INFLUENCE OF COMMUNICATION ON ADOPTION OF AGRICULTURAL INNOVATION: A CASE OF THE SYSTEM OF RICE INTENSIFICATION IN MWEA IRRIGATION SCHEME

BY

JUDITH TAAKA OCHIENNO

A Research Project Submitted In Partial Fulfillment of the Requirements for the Award of the Degree of Master of Arts in Communication Studies, School of Journalism at the University of Nairobi

NOVEMBER 2014
DECLARATION

This research project is my original work and has not been presented anywhere to the best of my knowledge. No part of this thesis may be reproduced without the prior permission of the author.

Signature……………………………… Date……………………………………

Judith Taaka Ochiенко
Reg. No. K50/79732/2012

This research project has been submitted with our approval as the university supervisor.

Signature……………………………… Date……………………………………

Dr. Hezron Mogambi
Supervisor
DEDICATION

This work is dedicated to these great people:

My husband Eric,

My parents Mr. and Mrs. Ochieno

My children, Yvonne and Jackson.
ACKNOWLEDGEMENT

I am greatly indebted to the Almighty God for granting me good health and the motivation to successfully complete this long journey to MA (Communication Studies) made up of three distinct yet intricately related components: coursework, examination and project. Special thanks to my supervisor Dr. Hezron Mogambi for his invaluable comments, guidance and encouragement. One could not have gotten better mentors.

This work would not have been completed without data support from Mwea Irrigation Agricultural Development (MIAD) Centre. I particularly thank Dr. Raphael Wanjogu and Prof. Bancy Matti for their insights they provided to enrich the study. I also make a special mention of my colleague Simon Kareithi for your special support during field visits. To my fellow classmates: Maximilla Onyango, Effie Rota, Esther G. Lungahi, Pauline S. Akuku, Concepta Adhiambo, and Risper Juma; thank you all for the encouragement.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>x</td>
</tr>
<tr>
<td>ABBREVIATIONS AND ACRONYMS</td>
<td>xi</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>xii</td>
</tr>
<tr>
<td>CHAPTER ONE: INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.0 Background</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Statement of the Problem</td>
<td>7</td>
</tr>
<tr>
<td>1.2 Research Objectives</td>
<td>7</td>
</tr>
<tr>
<td>1.3 Research Questions</td>
<td>8</td>
</tr>
<tr>
<td>1.4 Justification for the Study</td>
<td>8</td>
</tr>
<tr>
<td>1.5 Significance of the Study</td>
<td>9</td>
</tr>
<tr>
<td>1.6 Scope of the Study</td>
<td>9</td>
</tr>
<tr>
<td>1.7 Definition of Significant Terms</td>
<td>10</td>
</tr>
<tr>
<td>CHAPTER TWO: LITERATURE REVIEW</td>
<td>11</td>
</tr>
<tr>
<td>2.0 Introduction</td>
<td>11</td>
</tr>
<tr>
<td>2.1 Adoption of Agricultural Innovation</td>
<td>11</td>
</tr>
<tr>
<td>2.3 Communication Factors Affecting Adopting of Agricultural Innovation</td>
<td>13</td>
</tr>
<tr>
<td>2.3.1 Sources of information</td>
<td>13</td>
</tr>
<tr>
<td>2.3.2 Frequency of interaction</td>
<td>14</td>
</tr>
</tbody>
</table>
2.3.3 Membership of cooperative ................................................................. 15
2.3.4 Social Networks ...................................................................................... 15
2.4 Influence of socio-economic factors on adoption of agricultural innovations .... 16
  2.4.1 Farm Size ................................................................................................. 16
  2.4.2 Education ................................................................................................. 17
  2.4.3 Age ........................................................................................................... 18
  2.4.4 Household factors .................................................................................... 19
2.5 Barriers to Adoption of Agricultural Innovation Development ..................... 19
2.6 Theoretical Framework ................................................................................ 20
  2.6.1 Diffusion of Innovation Theory ............................................................. 21

CHAPTER THREE: RESEARCH METHODOLOGY ........................................ 24
3.0 Introduction .................................................................................................. 24
3.1 Research Design .......................................................................................... 24
3.2 Research Site ............................................................................................... 24
3.3 Target Population ........................................................................................ 25
3.4 Sampling Technique and Sample Size ....................................................... 25
3.5 Data Collection Methods ............................................................................ 26
  3.5.1 Questionnaires ......................................................................................... 26
  3.5.2 Key Informant Interviews ..................................................................... 27
  3.5.3 Observation ............................................................................................. 27
3.6 Data Collection Procedures ........................................................................ 27
3.7 Data Analysis Methods ................................................................................. 28
CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION........................................ 29

4.1 Socio-Economic Information........................................................................ 29
  4.1.1 Gender......................................................................................... 29
  4.1.2 Age............................................................................................. 30
  4.1.3 Education.................................................................................... 31
  4.1.4 Farming Experience...................................................................... 31
  4.1.5 Farm Size.................................................................................... 32

4.2 Information and Communication of SRI.................................................... 33
  4.2.1 Source of information on SRI....................................................... 33
  4.2.2 Frequency of use of SRI source of information............................. 34
  4.2.3 Sensitization of SRI................................................................. 35
  4.2.4 Communication Factors Affecting Adoption of SRI.................... 36

4.3 Constraint to adoption of SRI................................................................... 37
  4.3.2 Willingness of Farmers to Adopt SRI........................................... 38
  4.3.1 Barriers to Technological Innovation Adoption.......................... 39

4.4 Regression Analysis.................................................................................. 43
  4.4.1 ANOVA...................................................................................... 43
  4.4.2 Multiple Regression................................................................ .. 44

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS 47

5.0 Introduction............................................................................................. 47
5.1 Summary................................................................................................. 47
5.3 Recommendations................................................................................... 49
5.4 Areas of Further Study

APPENDICES

APPENDIX 1: LETTER OF INTRODUCTION

APPENDIX 2: QUESTIONNAIRE FOR RICE FARMERS

APPENDIX 3: KEY INFORMANT INTERVIEW GUIDE

APPENDIX 4: OBSERVATION CHECKLIST
LIST OF TABLES

Table 4.1: Source of Information on SRI for Farmers ........................................34
Table 4.2: Frequency of Use of Information Sources .........................................35
Table 4.3: Form of SRI Sensitization Given to Farmers .....................................36
Table 4.4: Communication Factors Influencing SRI Implementation ..................37
Table 4.5: The Technology is Expensive .............................................................40
Table 4.6: Labour Intensive Technology ..............................................................41
Table 4.7: Adequate Information ........................................................................41
Table 4.8: Lack of Experience ...........................................................................42
Table 4.9: Lack of Support and Training ............................................................42
Table 4.10: Investments Costs ...........................................................................43
Table 4.11: ANOVA .........................................................................................43
Table 4.12: Multiple Regression Analysis ..........................................................45
LIST OF FIGURES

Figure 1: Gender of Respondents…………………………………………………………..30
Figure 2: Age of Respondents……………………………………………………………31
Figure 3: Education of Respondents……………………………………………………32
Figure 4: Rice Farming Experience of Respondents………………………………..32
Figure 5: Farm Size of Respondents………………………………………………….33
Figure 6: Adoption of SRI among Farmers……………………………………….38
Figure 7: Willingness of Respondents to Adopt SRI……………………………39
### ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASDS</td>
<td>Agricultural Sector Development Strategy</td>
</tr>
<tr>
<td>DIT</td>
<td>Diffusion of Innovation Theory</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GoK</td>
<td>Government of Kenya</td>
</tr>
<tr>
<td>JKUAT</td>
<td>Jomo Kenyatta University of Agriculture and Technology</td>
</tr>
<tr>
<td>LDCs</td>
<td>Less Developed Countries</td>
</tr>
<tr>
<td>NIB</td>
<td>National Irrigation Board</td>
</tr>
<tr>
<td>NRDS</td>
<td>National Rice Development Strategy</td>
</tr>
<tr>
<td>SRI</td>
<td>System of Rice Intensification</td>
</tr>
<tr>
<td>TPB</td>
<td>Theory of Planned Behaviour</td>
</tr>
<tr>
<td>WARDA</td>
<td>West Africa Rice Development Association</td>
</tr>
</tbody>
</table>
ABSTRACT

The study sought to investigate the influence of communication on adoption of agricultural innovation and technology. The study used a case of the System of Rice Intensification (SRI) which was introduced to farmer in the Mwea Irrigation Scheme in 2009. The study was guided by three specific objectives which were; to determine the communication factors affecting the adoption of system of rice intensification; to find out the influence of background characteristics in adoption of system of rice intensification and to identify the barriers facing rice farmers in adoption of system of rice intensification.

The study adopted a descriptive research approach which used questionnaires, key informant interview guide and observation checklist. The use of qualitative and quantitative data techniques enhanced the validity and reliability of the research. The study was able to gather 81 complete questionnaires which fulfilled the criteria for analysis. The researcher was able to conduct a key informant interview with one of the project initiators. The data was presented in charts, graphs and tables and was added by the researcher’s own interpretation.

The study findings showed that education of the farmers and experience of the farmer influence adoption of SRI. In terms of communication, the frequency of interaction between farms and extension officers, availability of information on SRI were the most significant determinants of adoption whereas the source of information was the least. The barriers of adoption were the investments costs and inadequate information on SRI.

The study concludes that the frequency of communication between the farmers and extension agents was a significant communication factor affecting adoption of SRI among the Mwea Irrigation Scheme farmers. The availability of information was also shows to be a communication factor affecting adoption of SRI with the results indicating that the source of information was not a significant factor in determining adoption of SRI. Among the socio-economic variables influence on adoption of agricultural innovation are education levels and the farmers’ experience. The barriers facing farmers in adoption of SRI in the Mwea Irrigation Scheme were investments costs, lack of adequate information on SRI and lack of previous experience of technology.

The study recommends that more sensitization of The SRI technology to farmers through the extension officers and technical staff of the project. Previous studies have shown that the rate of adoption has been higher among those farmers that have more interaction with technical staff in their farms. That facilitation between farmers and the SRI project implementers on communication of information. This would entail identifying the information that farmers need to be provided in order to be sensitized on SRI through field visits. That the SRI project implementers should engage with farmers who have had more experience in rice farming and those with higher level of education. This will provide motivation for other farmers as they study found that these two groups are the most likely adoptees of SRI.
CHAPTER ONE

INTRODUCTION

1.0 Background

Advancements in technology has changed the dynamics of how human beings perform their work today in virtually all sectors of productivity. Agricultural production has also experienced change in terms of how farmland activities are undertaken and this has influenced the labour associated with agricultural farming and the performance of agriculture globally. Suding and Zilberman (2000) contend that technological change has been a major factor shaping agriculture in the last 100 years. However, the adoption and diffusion of these agricultural innovation has often been determined by communication on the transfers of technologies.

The agricultural sector is the backbone of the Kenya’s economy. The sector directly contributes 24% of the Gross Domestic Product (GDP) and 27% of GDP indirectly through linkages with manufacturing, distribution and other service related sectors. Approximately 45% of Government revenue is derived from agriculture and the sector contributes over 75% of industrial raw materials and more than 50% of the export earnings. The sector is the largest employer in the economy, accounting for 60 per cent of the total employment. Over 80% of the population, especially living in rural areas, derive their livelihoods mainly from agricultural related activities. Due to these reasons the Government of Kenya (GoK) has continued to give agriculture a high priority as an important tool for promoting national development. The ability of the sector to adopt and integrate agricultural innovations will propel the country to raises its food security while improving the livelihoods of the employees in the sector.
The agriculture sector is the single largest sector of the economy accounting for about one quarter of GDP. About 18% of growth in GDP in 2012 was from the sector, up from 7.5% recorded in 2011. The sector grew by about 3.8% in 2012, compared to 1.5% in 2011. In its vision 2030, the Government of Kenya reiterates the significance of the sector in contributing to the growth of the country. The Government is in the process of finalizing the development of the Agricultural Sector Development Strategy (ASDS). The overall aim of this strategy is to strategically make the agricultural sector a key driver for achieving the 10% annual economic growth rate expected under the economic pillar of the Vision 2030. Through the ASDS, the Government aims at transforming the agricultural sector into a profitable economic activity capable of attracting private investment and providing gainful employment for the people.

As early as the eighties there was evidence of research and interest in the adoption of agricultural technology in developing nations. Feder et al. (1985) admit that adoption of technological innovations in agriculture has attracted considerable attention among development economists because the majority of the population of less-developed countries (LDCs) derives its livelihood from agricultural production and because new technology apparently offers opportunity to increase production and income substantially. But the introduction of many new technologies has met with only partial success as measured by observed rates of adoption. However, Onasanya et al. (2006) argue there has been less evidence of research on communication of technologies particularly so among the farmers with much research being limited to academic researchers and agricultural extension officers.
Adebayo (1997) understands communication as a process of information flow by which ideas are transferred from a source to a receiver with the intent to change his/her knowledge, attitude and skill. The usefulness of a communication medium for a farmer will vary according to the adoption phase in which a potential adopter of an innovation passes. It is of great importance to know that the complexity of human behaviour often leads to many problems in the communication process (Onasanya et al., 2006). Likewise, Jan et al., (2011) opine that modern agriculture is characterized among other things by the salient role of communication as factor of change and progress.

Historically, this change agent centered process, usually referred to as a Transfer of Technology approach, is typically characterized as a top-down process where researchers develop the innovation, change agents promote its use, and farmers either adopt or reject the innovation (Lanyon in King and Rollins, 1999). In contrast, participatory assistance is a farmer/farm-centered process that seeks to ameliorate economic and environmental factors that may influence the behavior of researchers, change agents, and farmers during the development process and to determine the technical knowledge necessary for an innovation's use and adoption (Lanyon, 1994). Researchers, change agents, and farmers can share their perceptions and gain new insight into the development and subsequent use of an innovation.

Consequently, farmers, researchers, and change agents gain a better understanding of the innovation, thereby encouraging its adoption. By using this formative evaluation as part of the participatory process, an end user's satisfaction is likely to be increased (Mattocks & Steele; Lanyon in King & Rollins, 1999).
In addition, researchers and change agents can obtain more timely feedback concerning an innovation’s use, thus being able to learn new ways to modify and/or promote the innovation (Rosenberg in King & Rollins, 1999). According to Sunding and Zilberman (2000) there is often a duration between the periods an innovation is developed and available in the market, and the time it is widely used by producers. Adoption and diffusion are the processes governing the utilization of innovations. Studies of adoption behavior emphasize factors that affect if and when a particular individual will begin using an innovation. Measures of adoption may indicate both the timing and extent of new technology utilization by individuals.

Adoption behavior may be depicted by more than one variable. It may be depicted by a discrete choice, whether or not to utilize an innovation, or by a continuous variable that indicates to what extent a divisible innovation is used. For example, one measure of the adoption of a high-yield seed variety by a farmer is a discrete variable denoting if this variety is being used by a farmer at a certain time; another measure is what percent of the farmer’s land is planted with this variety (Sunding and Zilberman, 2000). Empirical studies in Ethiopia (Tiruneh et al 2001), Ghana (Doss & Morris 2001), Nigeria (Sanginga et al., 2007), and Benin (Kinkingninhoum-Médagbé et al., 2008) all document gender based disparities in adoption of improved technologies including improved seed, inorganic fertilizer, chemical insecticide (Sulo et al., 2012).

Onasanya et al. (2006) agree that adoption of innovation among the grassroots farmers is very low. They further contend that the use of communication skills, media and methodologies is typically abhorred and fragmented.
Too often, these are poorly integrated into the total extension programme. In order to meet the increased demand for food by the population, modern ways of farming have to be developed and the use of multi-media strategies integrated into extension programmes will increase their impact (Yahaya, 2001). Similarly, Umar et al. (2009) agree that the adoption of improved technologies can lead to increased productivity and higher income to farmers. This could, consequently lower the prices of agricultural products and generate greater economy efficiency and over-all growth in the national economy.

The current trend in agricultural communication in developing countries is towards emphasizing the message and the social dynamics of its transmission (Onasanya et al., 2006). There is evidence of research on communication and adoption of agricultural technology, for instance, Onasanya et al. (2006) studied the communication factors affecting the adoption of innovation at the grassroots level in Nigeria. Emenyeonu (1987) discussed the relationship between communication patterns and adoption of agricultural innovations similarly in Nigeria.

Africa has become a big player in international rice markets, accounting for 32 % of global imports in 2006. Africa’s emergence as a major rice importer is explained by the fact that rice has become the most rapidly growing food source in sub-Saharan Africa since the 1970s (Solh, 2005; Seck et al., 2010). The rice sector is of greatest importance within the West Africa subregion (Africa Rice Center et al., 2008). Since the 2008 food crisis, the consumption of locally produced rice has increased continuously.
Studies (World Bank, 2011; Hodges et al., 2011) have investigated postharvest losses in developing countries. This has been attributed as most sub-Saharan African rice-producing countries, processors still predominantly (Dandedjrohoun et al., n.d).

The National rice consumption in Kenya is estimated at about 300,000 tonnes against an annual domestic production of between 45,000 to 80,000 tonnes. This huge gap between consumption and production is met through importation of rice. In 2008, rice imports into Kenya were valued at Ksh 7 billion (NRDS, 2009). Promotion of rice production in Kenya will therefore improve food security, household incomes and reduce the rice import bill. Per capita rice consumption in Kenya is estimated to be between 10-18 kg per capita per year (West Africa Rice Development Association (WARDA), 2005). Annual rice consumption is increasing at the rate of 12 % compared to wheat (4%) and maize (1%) (NRDS, 2009).

Thairu (2010) traces the history of rice irrigation schemes as first started by the government. Out of the four schemes Mwea irrigation schemes in Central Province is the largest, followed by Ahero and West Kano in Nyanza province and then Bunyala Irrigation scheme in Western Province. The schemes were centrally managed by the National Irrigation Board. Plots were allocated to the tenants and inputs provided to them. They were expected to plant rice of which a part they would keep after the harvest for their consumption and the rest was purchased centrally. The farmers were however not allowed to grow any other crop (Niemeijer et. al, 1985).
1.1 Statement of the Problem

Approximately 95% of rice in Kenya is grown under irrigation in paddy schemes managed by the National Irrigation Board (NIB). The remaining 5% is rain fed. In order to improve the production of rice through sustainable use of both water and land; Systems of Rice Intensification (SRI) offers the best chances as observed in other rice producing nations. According to Mati (2009) the System of Rice Intensification (SRI) therefore offers the opportunity to improve food security through an increase in the production of rice, water conservation, increase smallholder farmers’ income and reduce the national rice import bill.

Despite the benefits to investments and rice production in adoption of System of Rice Intensification (SRI). The rate of adoption of SRI remains worrying among rice farming households in the Mwea Irrigation Scheme. SRI has been implemented in parts of Asia and has been highly successful with the high rates of adoption which have resulted to increased productivity in rice fields. The project to introduce the SRI technology among farmers has funding and was successfully implemented but the rate of adoption of the system isn’t commensurate to the rice farmer population in the Mwea Irrigation Scheme where the project was first introduced. The study seeks to investigate the factors affecting the adoption of the SRI among farmers in the Mwea Irrigation Scheme.

1.2 Research Objectives

The study was guided by the following specific objectives;

1. To determine the communication factors affecting the adoption of system of rise intensification.
2. To find out the influence of background characteristics in adoption of system of rice intensification.

3. To identify the barriers facing rice farmers in adoption of system of rice intensification.

1.3 Research Questions

1. What are the communication factors affecting the adoption of System of rice intensification?

2. What is the influence of socio-economic factors on adoption of system of rice intensification?

3. What are the barriers facing rice farmers in adoption of system of rice intensification?

1.4 Justification for the Study

The study assumed that there is a discrepancy between the communications of agricultural innovation which in turn limits the adoption of these technologies among the farmers. Distance is a major obstacle for adoption of technologies in developing countries. The impediment posed by distance is likely to decline with the spread of wireless communication technologies. The researcher’s investigation of communication strategies and patterns hopes to unearth the methods of communication that are more likely to influence adoption of modern technologies. Similarly, Jan et al., (2011) argue that the media consumption and adoption of agricultural innovations, is an ideal means for predicting the future rate of adoption the new methods of agri-growth.
The previous research on agricultural technological adoption hasn’t focused on the farming household’s perspective but rather have focused on the role of economic variables (principally prices) in the diffusion of new technologies. This microeconomic analysis is largely silent on how villages or ethnicity may hinder or help adoption, though it has much to say about how attributes of the person or of the household shape adoption.

1.5 Significance of the Study

The study will be of significance to different stakeholders. First, the study will be of significance to the project managers and administrators of the system of rice intensification as it will provide information and insight into the factors affecting adoption or non-adoption of the agricultural innovation. Second, the study will be significant to farmers as it will provide an opportunity to engage in discussion on some of the benefits and constraints they are facing in the adoption and implementation of the system of rice intensification. Thirdly, the study hopes to be of significance to researchers and academicians on the phenomenon of adoption and non-adoption of agricultural innovations and technologies in today’s farming and agricultural sector in the country.

1.6 Scope of the Study

The scope of the study was limited to the communication and socio-economic factors affecting the adoption and non-adoption of the system of rice intensification. The researcher also limited the investigation to farmers in the Mwea irrigation scheme who are involved in the implementation of the system of rice intensification. Although the farmers are involved in the adoption of different farming technologies the purpose of the
study was to examine the adoption trends of System of Rice Intensification in terms of the communication processes adopted.

1.7 Definition of Significant Terms

**Adoption** – refers to the uptake of a service or in this case the uptake of agricultural innovation such as the system of rice intensification

**Agricultural innovation** – refers to modern technological advancements of tools and methods to improve productivity

**Diffusion** – refers to the transmission of information between parties involving the agricultural innovation.

**Communication** – this refers to the passing of information from one person to another, a group to another person or group with the intent to influence adoption of agricultural innovation

**Extension officer** – this refers to personnel who provide information on agricultural issues to farmers.
CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter of the study focuses on the available literature on the relationship between communication and adoption of agricultural innovations. The section also presents the theoretical framework on which the study will be premised.

2.1 Adoption of Agricultural Innovation

Feder et al (1985) note adoption of technological innovations in agriculture has attracted considerable attention among development economists because the majority of the population of less-developed countries (LDCs) derives its livelihood from agricultural production and because new technology apparently offers opportunity to increase production and income substantially. While the finding of low levels of technology adoption is well accepted, few studies attempt to explain the slow rate of adoption of modern agricultural technology in Mozambique and other Sub-Saharan African (SSA) countries.

The introduction of many new technologies has met with only partial success as measured by observed rates of adoption. The conventional wisdom is that constraints to the rapid adoption of innovations involves factors such as the lack of credit, limited access to information, aversion to risk, inadequate farm size, inadequate incentives associated with farm tenure arrangements, insufficient human capital, absence of equipment to relieve labor shortages (thus preventing timeliness of operations), chaotic
supply of complementary inputs (such as seed, chemicals, and water), and inappropriate transportation infrastructure (Feder et al., 1985).

In most cases, agricultural technologies are introduced in packages that include several components, for example, high-yielding varieties (HYV), fertilizers, and corresponding land preparation practices. While the components of a package may complement each other, some of them can be adopted independently. Thus, farmers may face several distinct technological options (Mann, 1998).

Feber (1985) using an analytical framework for investigating adoption processes at the farm level should include a farmer's decision-making model determining the extent and intensity of use of the new technology at each point throughout the adoption process and a set of equations of motion describing the time pattern of parameters which affect the decisions of the farmer. These changes in parameters are the result of dynamic processes such as learning through information gathering, learning by doing, or accumulation of resources.

According to Uaiene et al. (2009) the literature on agricultural technology adoption is vast and somewhat difficult to summarize compactly. Traditionally, economic analysis of agricultural technology adoption (or lack thereof) has focused on imperfect information, risk, uncertainty, institutional constraints, human capital, input availability, and infrastructure as potential explanations for adoption decisions (Feder et al. 1985; Foster & Rosenzweig 1996; and Kohli & Singh 1997).
2.3 Communication Factors Affecting Adopting of Agricultural Innovation

In many countries, socio-cultural factors are leading constraints to the effectiveness of extension. Language differences and illiteracy can impede the communication of improved technology unless they are taken into account. The division of labour between the sexes can differ along cultural lines and influences the nature of farming systems in different regions. In many countries, the men are employed off-farm, leaving the farm operations to women. In extension organizations, under representation of women on the extension force means that the production responsibilities and needs of women at the farm level may not be adequately addressed (Swanson, Sands, & Peterson, 1990).

2.3.1 Sources of information

Traditional extension methods have only had limited success in promoting the widespread adoption of new management practices and technology (Vanclay & Lawrence, 1994; 1995). Radio is currently utilized more than television by most farmers, they perceive that the television program is providing very useful content (Yahaya, 2002). In the literature Researches distinguish between two major approaches to using media and technology in agriculture; one, where farmers can learn "from" media and technology, and they can learn "with" media and technology (Jonassen & Reeves, 1996). Several authors have stressed the importance of information in the adoption process (Saha et al., 1994; Dimara & Skuras, 2004). According to Adesina & Zinnah (1996) the users’ perception of the characteristics of a technology has been found to be an important determining factor of its adoption.
Learning "from" media and technology is often referred to in terms such as instructional television, computer-based instruction, or integrated learning systems (Hannafin, et al., 1996; Seels, et al., 1996). Learning "with" technology, less widespread than the "from" approach, is referred to in terms such as cognitive tools (Jonassen & Reeves, 1996) and constructivist learning environments (Wilson, 1996). For example, Zossou et al. (2009) have found video learning tools (Farmer-to-Farmer Video) to be more effective in transferring information on the technology characteristics. The literature (Dandedjrohoun et al., n.d.) reveals other participatory approaches such as the Farmer Field Schools (FFS), which is a participatory training approach targeted to smallholder farmers has been used widely in Africa (Braun et al., 2000).

Among Nigerian farmers acquire farm information from both the mass media and personal sources. In a study of the channels of farm information among cocoa farmers, for instance, Monu and Omole (1997) found that the majority of the respondents, 75%, received information concerning agricultural innovations from radio, followed by 51% who got their information from extension agents. Television ranked lowest with 0.8% dependents (Rogers, 1983).

### 2.3.2 Frequency of interaction

Umar et al. (2009) found that higher extension contact would increase adoption of improved rice production technologies. Extension workers are supposed to provide farmers with reliable information on a variety of agricultural innovations. The frequency of contact is very essential as it guides the farmers’ right from awareness to adoption stage. Uaiene et al. (2009) opine that exposing farmers to availability of information can
be expected to stimulate adoption (Kebede et al., 1990; Polson and Spencer, 1991). A positive relationship is hypothesized between extension visits and the probability of adoption of a new technology. Similarly, Ebojei et al. (2012) report that extension agents popularizes innovation by making farms exchange idea, experiences, and makes it cheaper to source information, knowledge and skills in order to enable farmers to improve their livelihood.

2.3.3 Membership of cooperative

The farmers’ membership to cooperative association is expected to influence farmer’s desire to adopt innovations. This stems from the fact that members of the association have more access to source of knowledge and information on new technology which can facilitate an improved access to cheaper sources of credit and other important inputs needed in rice production (Umar et al., 2009).

2.3.4 Social Networks

Bandiera and Rasul (2006) looked at social networks and technology adoption in Northern Mozambique and found that the probability of adoption is higher amongst farmers who reported discussing agriculture with others. Besley and Case (1993) use a model of learning where the profitability of adoption is uncertain and exogenous. Looking at a village in India, they found that once farmers discover the true profitability of adopting the new technology, they are more likely to adopt. Foster and Rosenzweig (1995) found that initially farmers may not adopt a new technology because of imperfect knowledge about management of the new technology; however, adoption eventually occurs due to own experience and neighbors' experience.
2.4 Influence of socio-economic factors on adoption of agricultural innovations

Extensive review of the literature on technology adoption in Developing countries, by Feder et al., 1985; Bravo-Ureta et al., 2005) reveal that the various factors that influence technology adoption can be distinguished into three broad categories; factors related to the characteristics of producers; factors related to the characteristics and relative performance of the technology and institutional factors.

The factors related to the characteristics of producers include: education level, experience in the activity, age, gender, level of wealth, farm size, labor availability, risk aversion (Feder et al, 1985). Ebojoi et al. (2012) conclude that five socio-economic variables; age, income, educational status, labour and extension visits influenced farmer’s participation in hybrid maize in the study area. The producer factors are discussed in detail in the following section. Onu (1991) opines that it is important to investigate the personal and social characteristics of farmers in order to understand their relative influence in the farmers’ information use behaviours.

2.4.1 Farm Size

Umar et al. (2009) found no significant relationship between income and adoption, a possible inference from the finding is that respondents with high income because of their potential privileged position to acquire production inputs will be more willing to adopt new technologies and accept higher risk than a low income respondents. However, empirical research shows that farm size a proxy of income is a significant factor determining adoption. This is because farm size can affect and in turn be affected by the other factors influencing adoption.
The effect of farm size on adoption could be positive, negative or neutral (Doss & Morris, 2001; Daku, 2002). In Kenya, for example, a study by Gabre-Madhin and Haggblade (2001) found that large commercial farmers adopted new high-yielding maize varieties more rapidly than smallholders.

**2.4.2 Education**

Accessibility to information on agricultural innovation has often been directly associated with the factors of literacy and poverty. According to Sheba (1997) exposure to education permits an individual to control the rate of message input and develop the ability to store and retrieve information for later use. Studies have always suggested that education increases awareness and prepares people for innovative changes. For instance, Cotlear (1990) finds for his sample of households in three regions in the Peruvian Sierra that education plays a greater role for early adopters, who use education to decrease the costs of obtaining new information and learning to apply new techniques, than for late adopters, who may simply copy their neighbours’ behaviour. Similarly, Opara (n.d) notes that education enables the individual to know how to seek for and apply information in day-to-day problem solving. This is because as the individual gained the ability to read, he is able to extend the scope of his experience through the print media.

Weir and Knight (2000) assert that to some extent that educated farmers are more likely to be willing to take risks with new technology and more likely to be adopters of successful innovations, there are possibilities for positive external returns to schooling in this context. Returns to education are greater the more the opportunities for adoption of
technical innovation. However the authors contend that the applied literature on the effect of education on innovation in developing countries is limited (Weir & Knight, 2000). Pramanik et al (2001) argues that majority of farmers at grassroots are uneducated, and therefore stressed the need to recognize the fact that they can be very efficient in some recommended agricultural innovations, if properly presented to them.

A majority of other findings dwell on the relationship between variables such as education. Social status, age, income, use of the media, farm size and adoption. Voh found, for instance, that education had a significant association with adoption of innovation among some farmers from Northern Nigeria (Voh, 1982). In a study conducted in Anambra and Imo States of Nigeria, found a positive correlation between level of education and response to innovation campaigns (Emenyeonu, 1987).

### 2.4.3 Age

Age is an important factor that influences the probability of adoption of new technologies because it is said to be a primary latent characteristic in adoption decisions. However, there is contention on the direction of the effect of age on adoption. However, studies show that there is no conclusive evidence of the influence of age on agricultural innovation adoption. Conroy (2005) found out that frequent contact with the nature and command of age on farmer’s contribution to new technology is indecisive. Younger farmers are likely to take up new technology than older farmers being that they are of higher schooling and have more contact to innovations. On the other hand, it may be that older farmers may have extra resource that makes it more likely for them to try new
technologies. In studies on adoption of rice in Guinea, age was either not significant or was negatively related to adoption (Adesiina & Baidu-Forson, 1995).

2.4.4 Household factors

According to the adopters’ perception paradigm, the perceived attributes of the technology condition adoption behavior of farmers. This means that, even with full farm household information, farmers may subjectively evaluate the technology differently than scientists (Ashby & Sperling, 1992). Thus, understanding farmers’ perceptions of a given technology is crucial in the generation and diffusion of new technologies and farm household information dissemination. Emenyeonu (1987) also established that the use of the mass media and size of farm and level of education were all positively associated with adoption.

2.5 Barriers to Adoption of Agricultural Innovation Development

According to Uphoff (2005), The System of Rice Intensification changes a number of practices that farmers have used for centuries, even millennia, to grow irrigated rice. However, it should be understood that SRI is more than these practices. It is the concepts, ideas and principles preceding and justifying the practices that are the crux of SRI. The alternative methods are manifestations of a different way of thinking about and pursuing agricultural production Uphoff (2005). Ferichani and Prasetya (2011) in their study of the socio-economic aspects of the system of rice intensification (SRI) in Indonesia found that the economic barriers that hampered in adoption of SRI to the people are product market, input source, and capital and production mechanism. The social barriers were government policy, social organization, academic support, and training.
SRI has been characterized as labor-intensive indeed so labor-intensive that this constitutes a barrier to adoption or a cause for disadoption (Moser and Barrett, 2003). However, evaluations in Cambodia (Anthofer, 2004), China (Li et al., 2005), India (Sinha and Talati, 2007), and Indonesia (Sato and Uphoff, 2007) have shown SRI methods to be labor-neutral or even labor-saving. Moser and Barrett (2003) find that irrigation and other issues related to water control have long been assumed to be major obstacles to SRI adoption, and while a significant number of farmers found water control problematic. The major sources of income for the household prove to be among the most important differences between those who have tried SRI and those who have not (Moser and Barrett, 2003).

2.6 Theoretical Framework

The researcher adopts the Diffusion of Innovation Theory (DIT) developed by Rogers (1995) and Theory of Planned Behaviour (TPB) which has been widely applied to explain the adoption of technology in a society and among individuals. The theories or models are appropriate for the study as they depict the social dynamic of a developing nation with emerging technologies impact on their day to day lives. The study deviates from the adaptation of the econometric model of explaining technology adoption. According to Shampine (1998) the economic constraint model contends that input fixity in the short run, such as access to credit, land, labor or other critical inputs limits production flexibility and conditions technology adoption decisions. The diffusion of innovation theory is more appropriate for the study as economic models fail to conceptualize the social dimensions of knowledge, information, communication and rationality (Leeuwis, 1993).
2.6.1 Diffusion of Innovation Theory

An innovation according to Rogers is “an idea, practice or object that is perceived as new by an individual or other unit of adoption”. According to Rogers (1995) many technologists believe that advantageous innovations will sell themselves, that the obvious benefits of a new idea will be widely realized by potential adopters, and that the innovation will therefore diffuse rapidly. Seldom is this the case. Most innovations, in fact, diffuse at a disappointingly slow rate” Diffusion is seen as “the process by which an innovation is communicated through certain channels over time among members of a social system”. A technological innovation usually has two components: a hardware aspect (the tool, product) and a software aspect (how to use the hardware). For good reasons studies of diffusion of innovations have often addressed individual innovations, in practice innovations often come in packages – clusters – and are interrelated and interdependent (Torbon, 2011).

The characteristics of innovations explain their rate of adoption. Five such characteristics of importance are discerned: 1) The relative advantage reflects how the innovation is subjectively perceived superior to the previous idea; 2) Compatibility reflects how the innovation is perceived “consistent with the existing values, past experiences, and needs of potential adopters”; 3) Complexity reflects the perceived difficulty to understand and use the innovation; 4) Trialability is “the degree to which an innovation may be experimented with on a limited basis”; and 5) Observability reflects how the results of an innovation are visible to others. An innovation can further be changed or modified (re-invented) by a user.
Communication, through channels, provides information to a social system with the purpose to influence the knowledge and assessment of the innovation. Mass media is often more effective in creating awareness of an innovation, whereas personal contacts are more effective in forming an opinion about a new idea. Such interpersonal communication is facilitated if conveyors of information are optimally similar to the receiver in certain attributes. More education and participation in a farmer association can both improve one’s access to information on a new technique and help a farmer deal with changes required by new technologies (Feder et al. 1985, Rogers 1995). So information seems to be a factor in SRI adoption, as it is in most adoption studies.

According to Rogers (1995) time is a main factor in the decision-making process, innovativeness and an innovation’s rate of adoption. In the innovation-decision process, an individual passes through the stages: knowledge, persuasion, decision, implementation (adoption) and confirmation (post-adoption assessment). Information is sought at the various stages to reduce uncertainty about the usefulness of the innovation. The decision stages result in adoption or rejection of the idea.

Innovativeness is an expression for how early an individual or other unit of adoption is adopting a new idea compared to other members of the social system. Adopters are divided into five categories, each with its own characteristics: 1) innovators, 2) early adopters, 3) early majority, 4) late majority, and 5) laggards.

Finally, rate of adoption is the relative speed with which an innovation is adopted by members of a social system. The social system with its interrelated units shares an
interest in finding solutions to a common goal, i.e. to improve their agricultural system to enhance livelihoods. Such a system has a social and communication structure that facilitates or impedes the diffusion of innovations in the system. Norms, being part of the social system, are the established behaviour patterns for system members. Often opinion leaders play a crucial role in influencing system members. Change agents may have the explicit role to influence members in a certain direction. Both opinion leaders and change agents are central actors in diffusion of innovations (Torbon, 2011).
CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the different approaches and strategies the researcher adopted to achieve the study objectives. These include the research design, research site, target population, sample and sampling size, data collection methods, data collection procedures and data analysis procedures.

3.1 Research Design

The research design is chosen to best answer the research questions proposed in the study. The study adopted the descriptive research design which allows the researcher to collect information from respondents, analyses it and is able to make inferences. According to Cooper and Schindler (2000) descriptive studies discover and measure cause and effect relationships among variables. The researcher used both qualitative and quantitative data collection and analysis approaches in order to enhance the validity and reliability of findings. This approach of using different methods has been referred to as triangulation. According to Bryman (2008) triangulation entails using more than one method or data in the study of social phenomena, resulting in greater confidence in findings.

3.2 Research Site

The research site for the study is the Mwea Irrigation Scheme. The Mwea Irrigation Scheme was started way back in 1956 and the predominant crop grown in the Scheme is rice. This is one of the seven public schemes under the management of the National
Irrigation Board. It is situated in the newly created Kirinyaga South District, in the Kirinyaga County. The Scheme is about 100 Km North East of Nairobi. The Temperatures range from a minimum of 12°C to a maximum of 26°C with an average of 20°C. The rainfall ranges between 1,100 mm and 1,250 mm per annum. Mwea Irrigation Scheme has a gazetted area of 30,350 acres. A total of 16,000 acres has been developed for paddy production. In addition to this, the scheme has a total of 4,000 acres of outgrower and jua kali areas under paddy production. The rest of the scheme is used for settlement, public utilities, subsistence and horticultural crops farming.

3.3 Target Population

According to Cooper and Schindler (2001), a population is the total collection of elements about which we wish to make inferences. The population of the study was farmers who were targets of the System of Rice intensification (SRI) programme in the Mwea Irrigation Scheme in its inception during the 2009 season.

3.4 Sampling Technique and Sample Size

The researcher adopted non-probability sampling procedures to identify the sample for the study. The convenience sampling procedure was chosen as it allowed the researcher to administer the questionnaire to farmers. Although there was a list of all the farmers involved in the SRI project, not all farmers were available to participate in the study. This was due to the fact that they were not in contact with the project staff. The study was therefore limited to the farmers that were in contact with the project staff and were available during the specific days of data collection. Cooper and Schindler (2001) describe convenience sampling as a non-probability sampling technique where subjects
are selected because of their convenient accessibility and proximity to the researcher. The sample size for the study was therefore 80 respondents.

3.5 Data Collection Methods

According to McMillan and Schumacher (2001) data collection may be done with measurement techniques, extensive interviews and observations, or a collection of documents. However, depending on the cost of obtaining data, the type of decision to be made on the basis of the evaluation, the size of the program, and the time available to conduct the evaluation (Posavac & Carey, 1997) also influenced the study. The researcher incorporated quantitative and qualitative methods of data collection. The researcher used questionnaires, interviews and observations. Adopting the mixed method strategy to data collection, Creswell (2003) observes that the model is characterized by an initial phases of qualitative data collection and analysis, which is followed by a phase of quantitative data collection and analysis.

3.5.1 Questionnaires

The questionnaires were administered to the farmers who are the majority of the study respondents. Questionnaires were developed for the sampled farmers in the study in accordance according to Kraut (1996), that questionnaires should be written in behavior terms that minimize rather subjectively and judgment, rather than in broad trait terms. The questionnaire was designed to be as concise as possible while still covering the necessary range of subject matter required in the study (Rea & Parker, 1997). The questionnaire was designed in a manner that ensures study participants’ anonymity when conducting surveys which enhanced more open and honest responses to the questions asked by the researcher.
3.5.2 Key Informant Interviews

Key informant interviews as a method of data collection is qualitative in nature. Key informants refer to respondents in the sample that are perceived to have more in-depth information on the phenomenon under study. The purpose of qualitative methods of data collection techniques is to gather in-depth data that is based on personal experience and stories and compliment quantitative data collect by the researcher. The key informants for the study were project implementing officers and extension officers of the SRI project in the Mwea Irrigation Scheme. The researcher prepared a key informant interview guide which was administered through face-to-face interviews with the key informants.

3.5.3 Observation

The researcher adopted the observation technique which is a qualitative method of data collection. This involved the inspection of farms within the Mwea Irrigation Scheme in terms of the adoption and implementation of System of Rice Intensification (SRI). The researcher developed an observation checklist which was used in the data collection exercise.

3.6 Data Collection Procedures

The researcher acquired a letter of authorization for field data collection from the University of Nairobi. This assisted the researcher in the data collection process as it guarantees the respondents that the study was purely for academic purposes. The researcher will also drafted a letter of introduction to the respondents elaborating on the purpose of the study and guaranteeing anonymity and confidentiality of the information
provided as for only academic purposes. The data collection process was conducted at the Mwea Irrigation Scheme in the month of September. The questionnaire administration was done by convening a group of 20 farmers in each session of questionnaire administration. This involved explaining the purpose of the study and a training session on filling the questionnaire. The questionnaire administration took two weeks and the key informant interview was done in the third week along with the preliminary data analysis.

3.7 Data Analysis Methods

This study adopted both qualitative and quantitative method of data analysis. To ensure easy analysis, the questionnaire was coded according to each variable of the study to ensure the margin of error is minimized to assure accuracy during analysis. The quantitative analysis is applied using descriptive statistics. According to Denscombe (1998) descriptive statistics involves a process of transforming a mass of raw data into tables, charts, with frequency distribution and percentages which are a vital part of making sense of the data. Data will be analyzed using Statistical Package for Social Sciences (SPSS) program and presented using tables and pie charts to give a clear picture of the research findings at a glance. The qualitative data was used to complement the quantitative data by providing descriptions.
CHAPTER FOUR
DATA ANALYSIS AND INTERPRETATION

4.0 Introduction
This chapter of the study represents the data analysis and the interpretation following the
data collection process. The chapter is presented according to the questionnaires and is
complemented by the researchers own interpretation.

4.1 Socio-Economic Information
The study sought to determine the socio-economic status of the respondents. The
extensive literature on the adoption of agricultural technologies has long emphasized the
importance of education, extension, income and wealth as determinants of propensity to
adopt, timing of adoption, or both (Feder et al., 1985, Rogers, 1995). The study included
these factors as gender, age, education, farming experience, and the size of their farm
which are presented in section of the study.

4.1.1 Gender
In terms of their gender, 65.0 % were male and 35.0 % were female as shown in Figure 1.
Kenya lacks a system of land tenure that provides for equitable and efficient distribution
of land ownership for both men and women within cultural and legal systems (Syagga, P.
M. 2006).
4.1.2 Age

Figure 2 shows the age of respondents where 2.5 % were 18-25, 31.3 % were 26-35, 23.8 % were 36-45, 25.0 % were 45-55 and 17.5 % were above 56 years. The sample shows there is a relatively youthful population of farmers in the Mwea Irrigation Scheme. Previous studies have suggested that young farmers are more receptive than the older farmers (Nsabimana & Masabo, 2005).
4.1.3 Education

The study results show that 3.8% had no formal education, 43.8% were primary, 41.3% were secondary, 2.5% were polytechnic, and 7.5% were college and 1.3% were university as shown in Figure 3. Results from this study show that most of adopters (80%) have primary or post-primary education. This is in line with past reports where the lack of formal education was considered as the main factor for the non-adoption of innovations (Chambers et al., 1994). More education and participation in a farmer association can both improve one’s access to information on a new technique and help a farmer deal with changes required by new technologies (Feder et al., 1985, Rogers, 1995). Adopters and disadopters have had more years of schooling on average than non-adopters and are more likely to belong to a farmer association.

Figure 4: Education of Respondents

4.1.4 Farming Experience

In terms of their farming experience, Figure 4 shows that 32.5% were more than 11 years, 25.0% were 6-10 years and 42.5% were less than 5 years.
4.1.5 Farm Size

In regard to their farm size, 41.3% were 1 acre, 42.5% were 2-3 acres, 10.0% were 4-5 acres and 6.3% were more than 5 acres as shown in Figure 5. Previous studies suggest that the more less land that a farmer has the more unlikely they are to adopt SRI.
4.2 Information and Communication of SRI

4.2.1 Source of information on SRI

In terms of the source of information for SRI, the study results show that 33.8% were farmers, 13.8% were extension officers, and 16.3% were extension officers/other farmers, 13.8% were extension officers/other farmers/mass media, 5.0% were Extension officers/other farmers/mass media/project officers and 6.3% were other farmers/mass media. The least used source of information among the farmers were Project officers (1.3%), other farmers/mass media/project officers, extension officers/other farmers/mass media all represented by 1.3% of the sample as shown in Table 4.1.

The results show that majority of the farmers got their information from other farmers. Bandiera and Rasul (2006) looked at social networks and technology adoption in Northern Mozambique and found that the probability of adoption is higher amongst farmers who reported discussing agriculture with others. This points to the social-learning model of technology adoption. The basic motivation behind this literature is the idea that a farmer in a village observes the behavior of neighboring farmers, including their experimentation with new technology (Uaiene et al., 2009).

Table 4.1: Source of Information on SRI for Farmers

<table>
<thead>
<tr>
<th>SRI source of information</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension officers</td>
<td>11</td>
<td>13.8</td>
</tr>
<tr>
<td>Extension officers/other farmers</td>
<td>13</td>
<td>16.3</td>
</tr>
<tr>
<td>Extension officers/other farmers/project officers</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Other farmers/mass media</td>
<td>5</td>
<td>6.3</td>
</tr>
<tr>
<td>Other farmers/project officers</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Project officers</td>
<td>1</td>
<td>1.3</td>
</tr>
</tbody>
</table>
These findings disagree with those of Moser and Barret (2002) who found that 66\% of adopters learned either through training or by working with an extension agent or local expert and only 30\% reported learning from other farmers. This results show the importance of social networks among rice farmers within the Mwea irrigation scheme. However, the results also showed that a sample of the respondents did indeed receive SRI information from the extension officers. According to the key informant:

The project implementers use majorly field days to communicate about the project. A farmer (role model) is selected in the target area and his farm used as a demonstration plot. The local media is at times invited to assist in inviting farmers to the field day. Fliers are also distributed to farmers through churches in the area (Key Informant Participant)

4.2.2 Frequency of use of SRI source of information

The respondents were asked to indicate the frequency with which they access information from the listed sources. As shown in Table 4.2, the use of extension officers was rarely (85.0\%), other farmers, mass media, cooperative and project officers were more popular means of information communication. Nsabimana and Masabo (2005) found that sensitization was through formal short-term training, during sectors’ meetings and visits.
by agricultural technical staff. Generally, adopters received more farm visits from the technical staff than the non-adopters.

Table 4.2: Frequency of Use of Information Sources

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Always</th>
<th>Sometimes</th>
<th>Rarely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension officers</td>
<td>7.5 %</td>
<td>7.5 %</td>
<td>85.0 %</td>
</tr>
<tr>
<td>Other farmers</td>
<td>88.8 %</td>
<td>1.3 %</td>
<td>10.0 %</td>
</tr>
<tr>
<td>Mass media</td>
<td>83.8 %</td>
<td>12.5 %</td>
<td>3.8 %</td>
</tr>
<tr>
<td>Cooperative</td>
<td>88.8 %</td>
<td>8.8 %</td>
<td>2.5 %</td>
</tr>
<tr>
<td>Project officers</td>
<td>87.5 %</td>
<td>11.3 %</td>
<td>1.3 %</td>
</tr>
</tbody>
</table>

4.2.3 Sensitization of SRI

The study sought to establish whether the farmers had received any sensitization in regard to the use of SRI. As shown in Table 4, the results show that 52.6 % indicated no whereas 47.5 % were yes. Nsabimana and Masabo (2005) study on the factors influencing adoption of agricultural technologies in Rwanda found that of the 25 adopters, 72% have been sensitized on the advantages of the technologies, while 89% of the non-adopters of the technologies have not been sensitized. Therefore, sensitization on new technologies through visits by technical staff and discussions during sector meetings appear to be related to promotion of adoption of technologies.

In terms of the form of sensitization given to farmers on SRI. The results show that 16.3 % were short terms training, 15.0 % were field visits from extension officers/visits to demonstration plots/National Irrigation Board, and 8.8 % were field visits from extension officers and visit to demonstration plots respectively as shown in Table 4.3. These findings Nsabimana and Masabo (2005) support Sensitisation was through formal short-term training, during sectors’ meetings and visits by agricultural technical staff.
Generally, adopters received more farm visits from the technical staff than the non-adopters.

**Table 4.3: Form of SRI Sensitization Given to Farmers**

<table>
<thead>
<tr>
<th>SRI Sensitization</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit to demonstration plots</td>
<td>7</td>
<td>8.8</td>
</tr>
<tr>
<td>Other farmers</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Not interested</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Field visits from extension officers</td>
<td>7</td>
<td>8.8</td>
</tr>
<tr>
<td>Formal short terms training</td>
<td>13</td>
<td>16.2</td>
</tr>
<tr>
<td>Field visits from extension officers / visits to</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>demonstration plots/ national irrigation board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td>19</td>
<td>57.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>61</strong></td>
<td><strong>52.6</strong></td>
</tr>
</tbody>
</table>

**4.2.4 Communication Factors Affecting Adoption of SRI**

In terms of the factors affecting adoption of SRI, 23.8 % were the frequency of information provided, 18.8 % were the type of information provided, and 17.5 % were the forum of information communication / availability of information/accessibility of information and 15.0 % were availability of information/frequency of information as shown in Table 4.4.

**Table 4.4: Communication Factors Influencing SRI Implementation**

<table>
<thead>
<tr>
<th>Communication factors</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of information provided</td>
<td>15</td>
<td>18.8</td>
</tr>
<tr>
<td>Frequency of information provided</td>
<td>19</td>
<td>23.8</td>
</tr>
<tr>
<td>Accessibility of information</td>
<td>3</td>
<td>3.8</td>
</tr>
<tr>
<td>Availability of information</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>All the above</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>The forum of information communication</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>Type of information/frequency of information</td>
<td>5</td>
<td>6.3</td>
</tr>
<tr>
<td>Availability of information/frequency of information</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>The forum of information communication/ availability of information/accessibility of information</td>
<td>14</td>
<td>17.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

### 4.3 Constraint to adoption of SRI

The study sought to explore the constraints and barriers that were limiting the adoption of SRI technology among the farmers.

#### 4.3.1 Farmer adoption of SRI

In terms of adoption of SRI among the sampled farmers, 55.0 % indicated that there were constraints compared to 45.0 % who indicated no as shown in Figure 13. Some of the constraints to adoption were listed by the key informant;

1. Farmer’s training / exposure to the technology
2. Few extension workers to monitor farmer’s fields
3. Limited funds to roll out the technology to other units within the scheme
4. Farmers view the technology as being labour intensive
4.3.2 Willingness of Farmers to Adopt SRI

The study sought to determine the willingness of the farmers to adopt SRI. The study results show that 56.3% were yes, 13.8% were no and 30.1% were not use as shown in Figure 7. This findings are similar to Moser and Barret (2002) who found that despite its obvious benefits and intensive extension efforts by an indigenous NGO, SRI has not taken off as expected. They found that adoption rates have generally been low, the average rate of disadoption (the percentage of households who have tried the method but who no longer practice it) has been high, at 40% and those who adopt and retain the technique rarely put more than half of their rice land in SRI. According to the key informant:

The technology was introduced in 2009. Only 2 farmers adopted during that season. The number has been gradually increasing with some units within the scheme having between 70% – 80% adoptions (Key Informant Participant)
4.3.1 Barriers to Technological Innovation Adoption

The study assumed that there were several factors that affected the adoption of SRI among rice farmers in the Mwea Irrigation Scheme. These barriers were identified from the literature review. These barriers are presented in this section with the respondents’ rating their influence on the adoption of SRI. According to the key informant some of the barriers on non-adoption were:

1. Farmers view the technology as labour intensive. The six stages involved in the implementation of the technology

2. Some of the implementers’ research fields are not under the SRI technology thus discouraging the neighboring farmers’ adoption of technology

3. Rivalry among farmers – some of the adopters are recruited to be the extension farmers which doesn’t auger well with some farmers

4. Lack of proper information on technology from the implementers
4.3.1.1 Expensive Technology

As shown in Table 4.5, 13.8 % were strongly disagree, 35.0 % were disagree, 15.0 % were neutral, 30.0 % were agree and 5.0 % were strongly agree.

Table 4.5: The Technology is Expensive

<table>
<thead>
<tr>
<th>The technology is expensive</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>11</td>
<td>13.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>28</td>
<td>35.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>Agree</td>
<td>24</td>
<td>30.0</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>Missing Responses</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

4.3.1.2 Labour Intensive Technology

Table 4.6 shows that 6.3 % were strongly disagree, 15.0 % were disagree, 7.5 % were neutral, 52.5 % were agree and 18.8 % were strongly agree that SRI was a labour intensive technology. Indeed, SRI involves the combination of wide spacing and less water, however, provides ideal conditions for weed growth, which means that frequent weeding is necessary. The few studies of its labor requirements show that the method requires an estimated 38 to 54 % more labor than traditional methods (Moser & Barret, 2002).

According to Rakotomalala (1997), 62 % of the extra labor needed for SRI is for weeding and 17 % for transplanting. Moser and Barret (2002) also found that the most cited reasons for disadoption of SRI was lack of time and money. Similarly, Uphoff (2005) main constraint that farmers have pointed to when questioned about SRI adoption has
been labor requirements, and the fact that with SRI certain operations like transplanting and weeding are more ‘time-bound.’ However, contrary findings in Cambodia (Anthofer, 2004), China (Li et al., 2005), India (Sinha & Talati, 2007), and Indonesia (Sato & Uphoff, 2007) have shown SRI methods to be labor-neutral or even labor-saving.

Table 4.6: Labour Intensive Technology

<table>
<thead>
<tr>
<th>The technology requires a lot of labour</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>5</td>
<td>6.3</td>
</tr>
<tr>
<td>Disagree</td>
<td>12</td>
<td>15.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>Agree</td>
<td>42</td>
<td>52.5</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>15</td>
<td>18.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

4.3.1.3 Information

Adoption of agricultural technology is influenced by the availability of information to the farmers. In terms of not having adequate information Table 4.7 shows that 26.3 % were strongly agree, 38.8 % were agree, 3.8 % were neutral, 21.3 % were disagree and 10.0 % were strongly disagree.

Table 4.7: Lack of Adequate Information

<table>
<thead>
<tr>
<th>I do not have adequate information</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>8</td>
<td>10.0</td>
</tr>
<tr>
<td>Disagree</td>
<td>17</td>
<td>21.3</td>
</tr>
<tr>
<td>Neutral</td>
<td>3</td>
<td>3.8</td>
</tr>
<tr>
<td>Agree</td>
<td>31</td>
<td>38.8</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>21</td>
<td>26.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
4.3.1.4 Experience

Lack of experience in use of SRI was shown to be a barriers for its adoption among Mwea rice farmers. Table 4.8 shows that 7.5 % were strongly disagree, 28.8 % were disagree, 13.8 % were neutral, 25.0 % were agree and 22.5 % were strongly agree.

**Table 4.8: Lack of Experience**

<table>
<thead>
<tr>
<th>I have no experience about it</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>Disagree</td>
<td>23</td>
<td>28.8</td>
</tr>
<tr>
<td>Neutral</td>
<td>11</td>
<td>13.8</td>
</tr>
<tr>
<td>Agree</td>
<td>20</td>
<td>25.0</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>20</td>
<td>250</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.3.1.5 Support and Training

Table 4.9 shows farmers responses regarding the influence of lack of support and training and show that 5.0 % were strongly disagree, 7.5 % were disagree, 5.0 % were neutral, 52.5 % were agree and 30.0 % were strongly agree.

**Table 4.9: Lack of Support and Training**

<table>
<thead>
<tr>
<th>Lack of support and training</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>Disagree</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>Neutral</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>Agree</td>
<td>42</td>
<td>52.5</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>24</td>
<td>30.0</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100.0</td>
</tr>
</tbody>
</table>
4.3.1.6 Investment Costs

In terms of the investments costs influence on SRI adoption, 7.5% were strongly disagree, 28.8% were disagree, 13.8% were neutral, 25.0% were agree and 22.5% were strongly agree as depicted in Table 4.10.

Table 4.10: Investments Costs

<table>
<thead>
<tr>
<th>Investments costs</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>8</td>
<td>9.0</td>
</tr>
<tr>
<td>Disagree</td>
<td>23</td>
<td>28.8</td>
</tr>
<tr>
<td>Neutral</td>
<td>11</td>
<td>13.8</td>
</tr>
<tr>
<td>Agree</td>
<td>20</td>
<td>25.0</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>18</td>
<td>22.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

4.4 Regression Analysis

An objective of the study was to examine the influence of socio-economic variables on the adoption of SRI. The independent variables (gender, age, education, experience as a rice farmer and farm size) on the dependent variable (adoption of SRI).

4.4.1 ANOVA

Table 4.11 show the significance value is .087 which is more than 0.05 thus the model is not statistically significant in predicting influence of the socio-economic variables in influencing adoption of SRI as shown in Table 4.12.

Table 4.11: ANOVA (b)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>2.368</td>
<td>5</td>
<td>.474</td>
<td>2.011</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>17.432</td>
<td>74</td>
<td>.236</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>19.800</td>
<td>79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Predictors: (Constant), gender, age, education, experience as rice farmer, farm size
b Dependent Variable: Adoption of SRI
4.4.2 Multiple Regression

The researcher conducted a multiple regression analysis between the independent variables and the dependent variables of research objective two. Multiple regression analysis are adequate as they allow a researcher to examine the influence of more than one independent variable on the dependent variable.

The regression equation ($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \varepsilon$) was:

Where

- $Y = \text{Constant (SRI Adoption)}$
- $X_1 = \text{Gender}$
- $X_2 = \text{Age}$
- $X_3 = \text{Education}$
- $X_4 = \text{Experience}$
- $X_5 = \text{Farm size}$
- $X_6 = \text{Availability of information}$
- $X_7 = \text{Frequency of communication}$
- $X_8 = \text{Source of communication}$

Table 4.12 shows that the most significant socio-economic factor influencing adoption of SRI among the Mwea Irrigation Scheme farmers was experience and education in that order. Previous studies show that the more years of schooling of a farmer the more likely that they will adopt agricultural innovation technology. Consistent with much of the adoption literature, adopters and disadopters have had more years of schooling on
average than non-adopters and are more likely to belong to a farmer association. More experienced farmers are more likely to try new farming technologies (Moser & Barret, 2002). The study results also showed that majority of the farmers had less than 5 years’ experience which could explain the slow adoption rates.

Table 4.12: Multiple Regression Analysis

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>B</td>
</tr>
<tr>
<td>(Constant)</td>
<td>1.264</td>
<td>.349</td>
<td>3.619</td>
<td>.001</td>
</tr>
<tr>
<td>Gender</td>
<td>-.053</td>
<td>.114</td>
<td>-.051</td>
<td>-.465</td>
</tr>
<tr>
<td>Age</td>
<td>-.022</td>
<td>.065</td>
<td>-.051</td>
<td>-.340</td>
</tr>
<tr>
<td>Education</td>
<td>.044</td>
<td>.068</td>
<td>.086</td>
<td>.655</td>
</tr>
<tr>
<td>Experience</td>
<td>.232</td>
<td>.088</td>
<td>.401</td>
<td>2.628</td>
</tr>
<tr>
<td>Farm size</td>
<td>-.127</td>
<td>.073</td>
<td>-.218</td>
<td>-1.751</td>
</tr>
<tr>
<td>Availability of information</td>
<td>.022</td>
<td>.085</td>
<td>.222</td>
<td>1.791</td>
</tr>
<tr>
<td>Frequency of information</td>
<td>.032</td>
<td>.013</td>
<td>.125</td>
<td>.377</td>
</tr>
<tr>
<td>Source of communication</td>
<td>.084</td>
<td>.088</td>
<td>.044</td>
<td>.964</td>
</tr>
</tbody>
</table>

A Dependent Variable: Adoption of SRI

In regard to communication factors, the regression results show that availability of information was the most significant factor (0.222), followed by frequency of information and communication (0.125) and lastly the source of information (0.044). The studies indicate that the availability of information on SRI is a determinant to the adoption of the technology. However, the study showed that there was a restively low level of information on SRI. Umar et al. (2009) found that higher extension contact would increase adoption of improved rice production technologies. The frequency of contact is very essential as it guides the farmers’ right from awareness to adoption stage. Similarly, Uaiene et al. (2009) agrees that exposing farmers to availability of information
can be expected to stimulate adoption. A positive relationship is hypothesized between extension visits and the probability of adoption of a new technology (Ebojei et al., 2012). Onasanya et al (2006) point out that it has also been found out that lack of interaction between the change agents and the farmers impede the adoption of innovation.

4.5 Actions to Improve Non-Adoption

There are several approaches that the project team adopts in order to address the challenge of non-adoption among farmers. These included;

1. Sourcing for more funding to facilitate dissemination of information on technology. The implementers have sought partnership with other institutions to promote the technology e.g. RICE MAPP

2. Training of more farmers to be trainer of trainers as champions

3. Conducting ladies only training (adopters/ would be adopters). Women are the main source of labour in the rice fields

4. Preparation of instruction manuals for farmers

5. Production of locally produced videos for training

6. Farmer’s exchange programme
CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction
This chapter of the study presents the summary of the study, the conclusions and recommendations based on the study findings. The researcher also suggests areas of further study.

5.1 Summary
The study sought to investigate the influence of communication on adoption of agricultural innovation and technology. The study used a case of the System of Rice Intensification (SRI) which was introduced to farmer in the Mwea Irrigation Scheme in 2009. The study was guided by three specific objectives which were; to determine the communication factors affecting the adoption of system of rise intensification; to find out the influence of background characteristics in adoption of system of rise intensification and to identify the barriers facing rice farmers in adoption of system of rice intensification. The study adopted a descriptive research approach which used questionnaires, key informant interview guide and observation checklist. The use of qualitative and quantitative data techniques enhanced the validity and reliability of the research. The study was able to gather 81 complete questionnaires which fulfilled the criteria for analysis. The researcher was able to conduct a key informant interview with one of the project initiators. The data was presented in charts, graphs and tables and was supplemented by the researcher’s own interpretation.
5.2 Conclusion

There is need for more information communication to farmers through extension officers and technical staff of the SRI project. The respondents indicated not having adequate information on the SRI technology and this could have a significant influence on adoption of SRI. The study found that the number of farmers who were involved in the implementation of SRI in the Mwea Irrigation Scheme had disadopted the technology. There is need to determine the reasons for SRI disadoption among farmers. The regression analysis showed that the frequency of communication between the farmers and extension agents was a significant communication factor affecting adoption of SRI among the Mwea Irrigation Scheme farmers. The availability of information was also shown to be a communication factor affecting adoption of SRI with the results indicating that the source of information was not a significant factor in determining adoption of SRI.

The use of mass media to communicate to farmers on new technologies can be a welcome approach. Jan et al. (2011) agree that traditional extensions methods may not be having significant impact on adoption and thus there is need to mix communication methods. The study also concludes that social networks are also a significant mode of information communication agricultural innovation and technology. This interaction requires the development of a special communication strategy capable of linking research personnel and all other stakeholders in agriculture to ensure their participation in agricultural development.

Among the socio-economic variables influence on adoption of agricultural innovation are education levels and the farmers’ experience. The higher the education of the farmer the
more likely they are to try new or modern technologies in rice production. Similarly, experienced farmers are more likely to take a risk by trying new methods unlike inexperienced farmers. The study found that the majority of farmers had less than 5 years’ experience and this could explain the low rates of adoption. The study also concludes that the low education levels of basic and post primary education found among the respondents could explain the low adoption rates.

The barriers facing farmers in adoption of SRI in the mwea irrigation scheme were investments costs, lack of adequate information on Sri and lack of previous experience of technology. These investments costs deter farmers in adopting the technology as they perceive it as being more labour intensive and this requires more time and labour. The lack of experience of using the technology is also a barrier to adoption. The study concludes that the lack of information on SRI to farmers hasn’t been adequate to influence them to adopt the SRI technology. This was also confirmed as among the communication factors affecting adoption of SRI the respondents indicated the frequency of information received was a factor. The type of information communicated is also concluded to be a significant factor affecting adoption of SRI among farmers.

5.3 Recommendations

The study makes the following recommendations based on the research findings;

1. There should be more sensitization of The SRI technology to farmers through the extension officers and technical staff of the project. Previous studies have shown that the rate of adoption has been higher among those farmers that have more interaction with technical staff in their farms.
2. That facilitation between farmers and the SRI project implementers on communication of information. This would entail identifying the information that farmers need to be provided in order to be sensitized on SRI. This should include designing appropriate forum for information communication such as field visits.

3. That the SRI project implementers should engage with farmers who have had more experience in rice farming and those with higher level of education. This will provide motivation for other farmers as they study found that these two groups are the most likely adoptees of SRI. Through their social networks, SRI adoption rates may be increased as the study found that most of the farmers used source of information from other farmers.

5.4 Areas of Further Study

The study limited its investigation to farmers who had adopted SRI. There should be further research on the reasons for disadoption among farmers. The SRI project saw a high number of farmers adopting the technology but this has reduced as farmers go back to the traditional means they use for farming. This knowledge will assist the project managers to develop effective measures and mechanisms to reduce the disadoption rates of SRI in the Mwea Irrigation Scheme.
REFERENCES


Leeuwis, C. (1993) *Of Computers, myths and modelling; the social construction of diversity, knowledge, information and communication Technologies.* Dutch horticulture and agricultural extension, 1, 22-31


Opara, U. N. (n.d). Personal and Socio-Economic Determinants of Agricultural Information Use by Farmers in the Agricultural Development Programme (ADP) Zones of Imo State, Nigeria


Rural Development, Researcher in Development Support Communication at the Department of Agricultural Extension & Rural Development, University of Ibadan, Nigeria.


APPENDICES

APPENDIX 1: LETTER OF INTRODUCTION

Judith Taaka

University of Nairobi

Date: 16th September 2014

Dear (Respondent),

I am a student at University of Nairobi and currently undertaking a Research Project titled “Influence of Communication on Adoption of Agricultural Innovation: A Case of the System of Rice Intensification in Mwea Irrigation Scheme”. You have been selected you to be part of the study I am undertaking. Kindly respond to the questions attached to the letter of introduction. The information provided is for academic purposes and will therefore not affect your participation in the SRI project. Your participation in the study is voluntary and any information provided will be held in confidence and in complete anonymity.

Thanks in advance for your cooperation.

Best Regards,

Judith Taaka

Signature: ______________________ Date: ______________________

Mobile No:

Email address:
APPENDIX 2: QUESTIONNAIRE FOR RICE FARMERS

Section 1: Socio-Economic Information

1. Gender
   Male ( )
   Female ( )

2. Age
   18 – 25 ( )
   26 – 35 ( )
   36 – 45 ( )
   45 – 55 ( )
   Above 56 ( )

3. Education
   None ( )
   Primary ( )
   Secondary ( )
   Polytechnic ( )
   College ( )
   University ( )

4. Years as a rice farmer
   Less than 5 years ( )
   6 – 10 years ( )
   More than 11 years ( )
5. Farm size
   Less than an acre (   )
   2-3 acres (   )
   4-5 acres (   )
   More than 5 acres (   )

6. Have you adopted the System of Rice intensification?
   Yes (   )
   No (   )

Section 2: Information and Communication of System of Rice Intensification

7. What are the source of information on System of Rice Intensification?
   Extension officers (   )
   Other farmers (   )
   Mass media (   )
   Cooperative (   )
   Project Officers (   )

8. How often do you use the above sources of information of the system of rice intensification?

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Sometimes</th>
<th>Rarely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension officers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass media</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Officers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9. Have you received any sensitization on the system of rice intensification?

Yes ( )

No ( )

(b) If yes, what form was this sensitization provided?

- Formal short-term training ( )
- Field visits from extension officers ( )
- Visits to demonstration plots ( )
- Others (Specify) ........................................……..…

10. What are some of the communication factors affecting implementation of SRI?

- The type of information provided ( )
- The frequency of information provided ( )
- The forum of information communication ( )
- The availability of information ( )
- The accessibility of information ( )

Section 3: Constraints Facing Farmers in Adopting System of Rice Intensification

11. Have you adopted the system of rice intensification in your farm?

Yes ( )

No ( )

12. Would you be willing to adopt the system of rice intensification in your farm?

Yes ( )

No ( )

Not sure ( )
13. The table below shows the barriers related to technological innovation adoption.

What are some of the barriers you face in implementation of the System of Rice Intensification? Please indicate to what extent you agree or disagree with the statements as the barriers of adopting the system of rice intensification.

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The technology is expensive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The technology requires a lot of labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t have adequate information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have no experience about it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of support and training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Are there any comments you would like to add on the System of rice intensification?

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

*Thank you for your participation*
APPENDIX 3: KEY INFORMANT INTERVIEW GUIDE

1. How could you describe the rate of adoption of the system of rice intensification (SRI) among rice farmers in the Mwea Irrigation Scheme?

2. What are the factors affecting the implementation of the SRI project in the Mwea Irrigation Scheme?

3. What is the process of communication with farmers on the SRI project implementation in the Mwea Irrigation Scheme?

4. How do you address the problems of non-adoption of the System of Rice Intensification?

5. What are the barriers to adoption of SRI among the farmers?

6. What are the strategies employed or adopted to improve uptake of the System of Rice Intensification?

7. What are the observed impacts of farmers who have adopted the system of rice intensification technology?
APPENDIX 4: OBSERVATION CHECKLIST

1. Adoption of SRI in model farms in the Mwea Irrigation Scheme
2. Implementation and utilization of SRI in the Mwea Irrigation Scheme
3. System of rice intensification technologies adopted in Mwea Irrigation Schemes
4. The number of farms with SRI technology adoption