



**UNIVERSITY OF NAIROBI
COLLEGE OF HUMANITIES AND SOCIAL SCIENCES
SCHOOL OF JOURNALISM AND MASS COMMUNICATION**

**EFFECTIVENESS OF COMMUNICATION APPROACHES USED IN
DISSEMINATING INTEGRATED SOIL FERTILITY MANAGEMENT
(ISFM) PRACTICES IN MUVAU AND KATHONZWENI WARDS,
MAKUENI COUNTY.**

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STUDIES**

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DECLARATION

I, Daniel Otieno Adero, the undersigned, do hereby declare that this research project is my original work and has not been submitted to any other institution for examination purposes for any award or any other qualification.

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This project has been submitted for examination with my approval as a university supervisor.

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DEDICATION

I dedicate this project to my late brother Mr. Fredrick Omondi Adero (Obach). Thank you for always being there for me and our entire family. Your love for education and your passion for success will always remain alive in me. I also dedicate this project to my loving parents; Mr. and Mrs. Adero, thank you both for your unyielding support that helped make my dream a reality! You are both the motivation I needed to keep pressing on to the finish line.

TABLE OF CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENTS	iii
DEDICATION	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
ABBREVIATIONS AND ACRONYMS	x
ABSTRACT.....	xi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Introduction.....	1
1.2 Statement of the problem	4
1.3 Research Objectives.....	6
1.4 Research Questions	6
1.5 Justification of the Study	6
1.6 Definition of operational terms.....	7
CHAPTER TWO	8
LITERATURE REVIEW	8
2.1 Introduction.....	8
2.2. Overview of ISFM	8
2.3 ISFM and Communication.....	11
2.4 Communication Approaches.....	13
2.5 Knowledge Gaps in ISFM Communication and Dissemination.....	18
2.6 Barriers hindering effective ISFM knowledge dissemination	18
2.7 Theoretical Framework	20
2.8 Conceptual framework.....	24

CHAPTER THREE	27
RESEARCH METHODOLOGY.....	27
3.1 Introduction.....	27
3.2 Research Design.....	27
3.3 Study Area	28
3.4 Target Population.....	30
3.5 Sample Size and Sampling Techniques	30
3.6 Data Collection Procedures.....	31
3.7 Data Analysis, Interpretation and Presentation.....	32
3.8 Validity and Reliability of Research Instruments.....	32
3.8.1 Validity	32
3.8.2 Reliability.....	33
3.9 Ethical considerations	33
CHAPTER FOUR.....	34
DATA ANALYSIS, INTERPRETATION AND PRESENTATION	34
4.1 Introduction.....	34
4.2 Study Findings	34
4.2.1 Demographic Information of the Respondents.....	34
4.2.2 Communication approaches used in disseminating ISFM practices to farmers in Makueni County.....	39
4.2.2.1 Sources of information on ISFM technologies	39
4.2.2.2 Channels of information dissemination	40
4.2.3 Effectiveness of communication approaches used in disseminating ISFM to farmers in Makueni County	41
4.2.3.3 Ranking of effectiveness of communication approaches.....	44
4.2.4 Effect of ISFM practices to local farmers on their production levels in Makueni County.....	45
CHAPTER FIVE	50
SUMMARY, CONCLUSION AND RECOMMENDATIONS.....	50

5.1 Introduction	49
5.2 Summary	50
5.3 Conclusion	51
5.4 Recommendations.....	53
REFERENCES	56
APPENDICES	56
Appendix 1: Questionnaire	63
Appendix 2: Interview Schedule for Focus Group Discussions (FGDs).....	71
Person Interviewing:	71
Appendix 3: Population data of Makueni County	72
Appendix 4: Letter of Introduction	74
Appendix 5: Certificate of Field Work	74
Appendix 5: Certificate of Field Work	75

LIST OF TABLES

Table 4.1 Respondent's main occupations, distribution by sex, and farming systems.....	35
Table 4.2: Acquisition and use of information in the application of ISFM technologies by farmers	46

LIST OF FIGURES

Figure 1:1 Relationship between level of agronomic knowledge of ISFM and the resultant adoption of the practices (CIAT, 2015)	10
Figure 2.2 Classic Diffusion Model.....	22
Fig 2.3: Conceptual framework	25
Fig 3.1: Map of Makueni County	29
Figure 4.1: Respondents distribution by age.....	37
Figure 4.2: Respondents levels of education	38
Fig 4.3: Sources of information on ISFM practices (Source: Field Survey 2015)	40
Fig 4.4: Channels used in disseminating information on ISFM technologies (Source: Field Survey 2015).....	41
Figure 4.5: Ranking the channels on accessibility (Source: Field Survey 2015)	42
Figure 4.6: Ranking the channels on reliability (Source: Field Survey 2015).....	42
Figure 4.7: Ranking the channels on comprehension (Source: Field Survey 2015).....	43
Figure 4.8: Ranking the channels on preference (Source: Field Survey 2015)	44
Figure 4.9: Ranking of effectiveness of communication approaches (Source: Field Survey 2015).....	45
Figure: 4.10 ISFM technology adoption rates and practice	47
Figure 4.11: Comparison between production yield from different crops before and after application of ISFM technologies.....	48

ABBREVIATIONS AND ACRONYMS

AGRA -	Alliance for a Green Revolution in Africa
AKIS -	Agricultural Knowledge and Innovations Systems
ASAL -	Arid and Semi-Arid Lands
ASDS -	Agriculture Sector Development Strategy
ASPS -	Agriculture Sector Programme Support
CAADP -	Comprehensive Africa Agriculture Development Programme
CIDP -	County's Integrated Development Plan
CSA –	Climate Smart Agriculture
FAO –	Food and Agriculture Organization
GDP –	Gross Domestic Product
ICRAF -	International Centre for Research in Agro-forestry
IFAD –	International Fund for Agricultural Development
IFPRI -	International Food Policy Research Institute
IIRR -	International Institute of Rural Reconstruction
ISFM –	Integrated Soil Fertility Management
KAPP -	Kenya Agricultural Productivity Project
KARI -	Kenya Agricultural Research Institute
KARI –	Kenya Agricultural Research Institute
NAAIAP -	National Accelerated Agricultural Inputs Access Programme
NALEP -	National Agriculture and Livestock Extension Programme
TSBF-CIAT -	Tropical Soil Biology and Fertility Institute of the International Centre for Tropical Agriculture

ABSTRACT

Adoption of agricultural technologies can be an important step towards improving farmer productivity hence alleviating poverty. However, the adoption rate of these technologies has been so low in many countries in Africa partly because of use of ineffective communication approaches when disseminating knowledge on these technologies. In this study, an investigation has been done to find out the communication approaches used in disseminating Integrated Soil Fertility Management (ISFM) practices to farmers in Makueni County, their effectiveness and to determine whether effective communication leading to adoption of ISFM practices has an impact on production levels of local farmers in Makueni County. Using diffusion of innovations theory as the theoretical framework, the study investigated gaps in disseminating ISFM knowledge using a descriptive survey design approach. The study sampled 368 respondents from two wards; Muvau and Kathonzweni, areas where Ukamba Christian Community Services (UCCS) has been implementing projects on ISFM practices. It was established that face to face, mass media, internet based and outdoor advertisement were some of the communication approaches used in disseminating ISFM knowledge and skills to farmers. It further established that face to face approaches are still the most effective in disseminating agricultural knowledge to farmers. Effective communication leads to adoption of innovations as established by this study and this in effect has a positive impact on farmer productivity. Farmers who had adopted ISFM had done so because of effective approach to knowledge dissemination and had realized increased yields in various crops since the application of ISFM practices. The study re-affirms that effective communication in agricultural knowledge dissemination leads to adoption and use of these technologies. Despite their being a number of communication approaches being used in agricultural communication, the study has strongly established how effective face to face approaches are compared to the rest. The choice of communication approach being used in agricultural knowledge dissemination is important needed attention should be focused when deciding which approach to use. The study recommends that technology developers, government and development partners should use face to face communication approaches when disseminating knowledge to farmers.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Food shortage is a major cause of hunger which is killing more people every year globally than those killed by AIDS, malaria and tuberculosis combined. Hunger and hunger related illnesses claim about 9 million lives every year globally (MercyCorps, 2015). Many people still sleep hungry with one in every eight people going to bed hungry every day. Sub-Saharan Africa bears the brunt being home to over 227 million hungry people in the world. This is because food production levels have dropped globally and efforts to combat this seeming to not yield expected results.

Agriculture still remains the major contributor to the economies of many countries in sub-Saharan Africa (SSA) (TSBF, 2002). Agriculture contributes 60% of the total labour force, 20% of the total exports and 17% of the Gross Domestic Product (GDP) for many countries south of the Sahara. Up to 80% of Kenya's population depends on agriculture and earn their daily living either directly or indirectly from this sector and the sector accounts for 26% of Kenya's GDP and provides 60% of export earnings (Haque, 2004). SSA has however been experiencing dwindling food productivity in the last decade and the total production for many countries has dropped (Swift & Seward, 1994).

Food production in SSA has been dropping and particularly among smallholder farmers. The decline in production has been attributed to a number of factors key among them being the drop in soil quality and fertility. Even though there is a seeming rise in production across the continent, the growth is very slow compared to

other developing regions of the world. According to Sanchez *et.al*, (1997) depletion of soil fertility is one of the major causes of low per capita food production and food insecurity in smallholder farms in Africa. This deters productivity of smallholder farmers and is the utmost biophysical constraint to increasing agricultural productivity causing a major threat to food security (Sanchez *et. al*, 1997).

To restore agricultural productivity, various actors in the agricultural sector have come up with a range of strategies aimed at recreating soil fertility to enhance production potential. The Kenyan government has since the late 1990s and early 2000, implemented various macro-economic, sectorial and institutional reforms earmarked to result in high and sustainable economic growth, realization of food security and enormous poverty reduction (Nyangito & Okello, 1998). The government has introduced a number of initiatives aimed at boosting farmers' yields and steering the country on the path of becoming food secure. Through its various departments and working in collaboration with development partners, the government has advocated for implementation of a number of agricultural innovative practices amongst various farming communities.

The government has advocated for adoption and use of emerging technologies and innovations aimed at reversing this declining trend in production. Integrated Soil Fertility Management (ISFM) practices; have been specifically promoted by the Government of Kenya through the Ministry of Agriculture, Science and Technology and the Kenya Agricultural Research Institute (KARI) working closely with like-minded organizations such as the Alliance for a Green Revolution in Africa (AGRA); Tropical Soil Biology and Fertility Institute of the International Centre for Tropical

Agriculture (TSBF-CIAT); and the International Centre for Research in Agro-forestry (ICRAF), to address the low food production menace faced by smallholder farmers spread across the country. ISFM advocates for strategic use of fertilizers, organic and inorganic inputs and improved crop varieties, combined with the knowledge on how to adapt these practices to local conditions to maximize agronomic use efficiency of the applied inputs (Vanlauwe, 2010).

ISFM practices have been promoted for over seven years now but still the expected resultant increase in production amongst farmers has not matched up. Successful use and adoption of innovations require that appropriate strategies are put in place to transfer these knowledge and skills. This calls for effective communication approaches to be deployed by the technology developers. The development of these innovations is just part of the solution and is a very important starting point to realizing gains in the sector. Ensuring that innovations, like ISFM, are widely and easily accessible and available by the end users is as critical in ensuring that the end goal is achieved (Pettengell, 2010). Pettengell (2010) further argues that access to these innovations should not be hampered at all as a result of a lack of information, or because they expensive and/or because of intellectual property rights. For a hunger-free world, small-scale farmers who play a critical role in global food security should be placed at the center of the new emerging investments and innovative partnerships (FAO, IFAD and WFP, 2014).

Most agricultural innovations are knowledge intensive and call for more attention in the process of transferring the skills. In the case of ISFM practices, there is need to use an appropriate mechanism or communication approach if the skills are to be

transferred, adopted and put in practice by the farmers. The communication approaches used matter a lot as they ensure that knowledge and skills are effectively transferred from the developers to the users.

ISFM was introduced in Makueni County in 2006 by the government and development partners and was unveiled as a promising solution to improving farmer productivity. Despite being a promising solution to farmers' low production predicament, ISFM has not yet resulted into improved productivity to many farmers in Africa (Sanginga, 2012). To ensure that this dilemma of effective ISFM knowledge dissemination for improved farmer productivity, the national planners and development partners would need to put in practice the effective communication approaches.

1.2 Statement of the problem

Despite efforts by the Kenyan government in ensuring that farmers' production improves through investment in research and technological invention, adoption and use of innovations is still very low whereas poverty and hunger still threaten lives of many Kenyans. Over 50% of the rural population in Kenya is still living below the poverty line. Even after the various initiatives and efforts that have been supported by development partners working with the government, information from the Kenya Agricultural Research Institute (KARI) shows that a number of viable agricultural technologies that have been developed and advocated for are actually not being used by the farmers. This situation has seen farmers' production still being very low and way below their potential with majority of them achieving as low as 6% of their potential (Salasya, *et al*, 1998).

The Government of Kenya and other development partners like AGRA have invested in promoting ISFM practices to farmers as a potential solution to the perennial low food production caused by declining soil fertility. Since 2006, the government and other partners took the ISFM practices to Makueni County. Ukamba Christian Community Services (UCCS) has been supported by the government and a number of development partners including AGRA to take the ISFM practices to farmers.

However, most farmers in Makueni as well as other parts of the country still experience declining food productivity after about 10 years of promoting ISFM practices. Food insecurity is still the order of the day and something that the County still has to grapple with. ISFM practices have been promoted to be perfect in helping to regain soil fertility hence resulting in increased yields hence there is an urgent need to re-look into what has been happening in the process of transferring ISFM practices to farmers (FAO, 2014). The numbers of these technologies have not translated yet into what has been intended and worse off; food production by many farmers in Kenya is still way below optimal signifying a problem in the process of knowledge transfer of ISFM practices. What communication approaches used in disseminating ISFM practices in Makueni County? How effective are the communication approaches used in disseminating ISFM practices to farmers in Makueni County? What are the effects of ISFM practices on local farmers' production levels in Makueni County? This study sought to interrogate and investigate further these questions.

1.3 Research Objectives

The objectives of this study were:

- i. To establish the communication approaches used in disseminating ISFM practices to farmers in Makueni County.
- ii. To assess the effectiveness of communication approaches used in disseminating ISFM to farmers in Makueni County
- iii. To determine whether effective communication leading to adoption of ISFM practices has an impact on production levels of local farmers in Makueni County.

1.4 Research Questions

- i. What are the communication approaches used in disseminating ISFM practices in Makueni County?
- ii. How effective are the communication approaches used in disseminating ISFM practices to farmers in Makueni County?
- iii. What are the effects of ISFM practices on local farmers' production levels in Makueni County resulting from effective communication?

1.5 Justification of the Study

Low food production and the existing poverty levels in the ASAL areas is a matter of national concern to Kenya. The Government in its development plans had intended to at least have reduced significantly poverty in these areas by 2015. In Kenya's Economic Pillar of Vision 2030, there is a clear realization that Agriculture still forms the backbone of the country's economy. If therefore there is effective communication and dissemination of information to the smallholder farmers as well as the large scale

farmers on better farming practices, one can categorically state or argue that the economic pillar of vision 2030 can be achieved. This is why the sector was amongst the six sectors that were to be addressed with the Medium Term Plan 2008-2012.

This study was crucial as it sought to find out what communication approaches are appropriate in disseminating ISFM practices, which in turn leads to an increase in food production, better understanding of farming practices, and better lifestyle amongst farming communities' hence eradicating poverty leading to an increased and sustainable economic growth. Further, the findings from this study form an important body of knowledge which can be used as reference and information, communication and education (IEC) material. Moreover, it is a resource material for the county government, development partners and even the central government in policy formulation and practice.

1.6 Definition of operational terms

Communication: In this study, communication refers to the process of passing knowledge from one person to another

Communication Approaches: In this study communication approaches refers to methods and forms used in conveying information from one person to another

Integrated Soil Fertility Management (ISFM): In this study, ISFM refers to soil management practices that are used to enhance soil fertility.

Dissemination: In this study, dissemination refers to the process of taking knowledge and skills from the developer or inventor to the target end users.

Effectiveness: In this study, effectiveness refers to the status at which an idea achieves its intended objective with minimal resource use.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

There have been various studies conducted in the areas of food security, agricultural productivity, innovations, agricultural innovations, adoption of innovations and the place of communication and knowledge transfer. This chapter takes a look at various contributions to the field of agricultural communication, agricultural innovations and food security. The chapter looks at the issue of ISFM practices and how the practices can be best transferred to the end users who are the farmers and also looks into related studies and dialogue that has taken place in this area.

2.2. Overview of ISFM

Integrated Soil Fertility Management practices refer to a set of soil fertility management practices that include the use of fertilizer, organic inputs, and improved crop varieties combined with the knowledge on how to adapt these practices to local conditions, aiming at maximizing agronomic use efficiency of the applied nutrients and improving food production (Vanlauwe & Zingore, 2011). ISFM involves using a number of soil management practices simultaneously in order to maximize the potential impact from each of the practices. ISFM is proposed under the hypothesis that no single fertility management technique or component of the soil fertility management technique would on its own result into sustainable soil fertility improvement (Vanlauwe, et al., 2013).

Bationo, *et al*, (2012) opined that, in ISFM, mineral fertilizers are the main way to increase yields and organic fertilizers can improve the efficiency of the mineral

fertilizers. ISFM focuses on how to manage the soil fertility management practices efficiently (Bationo, et al., 2012). ISFM epitomizes an avenue of overcoming farmers' low productivity predicament as it offers better returns on their agricultural investment in fertilizer through its combination with indigenous agro-minerals and available organic resources.

Woomer (2012), states that ISFM seeks to (i) encourage use and optimal combinations of locally available and externally added nutrient resources into cropping systems; (ii) promote appropriate choices of crop types and cultivars for given biophysical and socio-economic environments; (iii) employ mechanisms that minimize nutrient losses from the cropping system to enhance sustainability, and (iv) promote recycling of nutrients within cropping systems.

Generally, ISFM practices target maximizing of agronomic use efficiency of the applied soil nutrients whilst increasing crop productivity and all inputs need to be managed in accordance with sound agronomic principles (Vanlauwe, *et al.*, 2010). It is also about providing a wider variety of soil management practices from which farmers can choose and availing the knowledge on how each of these practices results into improved yields for them (Place, *et al.*, 2003). The choices available should resonate with the farmers' awareness of the same if these are to result into any desired changes. ISFM practice has been adopted and promoted by a number of institutions working to ensure farmers' productivity is enhanced and sustained. Some of the institutions include: Alliance for a Green Revolution in Africa (AGRA); Tropical Soil Biology and Fertility Institute (TSBF-CIAT), and African Network (AfNet) amongst

others (Vanlauwe, 2004). For complete adoption and use, the knowledge about ISFM and its application should go hand in hand as is shown in the diagram below.

Figure 2:1 Relationship between level of agronomic knowledge of ISFM and the resultant adoption of the practices (CIAT, 2015)

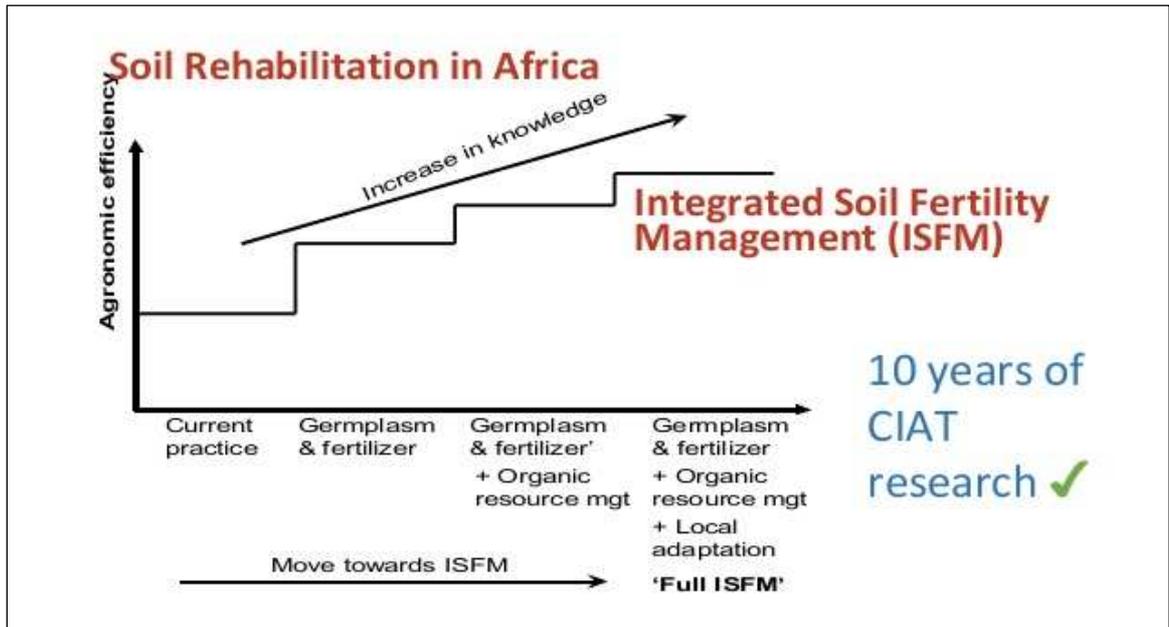


Figure 2.1 above is an illustration of the process towards full adoption of ISFM. In the figure above, for a full adoption to be achieved, there is a need for increased knowledge and an equal increase in agronomical efficiency. While ISFM practices have been proposed to be efficient in soil rehabilitation by CIAT, this can only be achieved when the users have acquired the necessary knowledge and skills. ISFM adoption is hence dependent on the extent to which the potential users are exposed to needed agronomical skills.

2.3 ISFM and Communication

A number of agencies both governmental and non-governmental have promoted the ISFM practices through various approaches. As a result there is a lot of information about the ISFM practices out there or there is supposed to be if there isn't yet. There is need to however look critically on what kind of information and knowledge is disseminate before addressing their sources and the various channels through which they are being disseminated. There also need to be clarity in what strategies or approaches have been used and the role of other socio-economic factors in receiving ISFM knowledge and adopting the practices.

According to Rogers (2010), communication, through a number of channels, provides information to a social system with the purpose to influence the knowledge and assessment of the innovation. Mass media has been widely used and becomes very handy when the intention of the communicator or the technologist is to create awareness of an innovation. Personal contacts and interpersonal interactions are however very effective in forming an opinion about an innovation. Interpersonal communication and interaction however calls for the conveyors (technologists) of an innovation to be optimally similar to the receiver in a number of attributes (Toborn, 2011). For an innovation to be adopted fully there is need for a mix of communication approaches for maximum transfer of knowledge and skills and even intent from the technology inventor to the prospective user.

According to studies that have been carried out around adoption of ISFM technologies, the major constraints to adoption that have been repeatedly identified include lack of awareness of technologies, insufficient adaptation of technologies to

farmers conditions, poor research-extension-farmer linkages, land tenure, labor, unfocused institutional support, gender considerations, and the absence or perversion of needed national and regional policies” (Sanginga, 2009). Further, it has been found out that the move towards complete ISFM is knowledge intensive and calls for an effective communication approach.

Studies have also found out that there is a wide gap between the existing innovations and research in developing the new technologies compared to the shortage of uptake by the smallholder farmers. This is happening at the context when the need to increase food productivity is even growing much higher. A number of development partners have also set up various arrangements with the government to support it in transferring the innovations to farmers but these have also not bore any fruit. Adoption levels are still way much below the expected levels that would produce the positive desired outcome of increase in food production (Ogada, Nyangena, & Yesuf, 2014).

In the adoption of new technologies and innovations that are emerging in the Agricultural sector, the government is usually the first to embrace the ideas and through them, the local people, in this case rural farmers get to adopt and use them. Majorly, the government relies on its extension workers in passing across innovative ideas to local farmers. Extension is an advisory service that is offered by trained government agricultural employees to pass information and skills to farmers. Many scholars agree that if extension services are well designed and structured there should be a resultant increase in agricultural productivity. In Kenya, extension support to

farmers is below par and concentrates mainly towards well-endowed or agriculturally 'rich' regions and on high value crops (Milu & Thomas, 2006).

A majority of farmers in arid and semi-arid areas who mostly work on 'low-value' crops and are responsible for feeding the nation still lag behind in terms of access and use of extension services. According a report by Egerton University's Tegemeo Institute, the Government has very few agricultural extension officers who cannot meet the demand. Farming in Kenya's arid regions is particularly challenging because of low and erratic rainfall, changing land use, and the decline in agricultural productivity. Climate change is also having negative impacts on households. Unfortunately, effective technologies developed by decades of agricultural research have not been adopted by farmers (Muyanga & Jayne, 2006).

2.4 Communication Approaches

The information or knowledge farmers get on various technologies, ISFM included, usually varies and the channels they use to access the same also varies considerably (Huesca, 2012). For knowledge to have been attained, there is need of data that is translated into information and then culminates in knowledge. This means that data is a set of symbols with little or no meaning to a recipient; information is a set of symbols that does have a meaning or significance to the recipient and; knowledge is the accumulation and integration of information received and processed by a recipient. Therefore, there is need to effectively disseminate information if knowledge is to be received. For adoption of ISFM practices, there is need for knowledge acquisition by the farmers. Knowledge is information that is meaningfully gathered into a pool of facts and concepts that can be applied or as information that is

organized or processed. There is also a difference between knowledge sources and dissemination approaches. A number of approaches exist for transfer of knowledge and information. The choice of which approach to use depends on various message attributes (Miller, 2014).

2.4.1 Face to face approaches

2.4.1.1 Farmer Field Schools (FFS)

This is one of the communication approaches that have been used in disseminating agricultural knowledge. Farmer Field School (FFS) refers to a group extension strategy based on adult education methods and characterized of learning by observing, doing, using, experimentation and peer learning (Rusike, 2004). This approach has been used in the Kenyan context as is seen when TSBF-CIAT began to promote FFS methodologies in Vihiga, Busia, and Teso districts of western Kenya in 2001 with the aim of enriching local knowledge on soil ecology and disseminating ISFM concepts. This approach provides farmers the opportunity to learn about useful agriculture innovations such as ISFM practices.

Farmer Field School approach is beneficial as it enhances farmer productivity, knowledge acquisition and empowerment. There are however some questions arising about its overall impact and financial sustainability. FFS approach is most beneficial to farmers who are most directly-engaged and have demonstrated little capacity for scaling up for greater impact. Some studies done about this approach have found out that the approach has limited or no effect on farmer-to-farmer dissemination of information and technologies. Furthermore, some criticisms have emerged about this

for being curricula-based thus building farmers' understanding of science as a replacement for simply following scientific recommendations (Ramisch, 2004).

2.4.1.2 Local interpersonal channels

Interpersonal approach is yet another avenue that has been used in reaching to farmers when passing knowledge and information. This specific approach has also been used by proponents of ISFM practices. Most users of this approach prefer the use of songs and poems and have used it in disseminating and communicating knowledge about improved soil management. Songs and poems have been written on the management of nitrogen, phosphorus and Striga as well as the use of organic resources (Vanlauwe, *et al.*, 2010). However, much as these activities have been important for building in group morale and solidarity, their role in raising interest and awareness in the broader communities has usually only come as a second priority.

2.4.1.3 Demonstration trials

Demonstrations is another approach that has been used in disseminating agricultural information to farmers on a number of technologies. According to Misiko and Ramisch (2007), this approach has been used in the past to communicate ISFM technologies (e.g. biomass transfer, cereal-legume rotations, and organic-inorganic fertilizer combinations) in western Kenya. ISFM concept and practices are knowledge intensive and hence critics of this approach have faulted it for not being able to effectively lead to knowledge transfer in a manner that can result to adaptations. Tittonel *et al.* (2008) points out the ineffectiveness of this communication approach by recommending that there is need to go beyond comparing technologies from demonstration plots.

2.4.1.4 Community-based approaches

A number of approaches have also been classified as community-based and have been used by ISFM practices proponents to reach out to farmers. For instance, the Strengthening “Folk Ecology” (SFE) project, TSBF-CIAT, has specifically promoted community-based learning approaches and farmer-led experimentations with an aim to reduce communication gaps between scientists and farmers thus enabling them jointly develop dynamic expertise in ISFM concepts (Ramisch, 2004).

Like all the other approaches, community-based approach has been faced with criticisms about it bring many challenges mitigating widespread dissemination of ISFM technologies thus reducing impact. This failure has been said to be as a result of unsustainable production of dynamic expertise itself, downplaying of the experimentation process in farmer-to-farmer instruction, and the fact that overall success depended on availability of new knowledge, resources, and contacts with outsiders (Ramisch, 2006).

TSBF-CIAT has also used farmer-to-farmer interaction in Vihiga and Busia districts in western Kenya in disseminating ISFM technologies. What they did was involving organizing the farmers into farmer research groups whereby these groups interact with other farmers through activities such as field days and cross-site visits. In addition, field days, farmer groups, and cross-site visits were also embedded to this.

According to (Noordin, 2001), community based approaches rely on using existing village organisational structures such as church groups, women and youth self-help

groups, and clan and sub-clan organisations which are common in western Kenya villages. Noordin (2001) further noted that this approach is advantageous as it creates awareness in the form of mass campaigns, using channels such as public gatherings and farm-to-farm visits. But on the other hand, they cited some handicaps in the approach, the major one being inactivity of the village committees especially where follow up from project officers was lacking.

2.4.1.5 Agricultural extension

The use of Agriculture extension as an approach to disseminating knowledge and information to farmers. Ajayi and Gunn (2009) define agricultural extension as an out of school education for rural people and an extension agent as the person charged with providing knowledge and information on particular innovations to farmers. Because of the various ways used in extension approach, the knowledge base of farmers is enhanced through various ways, such as demonstrations, model plots, specific training and group meetings. The exposure of farmers to such activities is aimed at increasing their ability to optimize the use of their resources and ultimately increase crops yields (Muyanga & Jayne, 2006). It has also been argued that if extension service is used the way they are supposed to then properly designed and implemented, agricultural productivity is improved.

2.4.2 Mass Media Approaches

Mass media communication is the kind of communication that is used to reach a wide range of people in the general public. There are a number of channels used in mass media communication and these channels have different impacts. The channels include radio, television, newspapers, magazines, and the internet. These channels

also carry all sorts of information on various issues including social, political, development, news and entertainment. The use of mass media channels in disseminating agricultural information has been there for quite some time now. The effectiveness of mass media channels in agricultural knowledge dissemination is yet to be established.

2.5 Knowledge Gaps in ISFM Communication and Dissemination

There is still a disconnect between the ISFM knowledge between developers and users. For effective diffusion of innovations, critical knowledge gaps that exists should be addressed. These should look into aspects such as the communication channels, communication approaches, farmers' demographic characteristics and their preferences, and the social system in which the innovations diffuse.

2.6 Barriers hindering effective ISFM knowledge dissemination

In many cases across the world, once researchers have generated the technologies, they mostly rely on available advisory services provided by the extension workers in transferring the knowledge and skills. This is always the best approach whenever the extension services exist. However, in Africa, extension services are left for the relevant government ministries to provide. These services are rarely available to smallholder farmers who unfortunately are the major producers of food for the majority of Kenya's population. Adoption of new technologies have therefore failed to succeed due to the rampant disconnect between the researchers who develop these technologies and the extension services.

According to the United Nations Food and Agriculture Organization (FAO), low agricultural production can be said to be a result of the existing poor linkages between researchers and extension workers which then trickles down to inadequate transfer of knowledge to farmers and also the poor information delivery to farmers that is a result of poor information packaging, inadequate communications channels, and poor methodology of knowledge transfer (GTZ and FAO, 2006).

For agriculture-related technology, skills and information to be effectively adopted by the intended users, the players involved should all be mutual learning and clear communication approaches that are used. However, in many developing and some developed countries agricultural innovations have failed to be adopted because extension services are mostly not properly equipped. Extension staffs are rarely given necessary transport to reach the farmers and worse still they are inadequately trained on effective communication. Smallholder farming population are usually the worst hit when it comes to accessing extension services and in this way, the innovations that are meant to help them boost their production never gets to them.

The major barrier hindering farmers' ability to tap the benefits of ISFM practices is that knowledge dissemination and incentives for adoption is a big headache for national planners and rural development specialists. He argues that if ISFM knowledge would be effectively and appropriately disseminated, there would be a resultant increased farmer productivity leading to sustainable agriculture, improved household and regional food security and increased incomes among small-scale farmers (Sanginga, 2012).

2.7 Theoretical Framework

2.7.1 Diffusion of Innovation Theory

Diffusion is the “process by which an innovation is communicated through certain channels over a period of time among the members of a social system”. An innovation is “an idea, practice, or object that is perceived to be new by an individual or other unit of adoption” (Rogers, 1995).

Diffusion of innovation theory predicts that media as well as interpersonal contacts provide information and influence opinion and judgment. Studying how innovation occurs, Herbert, (1960, as cited in Lattimore et al, 2004) argued that it consists of five stages: *Awareness* (the individual has been exposed to the idea), *Interest* (the idea has to arouse the individual), *Evaluation* (the individual must consider the idea as potentially useful), *Trial* (the individual tries out the idea on others) and *Adoption* (this represents final acceptance of the idea after having successfully passed through the four earlier stages) (Lattimore, Baskin, Suzette, & Elizabeth, 2008). The information flows through networks. The nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation be adopted.

The diffusion and innovation theory explains the process through which an innovation undergoes until when in it is adopted and describes what happens in the process. According to Straub (2009), individuals end up using an innovation depending on what happens in the process of advocating for use as opposed to just the innovation itself (Straub, 2009).

The transfer of knowledge and skills of adapting and use of agricultural innovations to farmers marks the beginning of the adoption process and use of these innovations. According to Rogers there is no innovation that ever gets adopted if there is no effective communication from the developers to the target end users. Rogers observed that, “Communication is an important element throughout the social change process; all explanations of human behavior directly stem from an examination of how individuals acquire and modify ideas through communication with other”.

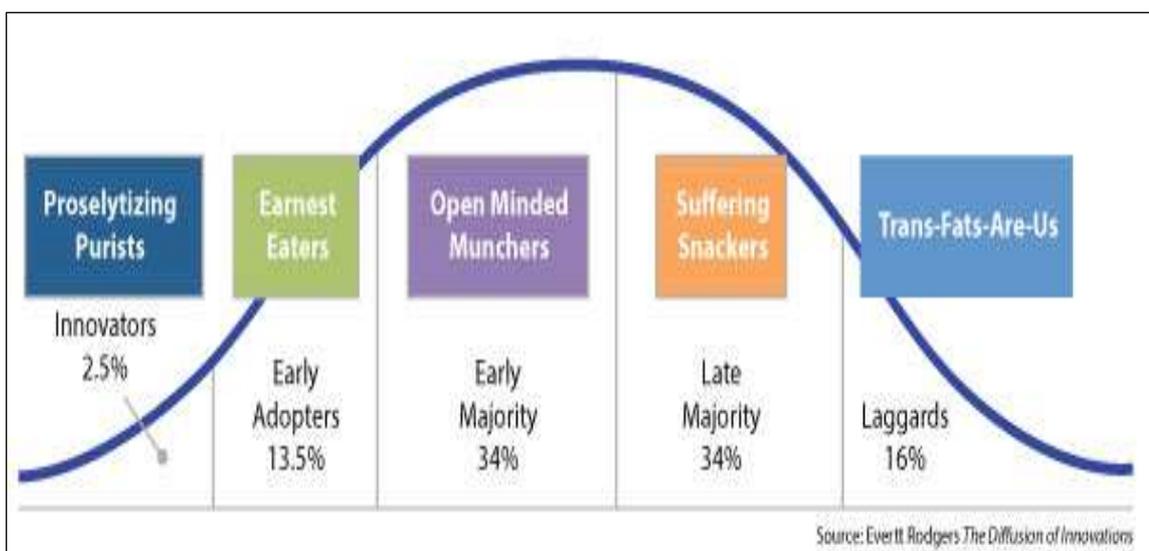
There have been several mechanism proposed and tested in disseminating various agricultural technologies both in Africa and beyond. Some of these methods that have been in use include field trips, farmer field days, guest speakers, group discussions, workshops, on-farm demonstrations, audio-visual materials (radio, television and multimedia), printed materials and some other interactive telecommunications.

In agricultural extension, workers have used traditional and modern methods in disseminating including traditional extension methods and farmer participatory research methodologies (Farrington & Martin, 1988). Others have also employed the use of Participatory Action Research (PAR). Active engagement among farmers and agricultural service providers including extension, in improving the farmers’ knowledge base on new and improved technologies is really important and enhances capacity to adopt (FAO, 2001). According to Rogers, “Many technologists believe that advantageous innovations sell themselves, that the obvious benefits of a new idea is widely realized by potential adopters, and that the innovations therefore diffuse rapidly. Seldom is this the case. Most innovations, in fact, diffuse at a disappointingly slow rate”. An innovation being a new idea goes through a process before people can

actually adopt it. Because of a number of characteristics of innovations, not all innovations usually take the same shape before being adopted.

Compatibility reflects how the innovation is perceived “consistent with the existing values, past experiences, and needs of potential adopters” Complexity reflects the perceived difficulty to understand and use the innovation; Trialability is “the degree to which an innovation may be experimented with on a limited basis”; and Observability reflects how the results of an innovation are visible to others. This process by which an innovation goes through before being adopted is referred to as diffusion of innovation. Diffusion is seen as “the process by which an innovation is communicated through certain channels over time among members of a social system”. Being that the target is always the farmers, an attempt to look at the characteristics of the specific innovation is critical before proposing and advising for use. The diagram below represents a diffusion curve that illustrates the various adoption stages of any innovation based on the five characteristics (Rogers E. , 1995).

Figure 2.2 Classic Diffusion Model



Source: Rogers, 1995

The figure above is a classical representation of what happens in the process of adoption of an innovation. In the process of diffusion of innovation, not everybody who has access to the innovation usually takes it up. Classic diffusion model follows the normal distribution curve. There are five types of people in the process: Innovators; early adopters; early majority; late majority and laggards. *Innovators* are the first in the adoption process. They are usually very few in number but visionary and imaginative. They are very passionate, energetic and creative on developing new ideas. Innovators are referred to as *proselytizing purists* in this model because they are the initiators who have nothing negative in mind. They are pure at heart.

Early adopters are those who are among the first to implement and work with the change. They are usually few though more than innovators. They join the bandwagon only after the innovation has started yielding some benefits. They are more strategic and quick to connect what benefits them. Early adopters are referred to as *Earnest Eaters* because they take what is available and use without much questioning. *Early majority* are the majority of audiences reached by an innovation after it becomes apparent that it is useful in the market. They are very pragmatic. They don't act without solid proof about a product's benefits. They are cost sensitive and not risk takers. They are referred to as *open minded* munchers because they ask questions and consume after having an informed decision. Late *majority* also known as *suffering snackers* are conservative pragmatic people who hate risks. They are usually uncomfortable with new ideas. They fear to be left out and that is why they join the others. They are only attracted to things that are fashionable and fully established. They join the bandwagon because of the fear to suffer by being left out. *Laggards* also referred to as *trans-fats-are-us* are the last to adopt and innovation. They wait till

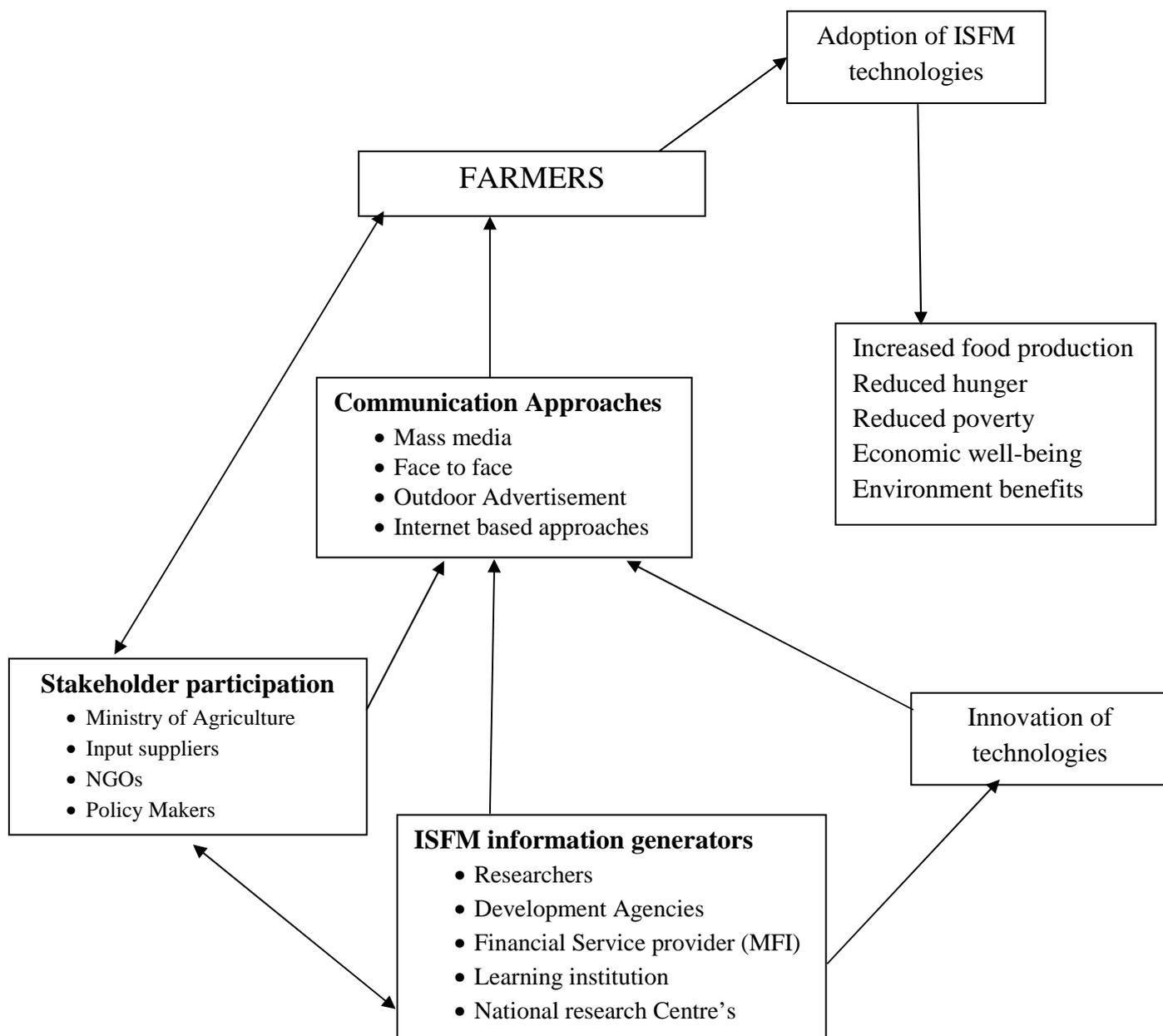
the last minute and can go all the way to the bitter end. They always see higher risks in adopting any innovation or new product. Some of them spend quite a lot of time debating why they should adopt and innovation. They are always thinking about the innovation and spend even their sleeping time debating. They mostly spend their time looking for arguments that are against adoption and use of any innovation or idea.

According to this diffusion of innovation model, any innovation spreads slowly along the adoption process from early adopters to majority audiences. Hence, face-to face communication becomes more essential to the decision to adopt any innovation or product. The relevance of this theory in this study is that it analyses how a new innovation can be adopted and actualized by practicing. This is well informed by how the ISFM can effectively be adopted by the inhabitants of Makueni County through effective communication and dissemination of information.

2.8 Conceptual framework

The conceptual framework used in this study is shown in Figure 2.3 below. This is an analytical tool with several actors and processes in the process of ISFM knowledge dissemination. It is used to make conceptual distinctions and organize ideas. This is largely based on the diffusions of innovations theory which explains the innovation-decision process through which an individual progresses from first knowledge of an innovation, to forming an attitude towards an innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision (Rogers, 2003).

Fig 2.3: Conceptual Framework



In the conceptual framework above, ISFM knowledge is generated from various actors including researcher, development agencies, learning institutions, national research centers and financial service providers amongst others. The process of knowledge generation is usually participatory and a number of stakeholders are usually involved. The stakeholders may include government agencies, non-

governmental organizations, input suppliers, and policy makers amongst others. This interaction usually leads to the development of an innovation, in this case, ISFM.

Once the innovation is developed, there is the process of dissemination that involves the various sector players interacting with farmers. At the center of disseminating the knowledge is communications approaches. Usually, the technology developers invent the innovations with an aim to lead to an impact on the end users. In the case of ISFM, the end goal is increase productivity, reduced hunger, reduced poverty, and economic well-being and environment benefits. For these to be realised, the stakeholders choose the channels through which to transfer the ISF knowledge and skills to farmers. There are numerous approaches that can be used in the process as is illustrated in this framework. Whatever the approach chosen, the end goal is to see farmers adopt and use ISFM practices. In this framework, once farmers have acquired the knowledge, they get to a position of adopting and using ISFM and this is the point when the desired benefits can be realised.

Going by this framework, there is need for complete knowledge dissemination for full adoption and use of ISFM practices. Effective knowledge transfer needs necessary and appropriate approaches. This framework borrows from the diffusion of innovation model which states that a lot of interaction needs to occur between technology developers and the targeted end users via a specific channel of communication adopting a given approach.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodology, the methods and tools that were used in data collection and analysis for conducting the study and how it was analysed and described. The chapter explains more about the study area, Research Design, Data collection procedure, Population and Sample of the Study, Data Analysis and Data presentation.

3.2 Research Design

This study used a descriptive survey design to investigate the effectiveness of communication approaches used in disseminating ISFM practices to farmers in Makueni County. Descriptive survey designs are used in preliminary and exploratory studies to allow researchers gather information, summarize, present and interpret for the purpose of clarification. Orodho (2009) further argues that descriptive survey designs are methods frequently used for collecting information about people's attitudes, opinions, habits or any of the variety of education or social issues.

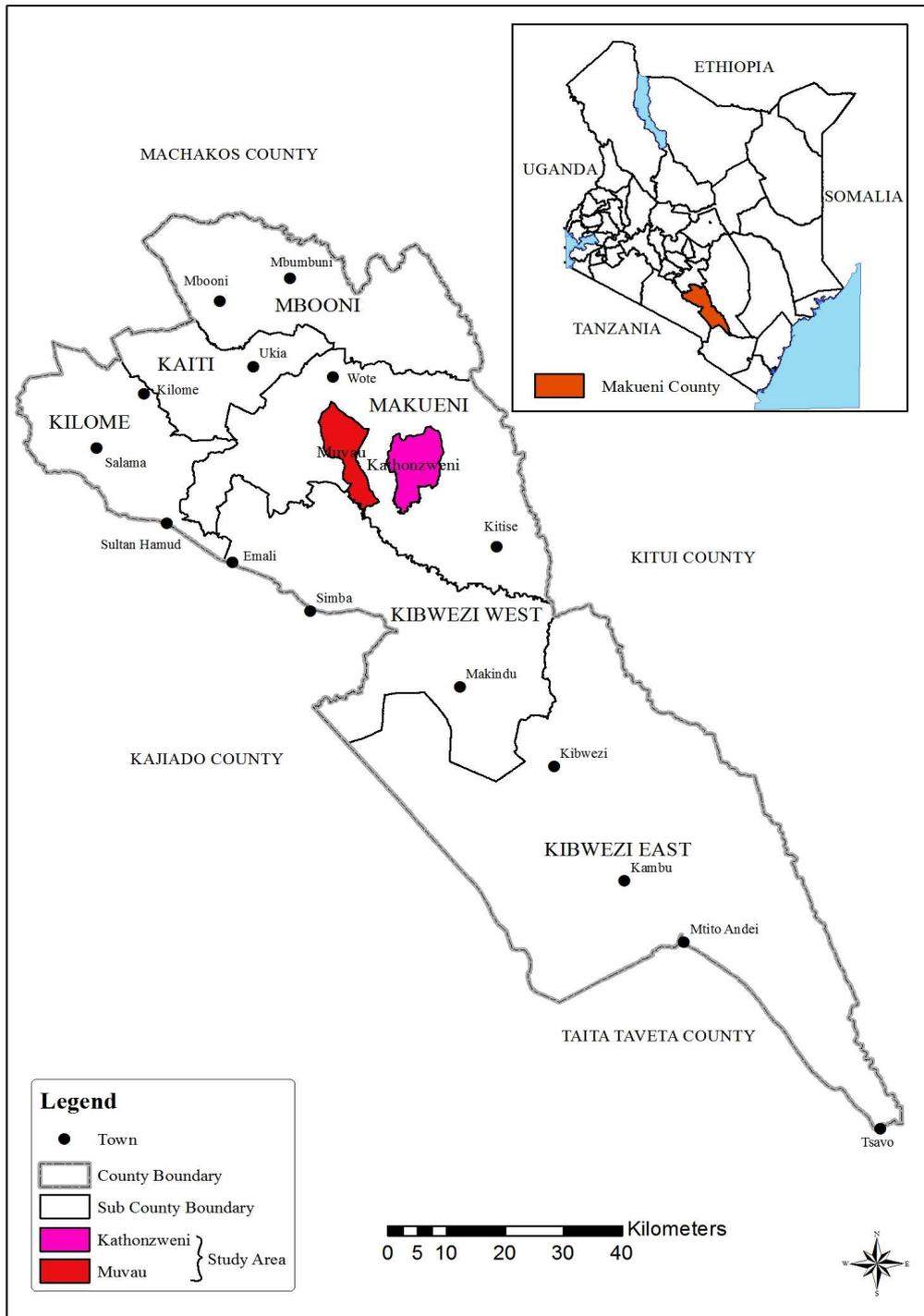
It relied mostly on describing how this is happening and finding out more. By demonstrating the existence of social problems, competent description can challenge accepted assumptions about the way things are and can provoke action. Because the main aim of this study was to find out correct and true representation of communication approaches used in disseminating ISFM practices, descriptive research design was most appropriate (Kothari, 2004).

3.3 Study Area

This study was carried out in Makueni sub-county, Makueni County. Makueni County was found suitable for this study because it lies in the ASAL areas of Kenya and is one of the areas where the use of ISFM practices has been advocated for. The government of Kenya and various stakeholders have been in Makueni County for more than 7 years advocating for use of ISFM practices. Moreover, due to limited resources; time and money, that were available for the study, Makueni County being easily accessible by the researcher was very appropriate for the study.

Makueni sub-county was chose among other sub-counties because it has the highest poverty index compared to the other five sub-counties of Makueni County. The poverty index stands at 66%. A lot of effort has also been placed in this sub-county to disseminate ISFM practices. The location of this cub-county is also appropriate for this study in that it is almost at the center of the county and thus residents of this sub-county are most likely to interact with residents of the other sub-counties in the County.

Fig 3.1: Map of Makueni County



3.4 Target Population

The population for this study was the farming community residing in Makueni sub-county, specifically the small scale farmers. Makueni sub-county has a total population of 193,798 (Kenya National Bureau of Statistics, 2009) which formed the study population. The target population for this study was farmers in the two wards of Muvau and Kathonzweni, a total of 9292 farmers.

3.5 Sample Size and Sampling Techniques

3.5.1 Sample Size

The sample size for this study was 368. This was arrived at using Krejcie and Morgan (1970) formula for getting sample size which states that for a study population of less than 10,000 the required sample size is 368. For this study the two wards that have been randomly selected (Muvau and Kathonzweni) have a total population of 9292 and hence the desired sample size based on the Krejcie and Morgan (1970) formula was 368 (Krejcie & Morgan, 1970).

3.5.2 Sampling Techniques

The sample selected for this study was as representative as possible of the farming population. It was deemed fit enough to help answer the research objectives and the research questions. Because the target population for this study is very vast, there was a need to choose a sample size for the study. Convenience sampling technique was used in this study to arrive at the sample size. This is the most commonly used sampling method in behavioral science research (Kothari, 2004). This is a statistical method of drawing representative data by selecting people because of the ease of their volunteering or selecting units because of their availability or easy access. It ensures

that a researcher targets the people who provide the needed responses in good time (Gravetter & Forzano, 2015).

The study was limited in scope by time and finances available. Convenience sampling best suited this study. This further informed the choice of convenience sampling technique. Black (2009) opines that convenience sampling ensures that the researcher is able to conduct a study where there are limited resources with meaningful results because the researcher only included units in the study who they were sure had the needed information and hence were more willing to participate.

3.6 Data Collection Procedures

The study used both primary and secondary data. The primary data was mainly collected through the use of questionnaires. Secondary data was gathered from secondary sources which include books, reports, other studies and journal papers. This is what is referred to as triangulation. There are a number of advantages that triangulation brings to a study apart from enhanced validity and reliability (Hussay & Hussay, 1997). The questionnaires addressed the specific objectives related to the study. Both open-ended and closed ended questions were used in the questionnaire – the open-ended ones being used predominantly as follow ups to the closed-ended questions.

3.6.1 Pilot Study

A pilot study was conducted before venturing into data collection for the project. This involved administering the data collection tools (questionnaires and interview schedules) to a small sub-set of the target population. This was be critical in ensuring

that the instruments are tested for reliability and to ensure validity before beginning to collect data for the study. Pilot testing in any research is an exceptionally important part of any research process though is more often than not neglected by many researchers (Anol, 2012). The pilot testing helped in identifying probable errors and problems that may be encountered using the identified data collection instruments. The sub-set of the population that was used for piloting this study was not included in the final sample for the study. The tools were pre-tested on six (6) respondents from the identified sample size.

3.7 Data Analysis, Interpretation and Presentation

Data collected from the field was cleaned, coded, input into a computer and then finally analyzed using the Statistical Product and Service Solutions (SPSS) software. The results obtained were then presented through frequency distribution tables, percentage frequencies, bar graphs and pie charts. The study used both descriptive and inferential statistics. The data was presented using graphs and charts. Depending on the nature of the findings, graphs and charts were used interchangeably. The data was analysed and presented as per the objectives of this study.

3.8 Validity and Reliability of Research Instruments

3.8.1 Validity

The relationship between the data being collected and the variable being measured is what is referred to as validity. Field (2004), states that validity is the capability of a research instrument to measure what it ought to measure so that the difference in individual scores can be taken as representing true difference in the characteristics under study. The content validity of the instrument was established by discussing the

items in the instrument with the supervisor and other colleagues within the school. The advice provided was reflected upon and taken into consideration while revising the questionnaire so as to measure what was under the study.

3.8.2 Reliability

Reliability is about the internal characteristics of what is being measured. It's about consistency in the generation of results by a research instrument if used by another researcher in another location. Reliability is the proportion of a variance attributable to the true measurement of a variable and estimates the consistency of such measurement overtime. It is a measure of the degree to which a research instrument would yield the same results or data after repeated trials. To test the reliability of the questionnaire, a pre – test through piloting was done. The reliability coefficient was determined using test – retest method because there was need to establish the stability of the data collection.

3.9 Ethical considerations

The researcher sought authority to carry out the research from the university and was given clearance certificate and data collection introduction letter annexed to this report. A self-introductory letter was also done and accompanied the certificate and letter from the University. This letter is also annexed to this report. All respondents were informed about the purpose of the study and the researcher guaranteed the participants confidentiality in the entire research process. Their identities were not revealed and numbers were used instead of their names, and all the information they gave was used for the purpose of this study only.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter presents data analysis, interpretation and presentation from the field study. The study investigated the communication approaches used in disseminating ISFM practices to farmers in Makueni County. The specific objectives were; to establish communication approaches used in disseminating ISFM practices to farmers; to assess the effectiveness of communication approaches used in disseminating ISFM to farmers and to determine the effect of ISFM practices to local farmers on their production levels in Makueni County.

4.2 Study Findings

4.2.1 Demographic Information of the Respondents

A total of 369 respondents participated in the study. They were drawn from two wards; Muvau and Kathonzweni, in Makueni sub-County, Makueni County. The demographic characteristics of the respondents were explored in order to better understand the types of the respondents who participated in the survey and establish their social responsibilities. This information would inform the researcher in several ways as information transfer and technology adoption is highly influenced by peoples' social settings and experience. Information about the respondents' main occupations, gender, and farming systems was analysed and presented in table 4.1.

Table 4.1 Respondent’s main occupations, distribution by sex, and farming systems

Demographic characteristic		Frequency	Percentage
Profession	Government officer	33	8.9%
	Farmer	329	89.2%
	Student	4	1.1%
	Elected leader	3	.8%
Gender	Male	132	35.8%
	Female	237	64.2%
Household decision maker	Self	292	80.0%
	Other	73	20.0%
Farming	Subsistence	362	98.1%
	Commercial	7	1.9%
Farm size	Less than 1 acre	26	7.0%
	More than 1 acre	343	93.0%

Source: Field Survey 2015

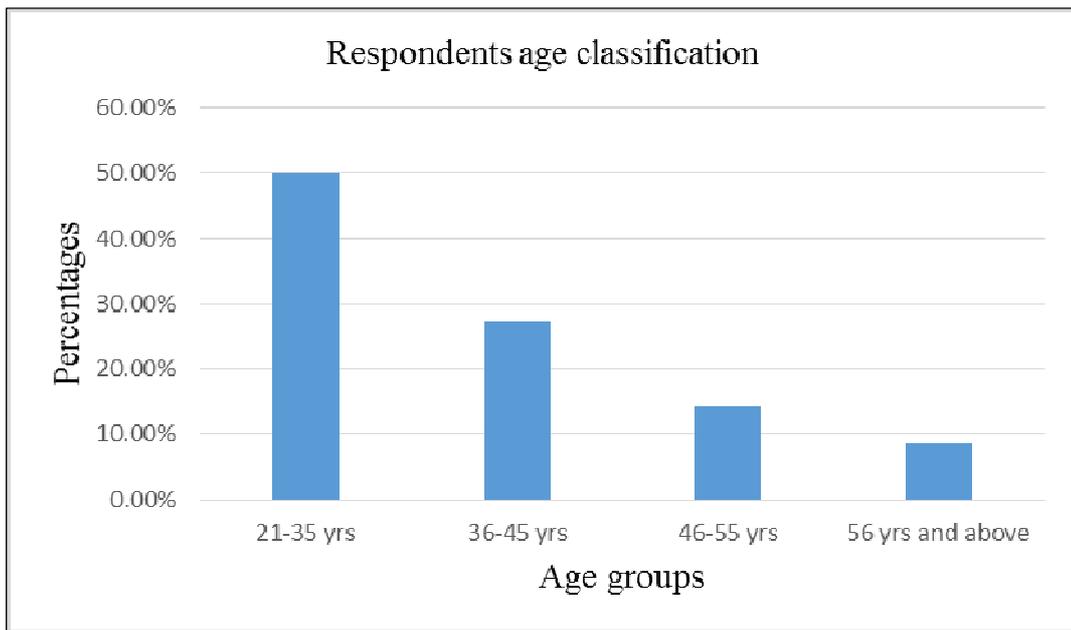
It was established from the study as is shown by table 4.1 above that majority of the respondents comprising of 89% were farmers and this gives a good representation of the farming community who are the main target users for ISFM practices. This means that the study targeted the appropriate respondents who are the expected end users of the ISFM practices. Gender is also important especially when making household decisions. An analysis of the respondents’ distribution by gender established that majority of the respondents were female accounting for up to 64% of the study respondents. The dominance by female respondents can be easily attributed to socialization, community culture and societal settings. Traditionally, farming has been left as a reserve for female farmers especially when it is being done majorly for subsistence as majority of the respondents were also subsistence farmers. In most

settings also, women are easily accessible within communities and this could be another reason why majority of the respondents were women. Regarding their farming systems, 98% of the farmers were subsistence farmers but farming on lands of more than one acre as reported by 93% of the respondents. Most respondents comprising of 80% of the respondents made decisions themselves in their households.

The findings on gender distribution and agriculture dominance by gender is in line with the position of the Food and Agriculture Organization, International Fund for Agricultural Development and World Food Programme that majority of farmers in Africa are actually women (FAO, IFAD and WFP, 2014). They further stated that ensuring sustainable increase in food productivity will involve lifting the many women located in traditional farming practices to adopting modern farming techniques.

An analysis was also conducted to determine age of the respondents involved in the study with the main aim of finding what age groups is highly involved in Agriculture. The respondents' distribution by age is presented in figure 4.1 below. Age is also a great factor when it comes to decision making and hence an important variable for this study.

Figure 4.1: Respondents distribution by age



Source: Field Survey 2015

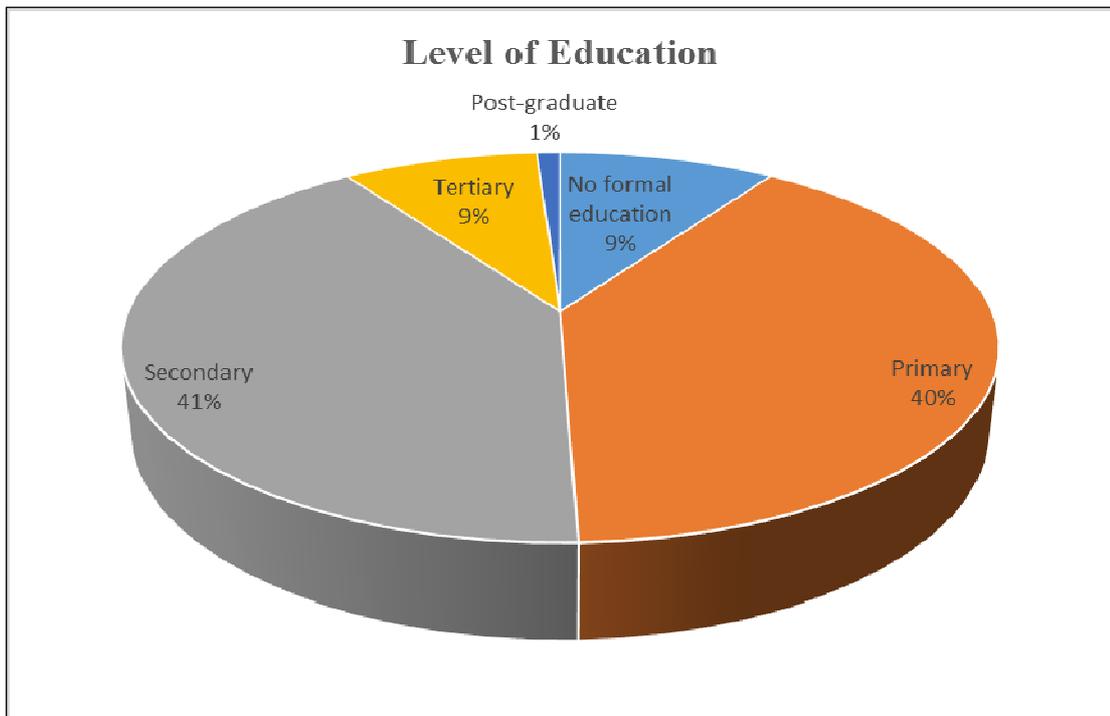
From figure 4.1 above, majority of the respondents were in the age category of 21-35 years comprising of 50% of the respondent followed by those in the age category of 36-45 years comprising of 28%. Others 14% and 9% were in the age category of 46-55 years and 56 years and above respectively. This finding shows that majority of the respondents belonged to the age groups at which they are able to make independent and informed decisions. This is very necessary when it comes to adoption and use of agricultural innovations and technologies like ISFM. Most of the respondent for this study were at an ideal age for making decisions on technology adoption and use are able to make independent decisions regarding farming practices.

An analysis was also done to establish respondents' distribution according to their level of education and their major occupational activities. ISFM practices like most agricultural technologies and innovations are knowledge intensive and thus require that the users should have acquired some basic level of education. Without education,

it is very challenging for one to acquire knowledge of ISFM practices and put them to use. Education level further determines the possibility of one to interact and engage with technology developers and the people involved in the knowledge transfer process.

An analysis on the respondents' level of education showed that majority had some level of education. It was established that most of the famers had primary and secondary levels of education comprising of 40% and 41% of the respondents respectively. 9% of the respondents had tertiary level of education with 1% having post-graduate education with the rest having not gone to school at all. This distribution is presented in table 4.2 below.

Figure 4.2: Respondents' levels of education



Source: Field Survey 2015

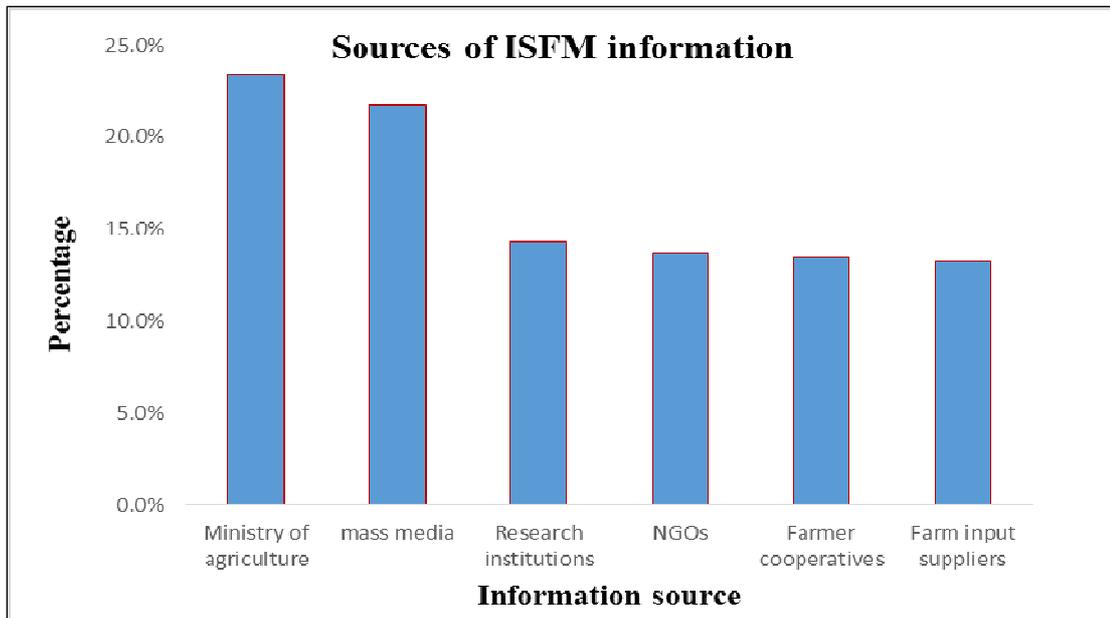
4.2.2 Communication approaches used in disseminating ISFM practices to farmers in Makueni County.

Agricultural research is the source of knowledge and innovations that propel current and future agricultural development. With the increasing challenges of globalization, information technology, international and regional competitiveness, the role of agricultural research as a source of knowledge, technology and innovations has become even more imperative and demanding. Rural farmers play an important role in Kenyan agriculture but there has been a challenge to agricultural extension in Kenya in finding creative, cost-effective and effective ways to communicate agricultural innovations to rural farmers.

4.2.2.1 Sources of information on ISFM technologies

Of the farmers interviewed, majority of them got information about ISFM technologies from the ministry of agricultural extension officers and NGOs comprising of 23.4% and 21.8% of the respondents respectively. Other sources as reported by 14.3%, 13.7%, 13.5% and 13.2% of the farmers were research institutions, the mass media, farmer cooperatives and farm input suppliers respectively as presented in figure 4.3.

Fig 4.3: Sources of information on ISFM practices



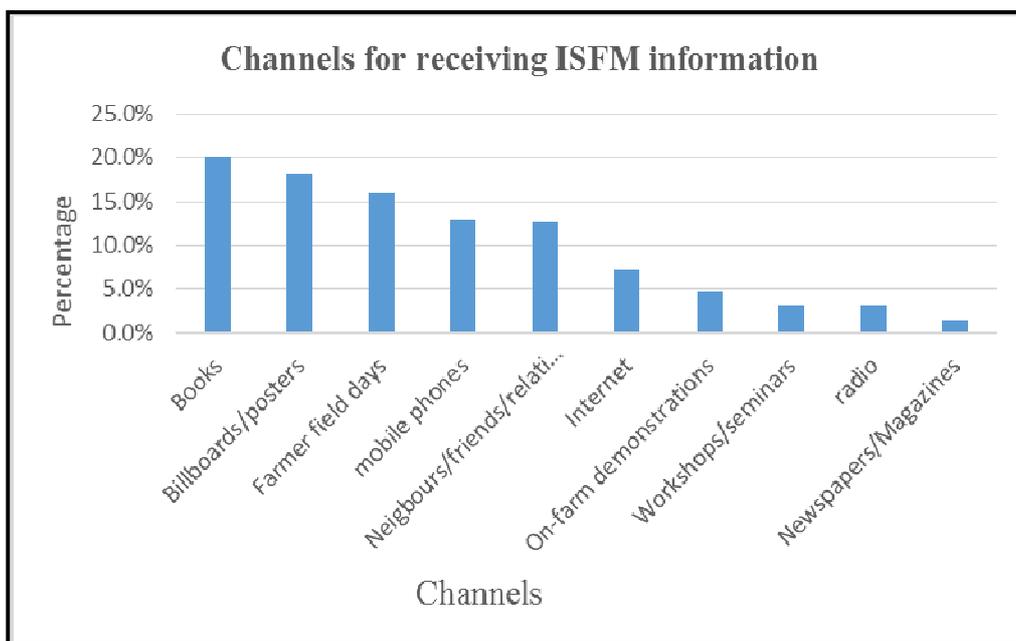
Source: Field Survey 2015

A participant at the Focus Group Discussion held in Muvau ward had this to say, “I have been farming for long and the only source of information about farming for me has been extension workers.” Contacted, the County Minister of Agriculture for Makueni County Mr. Jacobus Mutuku Kiilu said, “Most of the farmers in Makueni County prefer getting their information from the farmer field schools, extension workers and development partners like NGOs.”

4.2.2.2 Channels of information dissemination

From figure 4.4 below, a number of channels were identified as being used in disseminating ISFM information to farmers in Makueni County. They include farmer field schools, mobile phone, neighbors and friends, the internet, on-farm demonstrations, workshops and seminars, radios and newspapers. The frequency of use differs as per the figure below.

Fig 4.4: Channels used in disseminating information on ISFM technologies

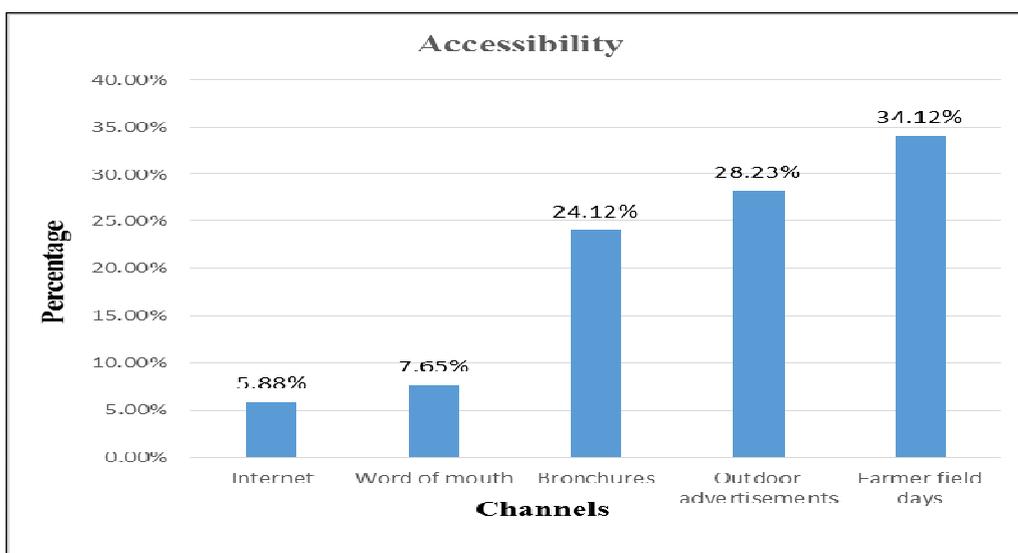


Source: Field Survey 2015

4.2.3 Effectiveness of communication approaches used in disseminating ISFM to farmers in Makueni County

To be able to measure the effectiveness of the channels of communication, the various channels were rated in terms of accessibility, reliability, preference, in-formativeness and comprehensiveness. This was to establish how the identified channels were perceived by the respondents and to be able to establish how they rank with each other. Reponses were analysed and presented in the figures below.

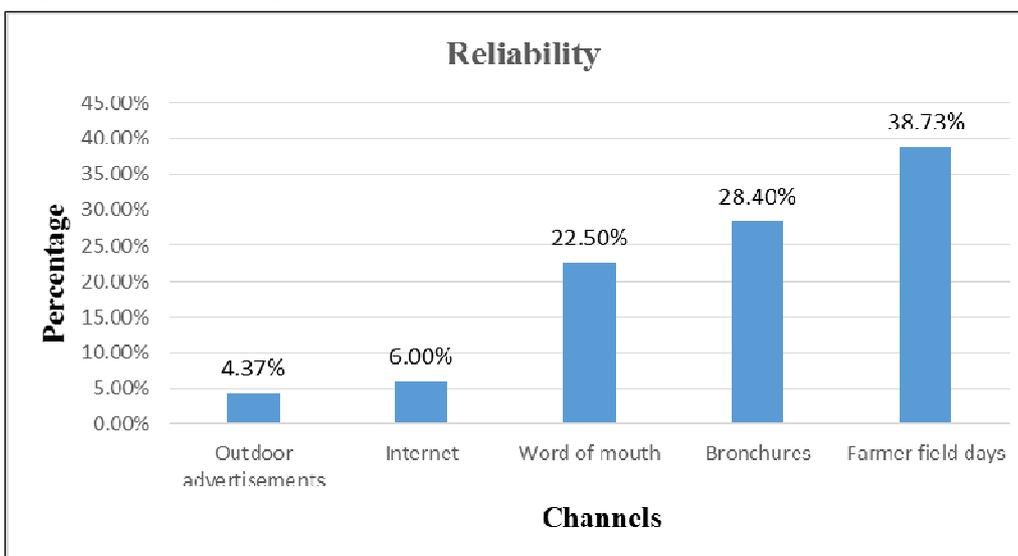
Figure 4.5: Ranking the channels on accessibility



Source: Field Survey 2015

Figure 4.5 above is a representation of the analysis of accessibility of communications channels used in disseminating ISFM information in Makueni County. Farmer field days were ranked by the respondents as the most accessible followed by brochures. Posters and billboards were rated as the least accessible with internet being second least accessible.

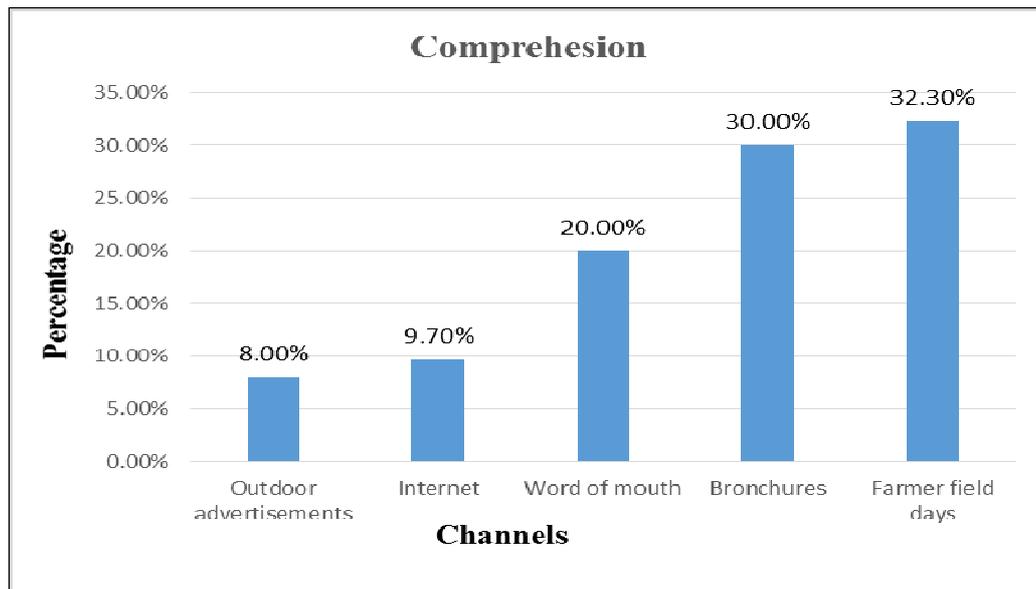
Figure 4.6: Ranking the channels on reliability



Source: Field Survey 2015

Figure 4.6 above is the representation of the ranking of information channels in terms of reliability. Farmer field days were rated as the most reliable by the respondents at 75%. It was followed by brochures at 56%, neighbours at 45%, internet 15% and billboards at 8.7%.

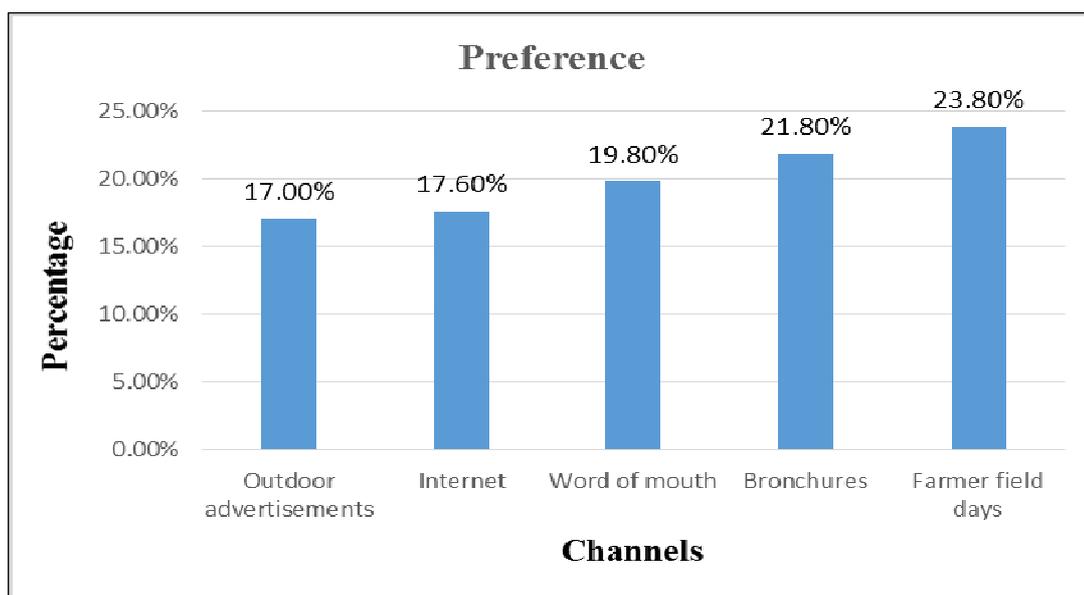
Figure 4.7: Ranking the channels on comprehension



Source: Field Survey 2015

Figure 4.7 above represents the ranking of communication channels on the level of comprehensiveness. Farmer field days was ranked by the farmers as the most comprehensive channel at 62.5%. It is followed by brochures and billboards are the least comprehensive at 16.25%.

Figure 4.8: Ranking the channels on preference



Source: Field Survey 2015

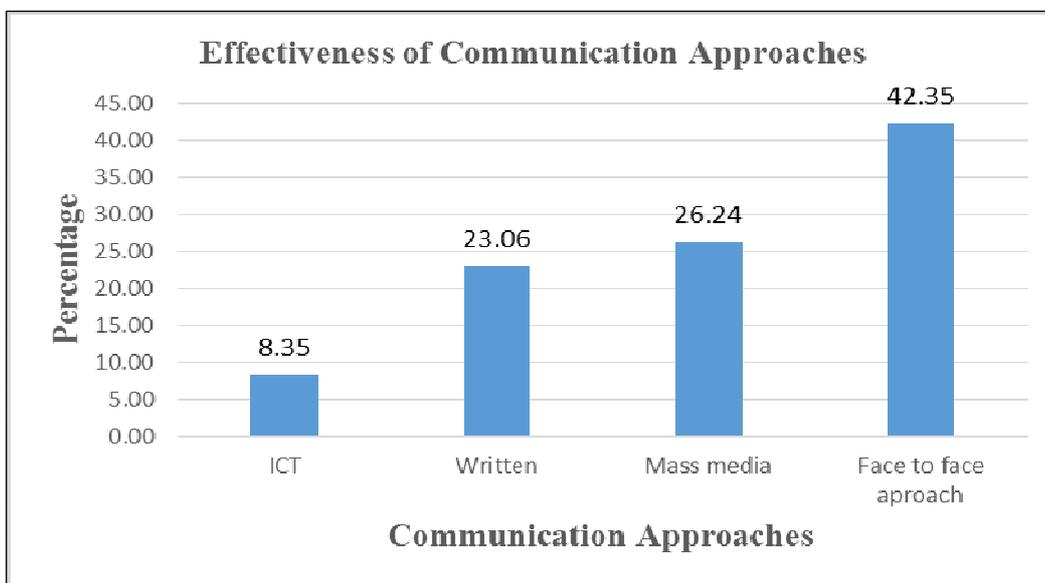
Figure 4.8 above is a representation of how the communication channels were ranked by the respondents in terms of preference. Farmer field days were ranked as the most preferred by farmers (respondents). Farmer field days were the most preferred channel by the respondents in Makueni County. Farmer field days were ranked at 73.75% followed by brochures at 67.5%, neighbours/friends at 61.2%, internet 55% and the least being at 52.50%.

4.2.3.3 Ranking of effectiveness of communication approaches

An analysis was done to establish which amongst the investigated approaches was the most effective when used in disseminating ISFM practices to farmers in Makueni County. The channels were first ranked as above to establish how accessible, comprehensive, reliable and preferred they were as sources of agricultural information. The rankings were then subjected to a further analysis that resulted in figure 4.9 below. According to figure 4.7, face to face approaches were the most

effective at 42.3%, followed by mass media approaches at 26.2% and written approaches at 23.1%. The last is internet-based approaches at 8.3%.

Figure 4.9: Ranking of effectiveness of communication approaches



Source: Field Survey 2015

These findings confirm the argument by Rusike (2004) that face to face approaches are still the most widely used and efficient ways of reaching out to farmers especially in rural areas.

4.2.4 Effect of ISFM practices to local farmers on their production levels in Makueni County.

The researcher sought information about the acquisition and use of the acquired information in the application of ISFM technologies in order to establish whether the acquired information had any impact on their production levels. Responses on variables such as whether the farmers had acquired any information on ISFM, general production and farming systems and productions and farming systems using ISFM were analysed and results presented in table 4.4.

Table 4.2: Acquisition and use of information in the application of ISFM practices by farmers in Makueni County

	Crops farmed	Frequency	Percentage
Crops farmed and which farmer acquired information on ISFM practices	Maize	24	9.1%
	Sorghum	75	28.3%
	Cow peas	73	27.5%
	Pigeon peas	73	27.5%
	Other crops	20	7.5%
	Total	265	100.0%
Crops farmed using ISFM information acquired	Maize	14	5.3%
	Sorghum	60	22.6%
	Cow peas	68	25.7%
	Pigeon peas	69	26.0%
	Other crops	15	5.7%
	Total	226	85.3%

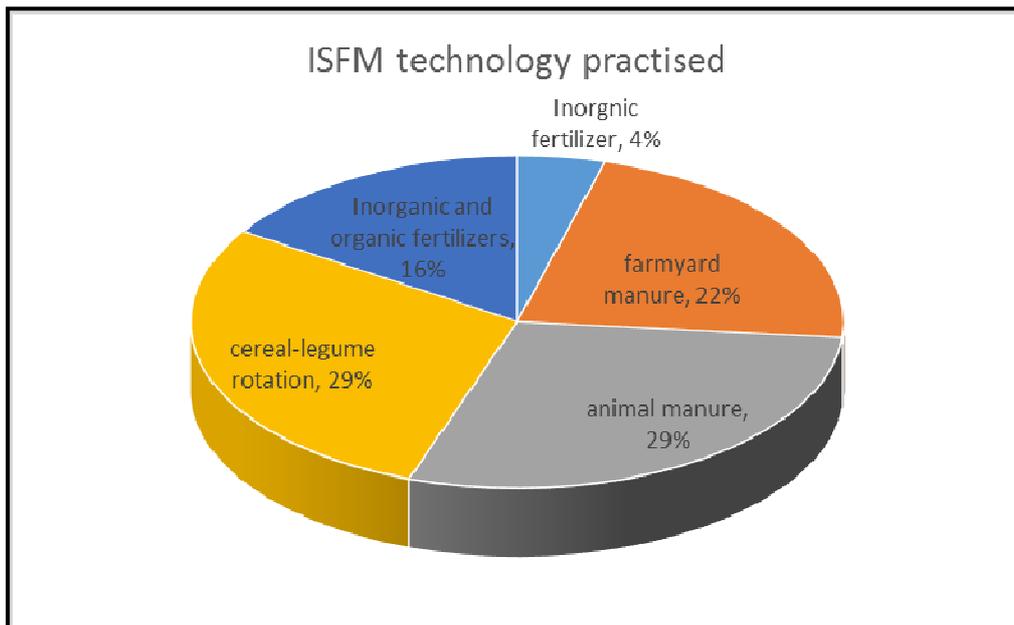
Source: Field Survey 2015

It was established from table 4.2 above that, 85% of the farmers who acquired information on ISFM technologies had practiced them in their farms. Majority of farmers had acquired information on technologies for growing sorghum as reported by 28% of the respondents and cowpeas and pigeon peas as reported by 27% of the respondents each. Others crops farmers knew how to grow using ISFM technologies included maize among others. Similar results were reflected in the adoption of the technologies as majority of farmers had used ISFM information acquired to grow sorghum, cowpeas and pigeon peas.

In terms of adoption of ISFM technologies disseminated, farmyard manure, animal manure and cereal-legume rotation were the highly adopted technologies at the rates of 22.5%, 28.2% and 28.2% respectively. Farmers had similarly practiced the same

technologies for the longest periods of time with each practiced for an average of 7, 6 and 6 years respectively. Inorganic fertilizers had being adopted by lesser farmers at a rate of 4% for a period of an average of 3 years as shown in table 4.5.

Figure: 4.10 ISFM technology adoption rates and practice

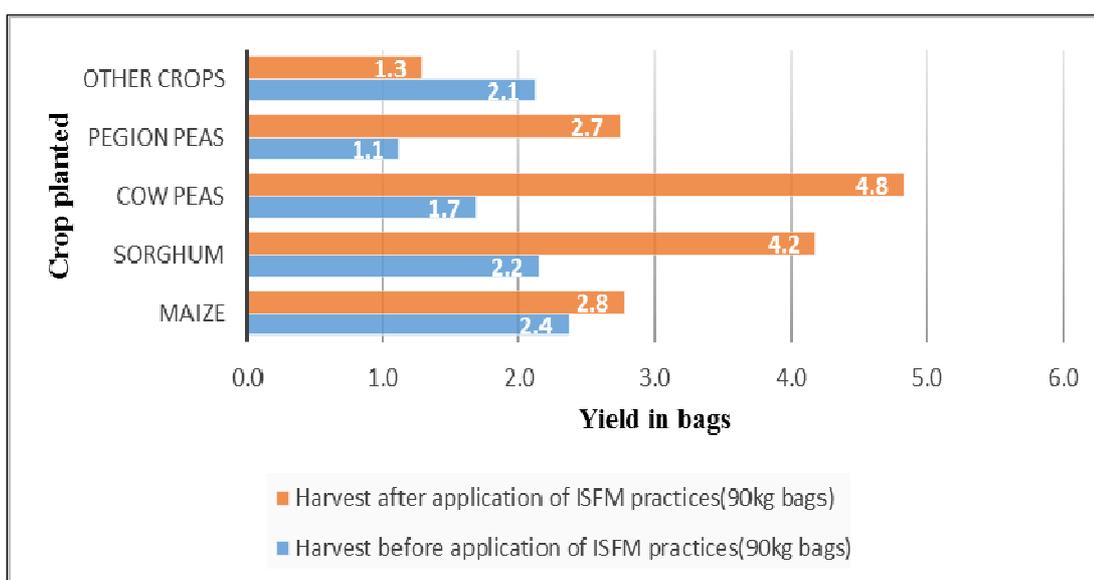


Source: Field Survey 2015

Generally, the level of adoption of the ISFM technologies by farmers is very low in Makueni County. This might be explained by the fact that communication approaches used in disseminating the technologies have various limitations. For instance, some sources such as research institutions, the mass media, farmer cooperatives and farm input suppliers, and channels such as the reading books and posters, farmer field schools, mobile phone, neighbors and friend, radio and television as reported by majority of the farmers in Makueni County are not compressive and informative enough.

To establish the impact of ISFM practices on farmer production, an analysis was conducted to determine the impact. The production trends were analysed with focus on the yields before and after application of ISFM technologies and results were as shown in figure 4.10 below.

Figure 4.11: Comparison between production yield from different crops before and after application of ISFM technologies



Source: Field Survey 2015

It was established from figure 4.10 above that yields from harvest of the crops grown using the application of ISFM technologies adopted by farmers had increased significantly compared to the other crops. Yields from cow peas and sorghum had increased tremendously compared to previous seasons were high yields were mostly realized from maize and other crops not promoted in the ISFM technologies. The use of ISFM practices has the ability to lead to 182% increase in production of cowpeas; 145% increase in production of pigeon peas; 90% increase in production of sorghum and 17% increase in maize production. As Sanginga (2012) suggested, this study has actually confirmed that the use of ISFM practices leads to a resultant increase in crop production for farmers.

The findings clearly demonstrate the fact that access to agricultural information and knowledge enhances farmer adoption and use of the technologies thus increasing their productivity more so in terms of crop yields. Asaba *et.al.* (2006), agricultural information is a key component in improving small-scale agricultural production and linking increased production to markets, thus leading to improved rural livelihoods, food security and national economies. Therefore, it is important that knowledge and information should be channeled to farmers through appropriate dissemination that uses appropriate communication approaches.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusion and recommendations based on the study findings. It looks into what the study was all about, literature review, methodology, data analysis and interpretation and also draws conclusions from the findings. Further, the chapter presents the recommendations based on the study findings.

5.2 Summary

Face to face approaches were rated highly effective by farmers in transferring of agricultural knowledge and skills. Socioeconomic variables (e.g. education level, wealth status, and distance from information centres) also play critical role and had a significant influence on farmer access to ISFM information and knowledge and subsequent uptake. A number of partners involved in agricultural knowledge dissemination have used different approaches to reach to farmers and these had varied levels of effectiveness. Overall, effective communication leads to adoption of technologies thus resulting in increased farmer productivity.

The study has established the different communication approaches and assessed the effectiveness of the approaches in disseminating ISFM technologies. Farmers identified different sources from which they acquired information on ISFM and also different channels through which the information was passed. Efficiency of the communication approaches was measured in terms of accessibility, reliability, informativeness, comprehensiveness and preference and farmers ranked sources and

channels on a four point Likert scale from the highest to the lowest. It was further observed that as a result good communication of the information on ISFM practices farmers had adopted some of the technologies and crop yields had increased from the application of the technologies.

5.2 Conclusion

According to the findings of this study, a number of communication approaches have been used in disseminating ISFM practices to farmers in Makueni County. The study also revealed that Makueni County is mostly habited by farmers as majority of households in Makueni depend on farming for their livelihoods. Most of these are subsistence farmers with a few doing commercial agriculture. In disseminating information and knowledge on ISFM practices to farmers in Makueni County, a number of communication approaches have been used. This is an assertion of Miller (2014) view that there are numerous communication approaches that have been used by different players to reach to farmers. Ther choice largely has been dependent on the preference of the technology developers.

The effectiveness of the different communications approaches in knowledge dissemination also varies as has been found out in this study. Face to face approaches that include farmer field days/schools, on-farm demonstration, agricultural extension, and community channels emerged to be the most effective. Face to face approaches were also found to be very comprehensive and the most reliable and informative and therefore were highly preferred. As Huesca (2012) argued, the various approaches to communication are different in the aspects of accessibility, preference, reliability, comprehensiveness and informativeness were newspapers, books, television, posters

and the internet. Rusike (2004) had also argued that face to face approaches offer the best way of disseminating ISFM knowledge. Being knowledge intensive, Rusike argued that ISFM practices require that a lot of time is spent with the farmers to ensure all skills are transferred.

The use of an appropriate approach to communication was found to lead to adoption of ISFM practices. The adoption and use of ISFM practices was hence found to be having a positive impact on farmer productivity and those who have adopted some aspects reported an increase in yields. 85% of the farmers who acquired information on ISFM practices and practiced them in their farms to grow sorghum, pigeon peas and cow peas, reported that ISFM practices indeed had improved their farm productivity.

As Place, *et al* (2003) argued, not all aspects of ISFM practices are being put into use by farmers. In agreeing with this argument the study found that not all aspects of ISFM practices are actually in use by farmers who have adopted and are using ISFM practices. Most of the farmers using ISFM practices are applying just portions of the ISFM package. Majority of the farmers had received information on the following components of ISFM practices; farmyard manure, animal manure and cereal-legume rotation and were adopted at the rates of 22.5%, 28.2% and 28.2% respectively. There were reported increases in yields after application of these ISFM practices observed. The greatest increase in yields was found to be from cow peas and sorghum which had recorded tremendous increase compared to previous seasons where high yields were mostly realized from maize and other crops not promoted in the ISFM technologies.

Finally, as fronted by the theory of diffusion of innovations theory, this study has confirmed that adoption of ISFM practices occurs through a process. Despite the introduction of the ISFM practices to all farmers in Makueni County, only a few of the farmers have adopted the practices. It was established that there are those who have used the practice for 6 years, others for 5 years, others for 3 years and others for just one season. This is a true confirmation that innovations go through a process towards full adoption. It is therefore necessary to factor this while taking innovations to users like farmers and to use appropriate communications approaches to inform, equip and persuade people to adopt and use the practices.

5.3 Recommendations

ISFM practices just like other agricultural innovations are knowledge intensive and require that appropriate knowledge transfer approaches be put in place. It has also been confirmed from the findings of this study that ISFM practices has a positive impact on farmer productivity. For these reasons, the researcher wishes to make the following recommendations.

Face to face communication approaches should be prioritized as the means of transferring knowledge and skills on agricultural innovations. This is because it has been clearly illustrated from the study findings that face to face communication approaches like farmer field schools/days, on-farm demonstrations and NGOs are most effective in knowledge dissemination.

To ensure that agricultural innovations are fully adopted and used by farmers, the researcher recommends an establishment of demonstration sites in at least each sub-

county. These demonstration plots can be managed by the ministry of agriculture but act as central points for acquiring knowledge on innovations. Other partners can use these sites whenever they need them. 77.5% of the respondents reported that they would prefer to receive information through farmer field days and these can be conducted at the demonstration sites.

The study has also established that ISFM practices lead to an increased yield in production. The use of ISFM practices has the ability to lead to 182% increase in production of cowpeas; 145% increase in production of pigeon peas; 90% increase in production of sorghum and 17% increase in maize production. Therefore, the study recommends that ISFM practices be introduced in all counties and most importantly counties that lie in arid and semi-arid areas of the country.

Based on the findings of this study, the researcher recommends that farmers be encouraged to farm the crops that can do better in their specific regions for them to realize maximum benefits from their farms. Farmers in arid and semi-arid lands are advised to concentrate on farming drought resistant crops such as cowpeas, pigeon peas, and sorghum.

Government and development agencies need to invest more resources towards knowledge transfer on innovations. This is because the study confirmed that agricultural innovations like other innovations are adopted through a process. While not all respondents had adopted ISFM practices, the study finding showed that even though who had adopted ISFM were not using the full package but just portions of the

package. More time and money needs to be allocated towards knowledge and skills transfer.

There is need to conduct research to explore how the emerging new media can be used in transferring knowledge about innovations to farmers. This is because while conducting the study it was established that majority of the farmers own mobile phones. A study should be conducted to find out how this can be taken advantage of to ensure even more farmers are reached with these innovations.

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APPENDICES

Appendix 1: Questionnaire

Dear Respondent,

Thank you for accepting to respond to this questionnaire. The questions herein are for the purposes of generating data for an academic research project titled: *Investigating Communication Approaches used in disseminating Integrated Soil Fertility Management (ISFM) practices: A case study of Makueni sub-county, Makueni County*, as part of the requirements for the award of a Master of Arts Degree in Communication Studies at the School of Journalism, University of Nairobi.

Your assistance in answering the questions accurately, truthfully and sincerely be highly appreciated. Please also note that the information you provide here be treated with utmost confidentiality.

Kind regards,

Daniel Adero,

Postgraduate Student, School of Journalism and Communication Studies,
University of Nairobi,

Email: mcadero85@gmail.com

Mobile: +254 720778155

SECTION A: Respondent Demographic Characteristics

Date:	Response options	Mark { X } as appropriate
Name (Optional)		
Farmer Identity (ID)		
Age Category	21 – 35 years	
	36 - 45 years	
	46 - 55 years	
	56 years and above	
Gender	1=Male, 2=Female	
County		
Sub-County		
Location		
Ward		
Educational Level Attained	No formal education	
	Primary	
	Secondary	
	Tertiary (College/University)	
	Post-Graduate (Masters/PhD)	
Profession	Government Officer	
	Researcher/ Scientist	
	Journalist	
	Religious Leader	
	Farmer	
	Student	
	Communications Specialist	
	Elected Leader	
	Other	
Household Decision Maker	1=Self , 2=Others	
Farming	1=Subsistence, 2=Commercial 3=Other (specify)	
Farm Size	1=Less than an acre, 2=More than an acre	

SECTION B: Question 1: Sources of information, knowledge, understanding and application of ISFM practices by farmers

ISFM Information Sources	Rank the different information sources on the basis of the following context 1=highest 4 =lowest				
	Accessibility	Reliability	Informativeness	Comprehension	Preference
Farmer groups					
Ministry of Agriculture					
Mass Media e.g radio, TV					
Extension staff					
Research institutions					
Neighbors/ friends/relatives					
CBOs					
Chief's barazas					
NGOs					
Agricultural companies					
Farmer groups or Cooperatives					
Farm Input Suppliers					
Others (Specify)					

**Question 2: Assessment of Channels used by Farmers to receive information
knowledge, understanding and application of ISFM practices by farmers**

ISFM Channels	Information	Rank the different channels on the basis of the following context 1=highest ... 4=lowest				Would you be to seek for information using this channel? 1=Yes,2=No
		Accessibility	Reliability	Informativeness	Comprehension	
Farmer Field Days						
Workshops/Seminars						
Radio						
Television						
Newspapers/Magazines						
Billboards/Posters						
Books						
Brochures						
Neighbours/ friends/relatives						
On-farm demonstrations						
Public gatherings (barazas)						
Mobile phones						
Internet						
Others specify						

Question 3: Acquisition and use of information in the application of ISFM technologies by farmers

ISFM practice	Acquisition of information			Use of information		
	Has the farmer acquired information on this technology? [1=Yes, 2=No]	If Yes, Sources of information about its use? [Use Codes Below]	If Yes, preferred channels for receiving information? [Use Codes Below]			
Inorganic fertilizers						
Green Manure (Herbaceous)						
Green manures (Trees)						
Farmyard manure						
Animal manure						
Cereal-legume rotation						
Compost						
Crop residues						
Inorganic + organic fert.						
Rock phosphate						
Rhizobium Inoculants						
Improved germplasm						
Biomass transfers						
Improved fallows						
Micro-dosage of fertilizers						
Agroforestry (fertilizer trees)						
Other- specify						

Information Sources Codes

1=Farmer groups **2**=Ministry of Agriculture **3**=Mass
Media **4**=Extension staff **5**=Research institutions
6=Learning institutions **7**=Neighbors/ friends/relatives **8**=CBOs
9=NGOs **10**=Churches **11**=Local administration / village elders
12=Agricultural companies **13**=Farmer Cooperatives **14**=Farm Input
Suppliers

Communication Approaches codes

a) Mass media **1**=Radio, **2**=TV **3**=Newspaper/magazines **b)**
Interpersonal **4**=Songs/ Poems/Skits, **5**=Neighbors/ friends/relatives **c)** Community-
based **6**=On-farm demonstrations **7**=Farmer field days
8=Workshops/Seminars **9**=Farmer-led experimentation **10**=Farm-to-farm visits
11=Public gatherings (barazas) **d)** Print-based

Question 4: Impact of ISFM information and knowledge on crop productivity.

(Answer only on relevant crops)

Crop being farmed	Did the farmer acquire information on ISFM practices (YES=1, NO=2)	Has the farmer applied ISFM practices (YES=1, NO=2)	If farmer applied ISFM practices what was the harvest after application (90kg bags)	If farmer did not apply ISFM practices what was the harvest after application (90kg bags)	What was the farmer's harvest before getting aware and using ISFM for those who applied it? (90kg bags)
Maize					
Sorghum					
Beans					
Soybean					
Other Crops (Specify)					

Question 5: Is the farmer or spouse a member of any co-operative, social group or out-grower group? [1=Yes 2=No] _____

If yes, fill the table below

Name of Farmer (Optional)	Farmer ID (from Section A)	Name of co- operative, social group or out grower group	Services received from the group or cooperative

Appendix 2: Interview Schedule for Focus Group Discussions (FGDs)

Person Interviewing: ...

Person being interviewed: ...

Date of interview: ...

Profession:

Age: Tick as appropriate

21 – 35 years
36 - 45 years
46 - 55 years
56 years and above

Questions:

1. Are you involved in farming/agriculture in the County/Sub-county?
2. How are you are involved with farming in the sub-County?
3. Have you ever heard about Integrated Soil Fertility Management?
4. How did you hear about ISFM?
5. How would you prefer to receive information on ISFM? What would you say is the most preferred approach for you?
6. Have you ever applied the ISFM practices? If yes, which amongst the practices have you used?
7. Would you say that ISFM has improved your productivity ever since you started using it? Explain?
8. Would you recommend ISFM to other farmers? Why?
9. Anything you would like to say about ISFM concerning how the message was conveyed to you, its impact on your production or anything in this line.

Appendix 3: Population data of Makueni County

Sub-county	Ward	Population		Poverty Index		Presence of NGO's	Agro-ecological and Livelihood Zones		
		Ward Level	Sub-county	Ward Average	Sub-county average		MF.CDI	MF.FCL	MMF
Mbooni	Tulimani	35,350		61	65	X			
	Mbooni	33,774		67		X			
	Kithungo/Kitundu	28,185		71		X			
	Kiteta-Kisau	37,059		61		X			
	Waia-Kako	23,082		63		XX			
	Kalawa	27,174	184,624	70		XXX			
Kilome	Kasikeu	38,348		62	59	XXX			
	Mukaa	26,525		57		XX			
	Kiima Kiu/Kalanzoni	22,991	87,864	57		X			
Kaiti	Ukia	38,490		67	65	X			
	Kee	26,649		64		XX			
	Kilungu	33,952		65		X			
	Ilima	21,025	120,116	64		X			
Makueni	Wote	25,326		61	66	XXX			
	Muvau/Kikumini	24,477		61		X			
	Mavindini	23,274		73		XXX			
	Kitise/Kithuki	22,054		72		XXX			
	Kathonzweni	31,277		72		XXX			
	Nzaui/Kilili/Kalamba	37,042		56		X			
	Mbitini	30,348	193,798	65		X			
Kibwezi West	Makindu	42,094		55	56	XXX			
	Nguumo	28,208		60		XXX			
	Nguu/Masumba	23,764		59		X			
	Emali/Mulala	25,657		66		X			
	Kikumbulyu North	20,314		49		XXX			
	Kikumbulyu South			49		XXX			

		26,368	166,405						
Kibwezi East	Masongaleni	32,270		57	55	XXX			
	Mtito Andei	34,354		55		X			
	Thange	31,654		51		XX		25%	75%
	Ivingoni/Nzambani	33,442	131,720	56		X		25%	75%
			884,527						

Appendix 4: Letter of Introduction



UNIVERSITY OF NAIROBI
COLLEGE OF HUMANITIES & SOCIAL SCIENCES
SCHOOL OF JOURNALISM & MASS COMMUNICATION

Telegram: Journalism Varsity Nairobi
Telephone: 254-02-334244, 332986, 226451 Ext. 28080, 28061
Director's Office: 254-02-229168 (Direct Line)
Telex: 22095 Fax: 254-02-229168
Email: director-soj@uonbi.ac.ke

P.O. Box 30197
Nairobi,
Kenya

OUR REF:
YOUR REF:

DATE: July 14, 2015

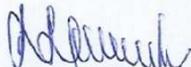
TO WHOM IT MAY CONCERN

RE: ADERO, Daniel Otieno- K50/69794/2013

This is to confirm that the above named is a bona fide student of the University of Nairobi's School of Journalism and Mass Communication registered for Master of Arts degree in Communication Studies.

Mr. Daniel has completed his course work and is currently going to collect data for his research project leading to a Master of Arts Degree in Communication Studies.

Any assistance accorded to him will be highly appreciated.


Ndung'u wa Munywe
Assistant Registrar

School of Journalism & Mass Communication



NwM/dm

Appendix 5: Certificate of Field Work



UNIVERSITY OF NAIROBI
COLLEGE OF HUMANITIES & SOCIAL SCIENCES
SCHOOL OF JOURNALISM & MASS COMMUNICATION

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Email: director-soj@uonb.ac.ke

P.O. Box 30197-00100
Nairobi, GPO
Kenya

REF: CERTIFICATE OF FIELD WORK

This is to certify that all corrections proposed at the Board of Examiners' meeting held on 21ST MAY 2015 in respect of M.A./Ph.D final Project/Thesis defence have been effected to my/our satisfaction and the student can be allowed to proceed for field work.

Reg. No: IK50/69794/2013

Name: ADERO, DANIEL OTIENO

Title: Investigating Communication Approaches used in disseminating Integrated Soil Fertility Management Practices: A case Study of Makueni sub-county, Makueni County

I. J. Ndolo
SUPERVISOR

[Signature]
SIG. NATURE DATE 17/9/2015

Dr Samuel Siringi
PROGRAMME COORDINATOR

[Signature]
UNIVERSITY OF NAIROBI
DIRECTOR DATE 20/9/2015

Dr. Wambui Kiani
DIRECTOR

[Signature]
SIG. NATURE/STAMP DATE 30.9.15

