tel. 255-23-2604420 / Fax 255- 23- 2603404 E-mail <a href="mailto:fos@suonet.ac.tz">fos@suonet.ac.tz</a> <small>PHYSICAL LOCATION: SOLOMON MAHLANGU CAMPUS, MAZIMBU</small></p>
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20<sup>th</sup> Jan, 2014

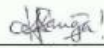
To whom it may concern,

Introducing Elizabeth Isaya

Dear Woman Participant:

Ms. Elizabeth Isaya is a Master's degree student at The Ohio State University, USA and also a Lecturer in my Department of Informatics at Sokoine University of Agriculture at Morogoro, here in Tanzania. Elizabeth will like to interview you for her study on how women farmers like yourself, get information on modern farming methods. For example, do you get this information through the radio or from other female farmers? I am writing to let you know that Elizabeth has my support to do this study and I strongly urge you to participate. If you have any questions about the study please feel free to call me at 255-23-260-4420. You may also call Elizabeth's academic advisor, Prof. Robert Agunga in the United States at (614) 292-8751.

Yours



Dr. Camilius Sanga  
Department Head



Department of Agricultural Communication, Education, and Leadership

208 Agricultural Administration Building  
2120 Fyffe Road  
Columbus, OH 43210-1067

Phone (614) 292-6321  
Fax (614) 292-7007

### Elizabeth Isaya Survey Research Participant Consent Form/Script

You are invited to participate in a study of "Assessing Sources of Agricultural Information for Women Farmers in Tanzania." I hope to learn about where and how Tanzanian Women Farmers get their information on modern farming methods. For example, is it from other female farmers, radio or extension workers?

The purpose of the study is to help the Ministry of Agriculture adopt suitable channels for delivering information to farmers like you.

You were selected as a possible participant in this study because you live and farm in the study area. This study is research towards my Master's degree in Agricultural Communication at The Ohio State University in the USA.

I am a Kiswahili speaker, as you can tell and I am from this country. If you decide to participate, I will read you the questions in Kiswahili and if you wish to answer them I will record your answers in my survey form. The survey will take about an hour. You may answer those questions you wish to answer and refuse to answer those you do not want to. If you do not want to answer any question, just say, "move to the next question."

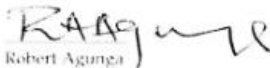
**Your participation in this study is voluntary.** Any information obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission. In any written reports or publications, no one will be identified and only aggregate data will be presented.

If you decide to participate, you are free to discontinue participation at any time. This research project has been reviewed and approved in accordance with The Ohio State University Initial Review Board (IRB). If you have any questions about the research and/or research participants' rights you may call my faculty supervisor, Dr. Robert Agunga, at 1- 614-292-8731 or Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-614-688-4792 or 1-800-678-6251.

This statement is for your oral consent. If you say "Yes," we will continue with the survey. If you say "No" I will move on to the next participant.

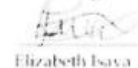
Should we continue? A "yes" response means I will begin asking the questions.

Advisor signature

  
Robert Agunga

1/21/14

Student signature

  
Elizabeth Isaya