SOCIO-ECONIMIC CHALLENGES AFFECTING AGRICULTURAL MODERNIZATION IN UGANDA: A CASE STUDY OF RWANYAMAHEMBE SUB-COUNTY, KASHARI COUNTY, MBARARA DISTRICT.

BY

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DECLARATION

I, Godfrey Ndyahikaho Tumusiime, declare that this dissertation entitled "Socio-economic Challenges Affecting Agricultural Modernization in Uganda: A Case Study of Rwanyamahembe Sub-county, Kashari County, Mbarara District" is my original work and has not been submitted to any institution of learning for award of a degree or any other award.

Signed: ……

Date…….

APPROVAL

This dissertation is submitted for examination with our approval as supervisors.

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Date: ……

DEDICATION

I dedicate this work to my sons, Herbert Ngabirano, Ronald Atwiine, Owen Nyesiga and Collins Tumusiime plus my sister Merab Kabeigarire.

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List of Abbreviations and Acronyms

ADF	Africa Development Fund
CDO	Community Development Officer
DAO	District Agriculture Officer
DNC	District NAADS Coordinator
DPMO	District Production and Marketing Officer
FAO	Food Agricultural Organization
GDP	Gross Domestic Product
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MDGs	Millennium Development Goals
MoFPED	Ministry of Finance Planning and Economic Development
NAADS	National Agriculture Advisory Services
PMA	Plan for Modernization of Agriculture
SNC	Sub-county NAADS Coordinator
SPSS	Statistical Package for the Social Sciences
UCA	Uganda Cooperative Alliance
UMI	Uganda Management Institute

Table of Contents

List of Figures

List of tables

ABSTRACT

This study set out to examine the socio-economic challenges affecting agricultural modernization in Rwanyamahembe Sub-county, Kashari County, Mbarara District. The problem was that despite various attempts by the Ugandan government to modernize agriculture in rural areas, there has been little progress in achieving agricultural modernization (African Development Fund 2000). The study was guided by four specific objectives namely; to find out the role of education of farmers; to examine the contribution of land availability to farmers; to establish the effect of infrastructure and to analyze the effect of market availability to farmers, all in relation to agricultural modernization in Rwanyamahembe Sub-county. A case study research design was adopted. A sample of 140 farmers was drawn from 223 registered farmers disaggregated in five farmer groups in the five Parishes of Rwanyamahembe Sub-county and were interviewed using a Questionnaire. Ten Key informants were interviewed using an Interview Guide and a Digital Voice Recorder. The results were analyzed using descriptive statistics in form of frequencies and percentages on the basis of cross tabulations generated using the Statistical Package for Social Sciences (SPSS). Qualitative data obtained from Key Informants' interviews was summarized and used to explain and back up Quantitative Findings. The study found out that, the level of education of farmers, land availability, infrastructure status and availability of market all significantly affect agricultural modernization. The study concluded that in order to achieve agricultural modernization, farmers' education, land availability, infrastructure status and market availability must be addressed. The study recommended that the Government of Uganda strengthens policies towards improvement of farmer's education, availability of land, infrastructure status and market availability. The research also recommended that local authorities intensify agricultural extension services and that farmers be encouraged to form cooperative societies for collective marketing and value addition. Further research could be carried out to establish the underlying factors responsible for the very low use of modern farm tools and reluctance by farmers to adopt new technologies.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

This study assessed the socio-economic challenges affecting agricultural modernization in Uganda using a case study of Rwanyamahembe Sub-county in Kashari County, Mbarara district. In this study, socio-economic challenges were regarded as the independent variable while agricultural modernization as the dependent variable. The socio-economic challenges which were studied related to education in terms of level, literacy and numeracy, land in relation to ownership and size, infrastructure especially water and roads and markets in terms of distance and number of buyers. Modernization covered mechanization, improved seeds and breeds plus high farm yields. This chapter presents background to the study, statement of the problem, objectives of the study, research questions, hypotheses of the study, conceptual frame work, significance of the study, justification of the study, scope of the study and operation definitions of terms and concepts.

1.2 Background to the Study

Petit (2010) defines modernization of agriculture as being directly and explicitly characterized by the adoption of production processes, technologies and tools derived from scientific advances, and results of the research and development process. Modern agriculture is not restricted to large scale, capital intensive agricultural production but includes the use of modern scientific methods of farming even on small holdings. In line with a rich intellectual tradition, we believe that science and technology have much to contribute to the transformation and modernization of traditional agriculture, particularly in developing countries, where literally billions of people depend, totally

or largely, on agriculture to ensure their livelihood. Thus, the economic and social stakes of the modernization of agriculture in many parts of the world are huge.

Modernization of agriculture leads to an increase in the total factor productivity in agriculture. The early stages of modernization require significant stepping up of investment in agriculture. Gross capital formation as a proportion of the net domestic product in agriculture has to rise considerably as this appears to be the precondition of modernization (Kyomuhendo, 1997)

Modernization of agriculture leads to resilience of agriculture and makes it less sensitive to weather conditions and fluctuations in rainfall. Since the success of modernization depends on the farmers switching over to modern agricultural inputs, the Government is required to intervene primarily in the form of ensuring remunerative prices of crops and providing direct incentives for the use of modern inputs (Petit, 2010).

1.2.1 Historical Background.

The concept of "modernization of agriculture" in Uganda started way back in 1996. As part of his election manifesto launched in March 1996, the President of the Republic of Uganda, H.E. Yoweri Museveni, promised to modernize Uganda's agriculture. The Plan for Modernization of Agriculture (PMA) was adopted as a holistic, strategic framework for eradicating poverty through multi-sectional interventions enabling the people to improve their livelihoods in a sustainable manner.

A report by Uganda's Ministry of Finance Planning and Economic Development (1997) indicates that the Ministry of planning also followed the pursuit by arguing that the modernization process of Uganda's agriculture will be accomplished by realizing the following: shifting from subsistence

to commercial agriculture that is responsive to changing market opportunities; shifting from low to high yielding technologies; shifting from low to high value enterprises; sustainable utilization of soils and other renewable natural resources.

It is worth mentioning that President Museveni's message on modernization of agriculture sums up some important changes agricultural extension is already experiencing and other changes that are eminent. Coping with such changes requires specialized agricultural extension systems with a broader knowledge base to handle more work and meet requirements of specialized production systems without compromising the environment.

Besides, during the relatively slow process of transformation of production systems from subsistence to commercial agriculture, as stipulated in the modernization strategy, demand driven and cost recovery extension approaches are likely to benefit a small proportion of the farming community especially in the short run (Mwanje and Duvel, 1998). After declining between 1971 and 1986, agriculture started to recover responding to new policies and increased stability in the country. Growth of agricultural Gross Domestic Product (GDP) averaged six percent between 1989-1999 for monetary agriculture and two percent for non-monetary agriculture. Between 2000 and 2004, these growth rates narrowed, with growth in monetary agriculture falling to five percent per year, and non-monetary agriculture rising to four percent per year.

Within monetary agriculture, performance of the cash sub-sector has been volatile, averaging an annual growth rate of nine percent from 1989-1999 and then just three percent from 2003-2004. The slowdown in cash crops is due to the decline in export prices, particularly for coffee (Ministry of Foreign Affairs, 2006).

The concept of modern agriculture in pro-poor growth has been a topic for hot debate in recent years, particularly in the context of achieving the Millennium Development Goals (MDGs). Many observers are skeptical about the ability of the agricultural sector in Africa today to deliver the kinds of benefits to the poor that arose from, for example, the Green Revolution in India.

Much has been made of the importance of the non-farm rural sector in assisting people out of poverty. However, a healthy and growing rural non-farm sector is dependent on growth in agriculture. Improved standards of living for most of the rural poor in Uganda will come either from modernization of agricultural activities, or in their ability to use capital and savings accumulated from agriculture in the non-farm sector or both (Ministry of Foreign Affairs, 2006).

1.2.2 Theoretical Background

The study was largely informed by the Modernization Theory which is used to analyze the way modernization processes in societies take place. The theory looks at which aspects of countries are beneficial and which constitute obstacles for development. The idea is that development assistance targeted at those particular aspects can lead to modernization of 'traditional' or 'backward' societies.

The earliest principles of Modernization Theory can be derived from the idea of progress, which stated that people can develop and change their society themselves. Marquis de Condorcet (1743-1794) was involved in the origins of this theory. Modernization Theory is part of theories under the development theory which is about how desirable a change in society is best achieved. Such theories draw on the variety of social science disciplines and approaches as the researcher will elaborate in chapter two of this dissertation. In this study the aspects of education, land, infrastructure and markets which constitute obstacles for development were considered to be the socio-economic challenges to agricultural modernization.

1.2.3 Conceptual Background

According to Mwanje and Duvel (1998), modernization of agriculture means introducing specialization and moving towards commercial (and profitable) agriculture. This implies adoption of appropriate (sustainable and environmentally friendly) agricultural technologies.

Kyomuhendo (1997) points out that modernization also means "training in skills to ensure that farmers use their land optimally and make profit". Modernization of agriculture also entails significant land reforms that provide security of property, develop land markets and increase efficient use of land and investments.

The strategy of modernizing agriculture is likely to succeed only to the extent which the individual farmers actually use modern agricultural inputs. The Government therefore must adopt the policy of providing a wide range of incentives to the farmers in the form of specific subsidies on modern agricultural inputs. Thus the subsidies have been provided to the farmers to encourage the use of chemical fertilizers, irrigation facilities, electricity and also to avail credit facilities (FAO, 2008). All this is intended to attain agricultural modernization.

1.2.4 Contextual Background

Rwanyamahembe sub-county is found in Kashari County Mbarara District in Western Uganda. It is one of the nine sub-counties in Kashari County in Mbarara District. The major economic activity in the sub-county is agriculture. The agricultural activities that are carried out in Rwanyamahembe Sub-county are mainly; crop production that includes the growing of bananas, coffee, maize, beans, sweet potatoes, cassava, tomatoes, peas, millet, sorghum, and vegetables. Livestock production is also carried out and includes poultry, cattle keeping, sheep rearing, goat rearing and piggery.

The methods of production used by the farmers are rudimentary. The crop farmers still use hoes. There is no irrigation. Cattle keepers use spray pumps for prevention of ticks and other parasites. Those who keep cattle for milk still use their hands for milking. The bicycle is the major means of transport for the farmers' products to market places. The roads are not well maintained and cattle farmers have a water problem during the dry season. The farmers appear not to know about modern agriculture. The pieces of land available to farmers appear small. Some farmers fail to sell their products.

1.3 Statement of the Problem

Agriculture is the dominant sector in the Ugandan economy. It creates employment to over 80% of the total population, contributes up to 45% to GDP and accounts for some 80% export earnings. Food production is by far the most important single economic activity, accounting for over a quarter of GDP (African Development Fund, 2000). Ministry of Foreign Affairs report (2006) indicates that rural poverty is seen to be best addressed through promoting the commercialization and modernization of agriculture, and in particular providing a coordinating framework for support services and public goods in rural areas.

In an attempt to improve modernization of agriculture, the government of Uganda has realized that training farmers and providing them with demonstrations is not sufficient. In so doing the government through Ministry of Finance has also decided to provide money for buying materials to model farmers in each parish country wide (NAADS 2010). For example, in Rwanyamahembe Sub-county six model farmers were selected from each of the five Parishes and were provided with materials such as wheel barrows and hoes. Some farmers were also given goats, heifers and one day old chicks depending on the choice and ability of the farmers. Service provision for both crops

and animals has also been availed under the NAADS Program. (Mbarara District Local Government: Production and Marketing Department Annual Report for the Financial Year 2011/2012)

Despite government's interventions to modernize agriculture in rural areas through application of improved production technologies, provision of high yield crops and giving money to farmers to buy materials, agricultural modernization has not been achieved in Uganda (African Development Fund, 2000). For example, Rwanyamahembe Sub-county has registered very little progress in agricultural production in spite of the government of Uganda's intervention in promoting agricultural modernization. (Mbarara District NAADS Program Report 2012)

This study therefore sought to assess the socio-economic challenges affecting agricultural modernization in Rwanyamahembe Sub-county with a view of making recommendations to address them.

1.4 General Objective

To examine socio-economic challenges affecting agricultural modernization in Rwanyamahembe Sub-county, Kashari County, Mbarara District.

1.4.1 Specific Objectives of the Study

i. To find out the role of education of farmers in agricultural modernization in Rwanyamahembe Sub-county.

ii. To examine the contribution of land availability to agricultural modernization in Rwanyamahembe Sub-county.

iii. To establish the effect of infrastructure on agricultural modernization in Rwanyamahembe Sub-county.

iv. To analyze the effect of market availability on agricultural modernization in Rwanyamahembe Sub-county.

1.4.2 Research Questions

i. What is the role of education of the farmers in agricultural modernization in Rwanyamahembe Sub-county?

ii. What is the contribution of land availability to agricultural modernization in Rwanyamahembe Sub-county?

iii. What is the effect of infrastructure on agricultural modernization in Rwanyamahembe Sub-county?

iv. What is the effect of market availability on agricultural modernization in Rwanyamahembe Sub-county?

1.5 Hypotheses

i. There is a strong relationship between the role of education of the farmers and agricultural modernization.

ii. There is a relationship between land availability and agricultural modernization.

iii. There is a significant relationship between infrastructure and agricultural modernization.

iv. There is a strong relationship between market availability and agricultural modernization.

1.6 Conceptual Framework

In order to focus this study, a conceptual framework was developed. This framework represents a relationship between education, land, infrastructure and markets to agricultural modernization.

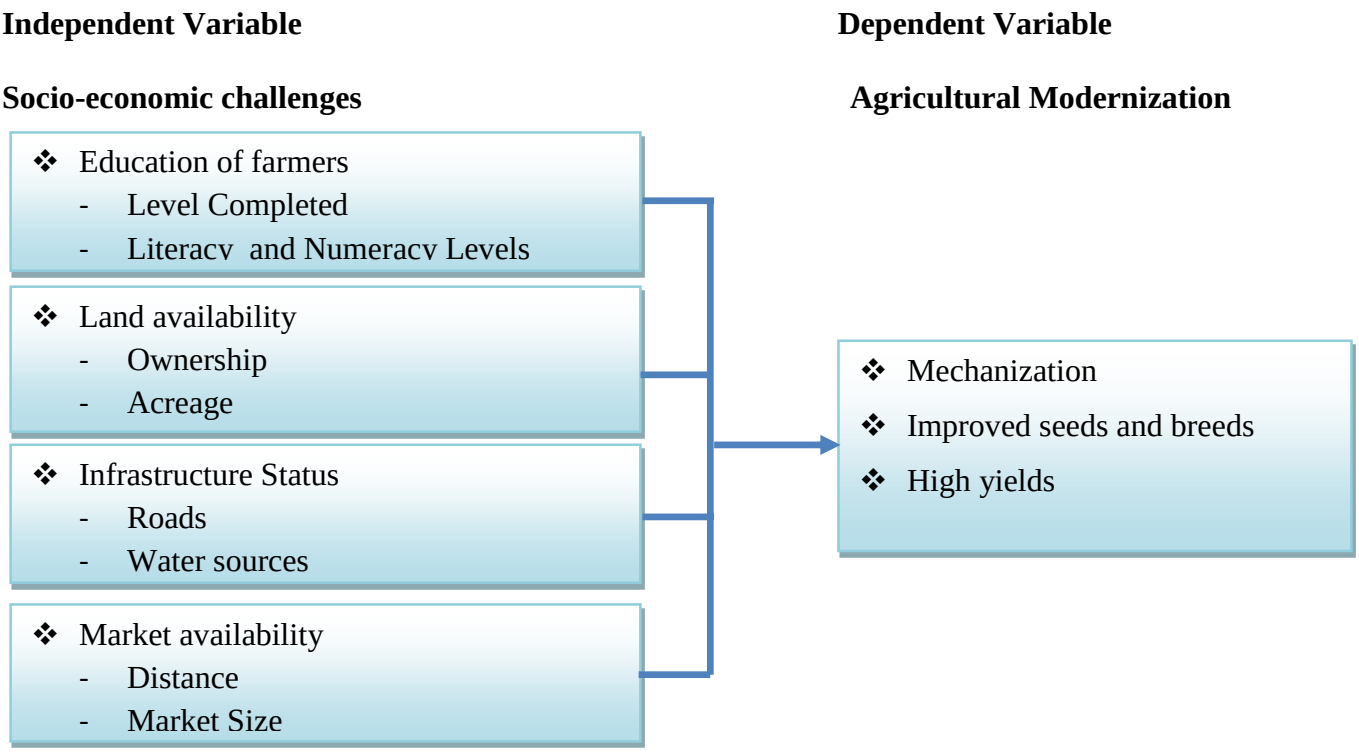

Figure 1 : Conceptual framework showing socio-economic challenges affecting agricultural modernization.

Source: Developed by the researcher from the works of Drueckhammer and White (1984), Keeler (2009), Brushett and Abraham (2006), Bibangambah (2002).

The independent and dependent variables in this study were socio-economic challenges and agricultural modernization respectively. The framework above depicts how modernization of agriculture is affected by various socio-economic challenges.

It can be observed from the conceptual frame work that farmers' education level, literacy and numeracy, affect agricultural modernization. This is because with low levels of education and

illiteracy, farmers may not easily and quickly adopt modern methods of farming as their highly educated counterparts. It is conceptualized that educated farmers do keep track of their farm records, and are always keen on adopting modern farming techniques as well as being easy to mobilize towards agricultural modernization. This is in line with propositions of Drueckhammer and White, (1984), who emphasize educational programmes for adults to improve efficiency in agricultural production. Similarly, when the farmers are not able to count (numeracy), they may not keep their farm records like simple farm financial statements and in most cases may easily be cheated by middlemen within the agricultural market. All this affects the profitability of their agricultural activities and hence may discourage any more efforts towards what may seem as an un-profitable venture simply because they cannot count.

As reflected in the works of (Keeler 2009), the availability of land in terms of ownership and Size (acreage) has a bearing on agriculture modernization. This is because when farmers do not individually own the pieces of land on which they carry out their agricultural activities, they may be hesitant to use modern farm tools or apply fertilizers and use improved seeds and breeds since they are uncertain about whether the land will be available to them for future use. Similarly, irrespective of land ownership, the size of land greatly influences use of modern farm tools. For example tractors cannot be used on a small chunk of land.

Infrastructure most especially roads and water sources are conceptualized as having an effect on agricultural modernization. The significance of infrastructure in agricultural modernization is well spelt out by Brushett and Abraham (2006). When the Roads are poor, and hence farms inaccessible by the potential buyers, farmers incur more transport costs and this reduces profits realized from sale of agricultural products while some may perish or go bad. This low turnover indeed

incapacitates farmers' abilities to either hire or afford use of improved farm inputs. Similarly, when there is shortage of water, livestock farming is affected very much as well as crop growing.

Bibangamba (2002) points out that market deficiency affects agricultural progress. The availability of markets in terms of distance and number of buyers is deemed to affect agricultural modernization in that when the distance is long more costs are incurred in the transportation of both farm inputs and outputs which reduces profitability and hence leaves farmers with less capital for improving on their farming. Short distances mean near markets for farm products, farm inputs and less transportation costs which lead to more profits and a high turnover and as a result farmers may be capable of hiring modern tools, use improved seeds and breeds in quest for high yields and hence more profits. Similarly when the number of buyers is big, farmers find it quite easy to sell their products at reasonable prices and get reasonable income that enables them to use improved farm inputs and realize high yields which they are sure of selling off and making profits.

1.7 Significance of the Study

The findings of this study may enable the Sub-county Council of Rwanyamahembe which is the policy maker to get informed of the obstacles to agricultural modernization and address them. The administrators may find it easy to implement the decisions of their council because they will equally be informed about what is required to be done to modernize agriculture while the research students will have access to what the researcher has found out on this topic and they can consider other issues that the researcher has not covered.

Besides, the research findings may broaden the knowledge of the researcher on the socio-economic challenges of agricultural modernization.

1.8 Justification of the Study

Several studies have been conducted in the field of plan for modernization of agriculture but none seem to have been done in Rwanyamahembe Sub-county in particular. There have been a lot of interventions by the government in the agricultural sector especially through National Agriculture Advisory Services (NAADS) but there appears little progress on the ground.

The research findings will enable farmers of Rwanyamahembe Sub-county to know where there are weaknesses in the process of modernizing agriculture and will be able direct their efforts towards addressing these weaknesses.

1.9 Scope of the Study

The study was carried out in Rwanyamahembe Sub-county, Kashari County, Mbarara District in western Uganda. Rwanyamahembe Sub-county was chosen because it is one of the sub-counties where NAADS activities are being implemented. The study was restricted to education, access to land, infrastructure and availability of markets as the socio-economic challenges to agricultural modernization.

The study covered the period from the year 2002 up to present. This is the period when the NAADS program was introduced in Mbarara District under which Rwanyamahembe Sub-county falls. Whereas the program for modernization of agriculture in Uganda was embarked on as far back as 1996, the farmers were considered to more likely remember what has transpired during the period of the NAADS program than what happened back since 1996. Thus the researcher chose to study the period 2002 to present.

1.10 Operational Definitions

Modernization of agriculture refers to the adoption of production processes, technologies and tools that lead to increased output and income.

Challenges in this study refer to the bottlenecks that cripple the achievement of something such as agricultural modernization.

Infrastructure is basically the base on which economic growth is built. Roads, water systems, mass transportation, airports, and utilities are all examples of infrastructure. According to Hardin (1968), infrastructure is the basic physical systems of a country's or community's population, including roads, utilities, water and sewage among others. In this study infrastructure is concentrated on both roads and water.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents an account of some content that has been written and published previously on agricultural modernization by scholars and researchers. It contains the theoretical review,

conceptual review and reviews on each of the objectives. It concludes with the summary of the literature reviewed and each of these is discussed and presented thematically.

2.2 Theoretical Review

The research was conducted within the framework of the Modernization Theory. It sought to ascertain the relevancy of the claims made by the advocates of this theory in the achievement of agricultural modernization.

Modernization theory is a grand theory encompassing many different disciplines as it seeks to explain how society progresses, what variables affect that progress, and how societies can react to that progress. Modernization theory focuses specifically on a type of modernization thought to have originated in Europe during the 17th century, which brought social morals and technological achievements into a new epoch (Petit, 2010).

The foundations of modernization theory go back to the Age of Enlightenment, when a number of philosophers began to look at how society changed and progressed. Theories were laid out as to how technological advancement necessarily led to social advancement, which in turn led to an examination of how different facets of advancement were connected. The basic premise of this phase of modernization theory was that humans were able to change their society within a generation, and that this change was often facilitated by advancements in technology, production, and consumption.

Rostow (1962) identifies five stages of growth namely; Traditional society, Preconditions for take-off, Take-off, Drive to maturity and Age of High mass consumption. Rostow argued that economic take-off must initially be led by a few individual sectors.

In this study the researcher has identified the sectors to be education, land, markets and infrastructure that if attended to would lead to agricultural modernization thus achieving economic development. This is in line with Drueckhammer and White (1984) who argue that there is a direct linkage between education and agricultural modernization. Keeler (2009) also adds that land availability is essential for agricultural modernization. Infrastructure is equally emphasized by Brushett and Abraham (2006) as a requisite for agricultural modernization. Bibangambah (2002) emphasizes the importance of markets in agricultural modernization.

Modernization is about Africa following the developmental footsteps of Europe (largely the former colonizer of Africa). According to modernity, policies intended to raise the standard of living of the poor often consist of disseminating knowledge and information about the efficient techniques of production. For instance, the agriculture modernization process involves encouraging farmers to try new crops, new production methods and new marketing skills (Ellis and Biggs, 2001).

In general, modernization led to the introduction of hybrids, the green house technology, genetically modified (GMO) food, use of artificial fertilizers, insecticides tractors and the application of other scientific knowledge to replace traditional agricultural practices. The above view is endorsed by Smith (1973) who pointed out that modernization is about exchanging of older agricultural practices with something more recent.

According to Karl Marx (1818-1883) the organization of society depends on means of production. Literally those things, such as land, natural resources, and technology, necessary for the production of material goods and the relations of production, in other words, the social relationships people enter into as they acquire and use the means of production. Together these compose the mode of production, and Marx distinguished historical eras in terms of distinct modes of production.

For Marx, classes are but the agents of social change, their ultimate determinant is the organization of production. His reasons for this assumption go back to early philosophical considerations. Each society, whether it was tribal, feudal or capitalist was characterized by the way its individuals produced their means of subsistence, their material means of life, how they went about producing the goods and services they needed to live. Each society created a ruling class and a subordinate class as a result of their mode of production or economy. Men cannot live without work; they also propagate their kind and hence enter into the social relations of the family. Men use tools to satisfy their needs; as needs are satisfied, new needs arise and techniques of production are improved. The proliferation of needs and improved techniques put a premium on cooperation based on some division of labor, for divided labor increases productivity. How labor is divided depends on the organization of production, specifically on the distribution of property in the means of production.

Parsons (1967) viewed society as a system. He argued that any social system has four basic functional prerequisites: adaptation, goal attainment, integration and pattern maintenance. These can be seen as problems that society must solve if it is to survive. The function of any part of the social system is understood as its contribution to meeting the functional prerequisites. In the context of this study, the farmers are the society that form a system and have a direct relationship with environment in which they carry out their farming activities to which they must adapt.

Goal attainment refers to the need for all societies to set goals towards which social activity is directed. The main goal of farmers is always to increase production. Therefore all efforts must be undertaken towards this goal.

Integration refers primarily to the ‘adjustment of conflict’. It is concerned with the coordination and mutual adjustment of the parts of the social system. Legal norms define and standardize

relations between individuals and between institutions, and so reduce the potential for conflict. When conflict does arise, it is settled by the judicial system and does not therefore lead to the disintegration of the social system. In line with this, farmers have to work within the laws of the day. Conflicts which may arise, for example, as a result of land disputes are handled according to the existing laws. Those who keep animals must ensure that the animals do not destroy crops of their neighbors to avoid legal wrangles.

Pattern maintenance refers to the 'maintenance of the basic pattern of values, institutionalized in the society'. Institutions that perform this function include the family, the educational system and religion. Farmers like any other society have families, send their children to school and have religious affiliations and as such, maintain the basic pattern of values that Parsons talks about.

2.3 Agricultural Modernization

The concept of modernization incorporates the full spectrum of the transition and drastic transformation that a traditional society has to undergo in order to become modern (Hussain, 1981). In line with a rich intellectual tradition, we believe that science and technology have much to contribute to the transformation and modernization of traditional agriculture, particularly in developing countries, where literally billions of people depend, totally or largely, on agriculture to ensure their livelihoods. Thus, the economic and social stakes of the modernization of agriculture in many parts of the world are huge.

The concept of agricultural modernization presents a great opportunity for poverty eradication because the agricultural sector employs over 80 percent of the labour force, and because agricultural growth can be accelerated substantially by the uptake of modern farming techniques.

Over 85% of Uganda's population lives in rural areas where agriculture is the major contributor to their livelihoods. From the poor households' perspective, improving their agriculture-based livelihoods means transforming agriculture by enhancing their capital assets – natural, physical, financial, human and social. Improving the welfare of poor subsistence farmers will require that they re-orient their production towards the market. More of their production must be marketed to enable them to earn higher incomes (Ministry of Agriculture Animal Industry and Fisheries, 2004).

By raising farm productivity, increasing the share of agricultural production that is marketed, and creating on-farm and off-farm employment modernizing agriculture will contribute to increasing incomes of the poor. Agriculture has great potential to contribute to sustainable and broad-based economic development in Uganda. It is the reason that majority of Ugandans derive their livelihoods from agriculture and that the country's foreign exchange earnings are predominantly agriculture-based hence reflecting the importance of the sector. The potential for poverty reduction associated with agricultural progress is well articulated in the revised Poverty Eradication Action Plan (Ministry of Foreign Affairs, 2006).

While the world is projected to need 70 percent more food for 9.2 billion people in 2050 as it did in 2000, it must address multiple challenges, including pervasive poverty; hunger and malnutrition; uncertainties from climate change (including higher intensity and incidence of droughts, floods and pests); decreasing water resources: rising energy, food and environmental, bio-security and bio-safety standards, measures, and regulations; the declining availability of land (land per capita will decrease from 4.3 hectares in 1961 to 1.5 hectares in 2050) lower crop productivity growth (annual growth rate of major cereals will decrease from three to five percent in 1980 to about one

percent in 2050) and eroded ecosystem services. There is also a demand for increased variety, quality and safety of agricultural products, driven by urbanization and rising incomes (FAO, 2010)

According to Starkey (1998), farm production and rural transport require power. There are three main options: human work, animal power and the use of motors. The choice depends on local circumstances. Human, animal and machine power can complement each other in the same household, farm and village. Agricultural mechanization involves the use of tools, implements and machines to improve the efficiency of human time and labour. The most appropriate machinery and power source for any operation depends on the work to be done and the relative desirability, affordability, availability and technical efficiency of the options. A hand hoe may be the best tool for intensive vegetable production. However, if much work needs to be done, human power alone is generally slow and tiring. Mechanization, using animal or motor power, can significantly increase the productivity of human labour and improve the quality of life for women, men and children. Agricultural mechanization is not an end in itself, but a means of development. The goal is sustainable and socially-beneficial agricultural production. The hardware is just one component of very complex farming systems. A wide range of social, economic and ecological factors determine whether a technology is practicable, beneficial and sustainable in an area.

Beyond farmer choice, the lack of seed availability and the narrowing of genetic resources are making our food system less secure. Classical breeding can provide the genetic tools farmers need to manage evolving pest, disease, and weather challenges, creating a source of seeds and breeds adapted to changing needs and opportunities. Of course, one of these needs includes feeding our growing population. The maintenance and improvement of genetic diversity through classical breeding is essential for the success of productive food systems and the greater global food supply,

both now and into the future. This is a national issue and should be addressed, at least in part, through national programs (Carroll, 2012).

Yair (1992) says that for many farmers especially in non-industrial countries, agricultural productivity may mean much more. A productive farm is one that provides most of the resources necessary for the farmer's family to live. It is a farm which ensures food security as well as a way to sustain the well-being of a community. This implies that a productive farm is also one which is able to ensure proper management of natural resources, such as biodiversity, soil, and water. For most farmers, a productive farm would also produce more goods than required for the community in order to allow trade. It is evident from the above presentation that a farm will only be meaningful to a farmer if the yields are high enough not only for domestic consumption but also for trade.

2.4 Education and Agricultural Modernization

In "Plan for Modernization of Agriculture: Eradicating Poverty in Uganda, (Government Strategy and Operational Framework) it is said that many communities blamed lack of productivity on lack of information, knowledge and skills concerning better methods of food and income-generation (Crop production, animal husbandry, fishing methods and alternatives), soil conservation, pest and disease control, marketing opportunities, prices, processing and pertinent Government Policies and regulations. Poor farmers blamed this on limited, poor quality extension services, which they desire because of positive experiences in the past. Poor farmers complained that agricultural officers are rarely seen in the community, whereas the cost and quality of service of veterinary extension workers are of concern.

Adult education programs transfer information in many ways. Programs for adults have focused on the development of skills needed to improve efficiency in production agriculture. Some adult programs have also addressed topics related to the improvement of managerial skills. However, as the number of agricultural producers declined, so has the number of persons interested in production information from the commercial producer's perspective (Drueckhammer and White, 1984).

The need for agricultural literacy is becoming increasingly evident (Hagins, 2001). Without agricultural literacy there is a potential threat to a nation "when a majority of a nations' population lacks a basic understanding of the industry which produces and distributes the food needed to satisfy one of the most basic of all human needs" (Birkenholz, 1992). According to Braverman and Rilla (1991), agricultural literacy among adults is an important area of education and research.

Birkenholz, (1993) points out that failure to educate the American public about the production and marketing of agricultural products may place the industry in jeopardy. The security of the industry will be directly influenced by policies developed by groups and individuals with limited agricultural knowledge and experience. Birkenholz was therefore stressing the need for educating the American public about production and marketing of agricultural products so that agricultural industry is in the hands of both experienced and knowledgeable people.

Developing an Adult Education Agricultural Literacy Program could be a possible avenue for improving agriculture literacy within society. According to Caffarella (2002), the purpose of adult education programs includes assisting adults to bring about changes in societal norms and values. Therefore, an adult education program could be used to improve the American society's understanding of agriculture.

Ghunain (2008) states that since the majority of the farmers in the Disi basin in Jordan have limited education levels, those farmers are expected to face difficulties and barriers if they were to transfer their labour resources to pursuit other than low input, traditional farms.

Belay (2008) writes that Ethiopian agriculture is characterized by very low productivity. The low productivity of agricultural sector has made it difficult to attain food self sufficiency at the national level. One of the major obstacles for the rapid development of the agricultural sector in Ethiopia is the scarcity of skilled and experienced labour.

2.5 Land Availability and Agricultural Modernization

Land and Equity Movement in Uganda Policy Discussion Paper 3A: Landlessness, states that the vast majority of Ugandans will continue to depend on agriculture for many years, and policy for eradicating poverty in Uganda therefore depends on transforming the profitability of land.

The Plan for the Modernization of Agriculture envisages both technical and marketing improvements – but either way, the ability to advance economically will depend upon one key factor: how much land a family owns. This is why the researcher felt that the size of the land available to farmers in Rwanyamahembe Sub-county was of significant importance.

Keeler (2009) writes that Uganda's new land policy aims to modernize land rights and streamline the land administration to support investment, both in agriculture and other sectors. However, inconsistencies in the proposed regime, corrupt land handouts and a distrust of the intentions of the central government make this a potentially explosive initiative. Convoluted traditional tenure systems have dominated land use in Uganda for more than a century. Deadlocks between land owners and tenants, vague and often disputed communal rights, and a basic lack of clear

administration have kept the country from developing much of its land. After many failed attempts to address these problems, the government is now in the final stages of producing a National Land Policy—a sweeping piece of legislation that would modernize land rights and streamline administration to support national development planning. The stated intention of this legislation to cultivate the urban market, introduce new technologies to smallholder farming and attract investment for commercial agriculture.

A number of studies have demonstrated that security of land ownership has substantial effect on the agricultural performance of farmers (Besely 1995). Better tenure security increases the likelihood that farmers will capture the returns from their investments. As a result demand for short term inputs (farm chemicals, labour) will increase as well.

2.6 Infrastructure Status and Agricultural Modernization

Adequate and quality infrastructure is a *sine qua non* for sustainable development of agriculture. Strengthening rural infrastructure such as, roads and bridges, irrigation, post-harvesting facilities, results in improved productivity/efficiency, reduced production costs, and post-harvest losses, which further enhance income and employment for the rural farming community.

Brushett and Abraham (2006), indicated that the rural setting poses additional and specific challenges for infrastructure provision, notably the need to serve dispersed and, at times, isolated communities. Economically speaking, reduced economies of scale and other factors result in higher unit costs of infrastructure service delivery. The investment conditions in rural areas taken together with the generally prevailing lower incomes found in these areas create particular challenges related to the pricing of services and willingness of the private sector to participate. Extension of networked services, to remote rural locales is often costly and complex. Government

has commonly been called upon in these cases to fill the gap on service provision, although this has rarely been sufficient to offset the disadvantages faced in the rural areas.

Ban Ki-moon (2012) states that over the coming decades, feeding a growing global population and ensuring food and nutrition security for all will depend on increasing food production. This, in turn, means ensuring the sustainable use of our most critical finite source – water.

A Senior Technical Adviser for the International Fund for Agricultural Development (IFAD) in Rome, Rudolph Cleveringa, echoed Mr. Ki-moon's remarks, stressing that securing water access is particularly important in rural communities. He said that, for smallholder farmers in developing countries, water and land cannot be treated as separate issues. If we are to reduce poverty in rural areas, we must develop a holistic approach to focus on water in all of its contributions to development such as in areas of health and agriculture.

Li and Liu (2009) write that the status of rural infrastructure such as roads not only influence agricultural productivity and operation modes directly, but also improve the living standards for rural people and enhance the quality of rural labour. Deficient rural infrastructure may hinder agricultural production and induce poor technical performance. Rural infrastructure is considered to have an effect on agricultural production efficiency and is regarded as a strategic variable.

2.7 Market Availability and Agricultural Modernization

According to Tayebwa (2008), most of the commodities in Uganda are produced by small scale farmers and there are several marketing problems which include inadequacy of funds, limited value addition, poor flow of market information, small quantities difficult to market, high costs

leading to buying of inputs in small quantities, after harvest losses due to poor storage, weak bargaining power, weak institutions and selling after harvest when prices are low.

Bibangambah (2002) attested that often the majority of "marketers" in Uganda have limited or no access to timely information regarding both domestic and export markets especially with respect to such matters as price, supply, demand, production opportunities, and prospects or economic returns. It is noted that agricultural markets in Uganda are characterized by elongated or overextended marketing chains of middlemen (buyers/agents) which, in turn, mean long chains of transactions between farm gate and exporters or consumers, lack of competiveness between traders, collusion at all levels of trading and poor access to appropriate market information. The distance to markets can influence farmers' decisions in various ways. Better access, apart from influencing availability of technology, can influence the use of output and input markets, and the availability of information and support organizations (Jensen, 2006).

Most agricultural commodity markets are characterized by a high degree of volatility. Three major fundamentals explain why that is the case. Firstly, agricultural output varies from period to period because of natural shocks such as weather and pests. Secondly, demand elasticities are relatively small with respect to price and supply. Elasticities are also low, at least in the short run. In order to get supply and demand back into balance after a supply shock, prices have to vary rather strongly, especially if stocks are low. Thirdly, because of the production term, though it can do so much more once the production cycle is completed (FAO, 2011).

2.8 Summary of the Literature Review.

This chapter has mainly looked at the modernization theory as the basis of the study and the concepts of modernization. It has considered the levels of education regarding the acquisition of skills and knowledge and how they are related to agricultural modernization. The Land available to farmers, in addition to infrastructure and markets has also been examined in relation to agricultural modernization.

According to the modernization theory, “a change in the internal factors within the country such as illiteracy, traditional agrarian structure, low division of labour, poor communication and infrastructure, is a strategy for development and progress”. The theory also looks at aspects that if addressed would lead to agricultural modernization.

Whereas the level of education has got a lot of influence on agricultural modernization, the availability of information is crucial because no matter how highly educated a farmer is, the high level of education the farmer has attained will not be of any serious use to him or her if he or she does not have access to information on current inputs and methods of farming.

Besides the level of education, literacy and numeracy are very useful because literate farmers who can read, write and count are most likely to appraise their farming activities through record keeping and can measure and evaluate their methods used in farming.

Some farms have been cultivated overtime and have since lost their fertility. The question of unfertile soils has to be addressed by the introduction of fertilizers. Whereas farmers may acquire bigger sizes of land thus increasing their acreage, this may not necessarily increase their yields if the soils are not fertile enough to support crop production.

Although the question of market distance is of great significance in marketing of agricultural products, these days, produce buyers have started to get the products from the farms. In

Rwanyamahembe Sub-county for example, buyers of bananas and cattle traders have on several occasions been seen going to farms in the villages to buy from farmers directly. This has to some extent reduced the market distance burden to farmers.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter is about the methods that were used in this study and explains the approaches that were used in order to understand the challenges affecting agricultural modernization in Uganda. It presents the research design, research population, sample size and sampling procedure. The chapter also includes research instruments, reliability and validity of instruments, data gathering procedures, data processing and data entry and analysis.

3.2 Research Design

A case study research design was used. The use of case study enabled the researcher to study the phenomenon under investigation in a detailed manner. George and Bennet (2005), define case study "as a well-defined aspect of a historical episode that an investigator selects for analysis,

rather than a historical event itself". It means that it helps in providing detailed description and analysis of an event, institution, a group or a community in its own social context.

Yin (2009) defines case study as a thorough examination, and comprehensive account of particular project, group, as they exist in their environment. Case study is one of the several methods used in conducting studies in the area of social science, psychology and political science.

3.3 Study Population

Cochran (1977) defines population as the aggregate or totality of objects of individuals, having one or more characteristics in common that are of interest to the researcher and where inferences are to be made. The study population consisted of 223 farmers of Rwanyamahembe Sub-county who were registered as farmer group members plus key stake holders involved in the implementation of agricultural activities (key informants).

The farmers were considered because the problem under investigation was directly related to them. The key informants were taken on since they had vital information on the various interventions that have been under implementation in the period under study. The key informants included; the District NAADS Coordinator (DNC), the District Production and Marketing Officer (DPMO), the District Agriculture Officer (DAO), the Chairperson District Farmers Forum, the Sub-county NAADS Coordinator (SNC), the Sub-county Chief, the Sub-county Chairperson, The sub-county Chairperson Farmers Forum, and the two Sub-county agriculture extension workers.

According to the available statistics from Rwanyamahembe Sub-county Agriculture Office (2011), the Sub-county has a total of 223 registered farmers in five groups disaggregated in each of the five Parishes as shown in the table below.

Table 1: Disaggregation of Farmers by group in Rwanyamahembe Sub-county

SN	NAME OF FARMERS' GROUP	NUMBER OF FARMERS
1	Kakyerere	47
2	Katyazo	41
3	Mabira	35
4	Rutooma	56
5	Rwebishekye	44
TOTAL		223

Source: Rwanyamahembe Sub-county Agriculture Department (2011).

Table 1 above shows all the 223 farmers of Rwanyamahembe Sub-county disaggregated in their respective Groups. The researcher used this information to draw a sample of farmers from whom the required data about this study was obtained.

3.4 Sample Size

The study took on a sample of 140 farmers. A sample is a collection of some (a sub set) elements of the population that is taken for investigation such that results obtained are used to infer on the population from which it was drawn (Cochran, 1977). Thus it is very important to make the sample as representative as possible. Regardless of what sampling approach is used, all sampling approaches aim at serving the purpose of generalization of findings and reduction of costs and time.

Rwanyamahembe has 223 registered farmers in five farmer groups, a sample of 140 farmers was considered. The decision to arrive at this sample size is in line with the mathematical table computed by Morgan & Krejcie (1970) adopted from Amin (2005) that prescribes a suitable sample size of 140 to be drawn from a population of 220 to 229 units. Table 2 shows the number of sampled farmers from each of the farmers' groups.

Table 2 : Sampled Farmers by Group in Rwanyamahembe Sub-county.

SN	NAME OF FARMERS' GROUP	POPULATION OF FARMERS	SAMPLED FARMERS	SAMPLING TECHNIQUE
1	Kakyerere	47	29	Simple Random Sampling
2	Katyazo	41	26	Simple Random Sampling
3	Mabira	35	22	Simple Random Sampling
4	Rutooma	56	35	Simple Random Sampling
5	Rwebishekye	44	28	Simple Random Sampling
TOTAL		223	140	

Source: Rwanyamahembe Sub-county Agriculture Department (2011).

The study used Purposive non-probability sampling technique to select 10 key informants. Non-probability sampling is the selection of a sample without using any random technique and hence all elements that meet the same selection criteria are not given equal chance for being included in the desired sample. (Amin, 2005). In Purposive Sampling, respondents are chosen by the researcher for a specific purpose in mind (Lauridsen, 2005). In this study, the sampling criterion was that a key informant is directly involved in administering and coordination of the implementation of agricultural activities in Rwanyamahembe Sub-county.

3.5 Sampling Procedure

The study employed probability random sampling techniques. By Probability random sampling the researcher refers to the technique of choosing elementary units whereby each unit is given equal chance of being included in the sample (Amin, 2005).

This technique was used to draw a sample of 140 farmers from a total of 223. Considering that Rwanyamahembe Sub-county has five registered groups one from each of the Parishes, stratification technique of sampling was used and each group was treated as an independent stratum. By the term Stratification the researcher refers to the technique of sampling where by the population is first sub-divided into sub population (this time into groups) in such a way that the

strata are non-overlapping and altogether they form the whole population. A sample of 140 was drawn from the five parishes using proportion allocation method utilizing the formula below.

Proportion Allocation Formula: = $\frac{Ni}{N} \times n$ where

(Ni) - Symbolizes number of farmers in each group (stratum)

(N) - Stands for the Population (223) as the number of farmers in Rwanyamahembe Sub-county)

(n) - Represents the sample size (140 farmers) required.

Applying the above formula to our population in table 1, the researcher determined the number of farmers that were obtained from each of the five groups as illustrated below.

Table 3: Proportional allocation procedure of drawing the Sample from the Population

FARMERS' GROUP	No. OF FARMERS	COMPUTATION	SAMPLED FARMERS
Kakyerere	47	$\frac{47}{223} \times 140$ =	29.5 approx to 29 farmers
Katyazo	41	$\frac{41}{223} \times 140$ =	25.7 approx to 26 farmers
Mabira	35	$\frac{35}{223} \times 140$ =	21.9 approx to 22 farmers
Rutooma	56	$\frac{56}{223} \times 140$ =	35.1 approx to 35 farmers
Rwebishekye	44	$\frac{44}{223} \times 140$ =	27.6 approx to 28 farmers
TOTAL	223	Total sample size =	140 farmers

Source: Rwanyamahembe Sub-county Agriculture Department (2011)

The computations in Table 3 are in line with the procedures spelt out by Lauridsen (2005).The approximations made are in sense that farmers must be quantified in absolute numbers and the criterion used for conversion is the degree of the magnitude of the decimal point.

From Table 3, it is depicted that 29 farmers (respondents) were obtained from Kakyerere group, 26 from Katyazo, 22 from Mabira, 35 from Rutooma and 28 from Rwebishekye group.
This scientific approach thus resulted into the desired sample size of 140 respondents (farmers).

Finally simple random sampling was done for each group to arrive at the actual names of the farmers from whom data was collected. This was aided by a list of farmers in each group (sampling frame). The procedure involved folding of pieces of paper each containing a name of an individual farmer from the group list and then without replacement the researcher picked randomly until the number in each of the parishes was got. For example in Kakyerere group 47 pieces of paper each containing a name of one farmer in the group were folded and then the researcher randomly picked 29 of them, one after the other without replacement. When the 29 pieces of paper were drawn, the researcher then unfolded the pieces of paper to know the names of the farmers who were the actual respondents for this study. This procedure was uniformly done across all other groups.

3.6 Methods of Data Collection

Methods of data collection are approaches and techniques that are used to gather the required data by the researchers from the target population. In this research, the researcher collected Primary data using a questionnaire survey and interviews.

3.6.1 Questionnaire Survey

One interviewer collected data from the selected farmers using a pre-prepared questionnaire. The interviewer recorded the responses from each of the farmers and returned the dully completed questionnaires to the researcher.

3.6.2 Interviews

The researcher personally interviewed the ten selected key Informants with the aid of a Key Informants' interview guide. The researcher used a recorder and a note book to record the responses.

3.7 Research Instruments

Research instruments are a description of the tools of data collection used in the study. They typically include interviews, questionnaires, documentary analysis, psychological tests and discussion techniques (Amin, 2005). In this study the researcher used a "Questionnaire" and a "Key Informants Guide".

3.7.1 Questionnaire.

A questionnaire is essentially a structured technique of collecting primary data. It is generally a series of written questions for which the respondents have to provide the answers (Bell, 1999). In this study, questionnaires were administered by one data collector to conduct interviews and hence record down farmers' responses related to farmers' background information (bio-data) and items related to the independent and dependent variables. Bio-data questions included: the respondents' sex; age and major agricultural activities. The questions on independent variables captured: the respondents' Education level, literacy and numeracy as well as on receiving agricultural extension services; Land in terms of ownership, and size in acreage; Infrastructure in terms of roads accessibility and water availability to farmers and as well as on Market availability in terms of distance and size. The Questions on the Dependent Variable " Agricultural Modernization" included: use of modern farm tools or machines; use of improved seeds and breads and as well as extent of improvement in farm yields.

3.7.2 Key Informants Interview Guide

A Key Informant's guide is an interview schedule with a set of questions that the interviewer asks when interviewing. An interview schedule makes it possible to meet specific objectives of the study (Mugenda & Mugenda, 2003). In this study open ended questions were asked to get detailed information from the selected key informants. The key informants Guide used in this study captured the respondent's Title; venue of interview; date of interview and the time of interview. The questions asked included: the role of the respondent in managing agriculture in Rwanyamahembe Sub-county; the activities being implemented towards agricultural modernization in Rwanyamahembe Sub-county; rating of literacy, numeracy of farmers in Rwanyamahembe Sub-county; views on land accessibility, roads, water sources available to farmers, and market availability in Rwanyamahembe Sub-county. These responses supplemented the data that was obtained from the farmers.

3.8 Quality Control of Instruments

Quality control of instruments refers to the goodness of the data collected using these instruments. It encompasses both Reliability and Validity which are important concepts in the acceptability of the use of an instrument for research purposes.

3.8.1 Reliability

Reliability refers to accuracy and consistence of the data obtained during the study. According to Amin (2005), an instrument is reliable if it produces the same results wherever it is repeatedly used to measure a trait or a concept from the same population and under similar circumstances.

The researcher used test and re-test method. The questionnaire that was used was administered twice to ten selected individuals who are also farmers of Rwanyamahembe Sub-county but were

not included in the sample. This was meant to check on the appropriateness of the instrument and adjustments were made in the instrument to enable the researcher achieve the study objective.

3.8.2 Validity

Validity refers to whether information that was obtained during the study was extremely convincing and grounded (Robinson, 2002). In research, validity seeks to establish whether the researcher has developed an instrument which tests the right issues. Amin (2005) indicates that validity tests whether an instrument used in research is accurate, correct and meaningful. During this study, validity was established by looking at the extent to which the content in instruments relates to the concepts that are under the study. This is also in line with Siegle (2004) whose study established that the closer the content in an instrument to contents of theoretical concepts, the more an instrument generates valid results.

3.9 Data Gathering Procedures

The researcher obtained an introductory letter from the department of higher degrees of Uganda Management Institute after defending the proposal authorizing him to proceed to collect data. The researcher presented the letter to the District authorities for clearance to conduct the research in Rwanyamahembe Sub-county which clearance was presented to Rwanyamahembe Sub-county authorities. The researcher had one day training for the data collector who had been identified. Upon getting clearance from the Sub-county authorities, the researcher then issued a copy of the clearance along with the questionnaires to the data collector who proceeded to the field to collect the data. The identified key informants were interviewed by the researcher himself using a “key informants Guide”. The researcher was noting the responses in a note book and at the same time using a recording device for which the consent of each Key informant had been sought first.

3.10 Data Processing and Entry

After data collection, the collected raw data was processed. By the term processing the researcher means that the completed questionnaires containing the research raw data were manually checked for errors to ensure accuracy, consistency, homogeneity and completeness. The researcher then embarked on data entry using the Statistical Package for the Social Scientists (SPSS).

3.11 Data Analysis

Data analysis was conducted with the objective of getting a feel for the data, testing the goodness of data, and testing the hypotheses developed for the research. Both quantitative and qualitative analyses were conducted.

3.11.1 Quantitative Data Analysis

Quantitative analysis was done using SPSS. Analysis was done based on the objectives of the study on a case by case basis. Because the dataset was highly categorical, data analysis was done in form of descriptive statistics by cross tabulating components of each of the independent variable with the components of the dependent variable separately. Results of all cross tabulations were then summarized in contingency tables for each objective and both in absolute numbers and percentages to aid comparisons and for simplicity of potential users of the findings.

3.11.2 Qualitative data analysis

Qualitative analysis approach was basically applied for the data gathered from the key informants. The Key informants' responses were thematically summarized by objective on a case by case basis. After quantitative analysis of the data obtained from the farmers, the findings obtained from the key informants were used to make supplementary discussion on the quantitative findings.

3.11.1 Measurement of Variables.

In this study both the independent and dependent variables were measured. The independent variables taken to be the socio economic challenges to agricultural modernization were conceptualized to be; education, land, infrastructure and market. Education was measured by level, literacy and numeracy. Land was measured by ownership and size. Infrastructure was measured by access to roads and water available to farmers for agricultural activities while market was measured by distance to market places and market size in terms of how easy farmers found it to sell their farm products.

The dependent variable "Agricultural Modernization" was measured by use of modern farm tools and machines, use of improved seeds and breeds, and high yields.

In the analysis, the components of the independent variable were cross tabulated with those of the dependent variable and the results were presented in contingency tables. For example, the sub components of "education" which were farmers' level of education, literacy and numeracy of the farmers were each cross tabulated separately with the three components of the dependent variable "agricultural modernization" which were mechanization, improved seeds and breeds and high yields. The same was done for other components of the independent variable which gave a very precise accurate and a user friendly measure of the independent variable on the dependent variable.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF THE FINDINGS

4.1 Introduction

This chapter includes presentation, analysis and interpretation of findings. The study aimed at examining the socio-economic challenges affecting agricultural modernization in Rwanyamahembe Sub-county, Kashari County, Mbarara District. Analysis of the study findings was both quantitative and qualitative based on the major variables. The findings of the study were discussed in depth with the help of tables, pie-charts, graphs and numeric data in form of percentages and figures.

4.2 Response Rate

The response rate of the respondents is shown in table 4.

Table 4: Response Rate

CATEGORY	TARGET RESPONDENTS	ACTUAL RESPONDENTS	RESPONSE RATE (%)
Farmers	140	140	100
Key informants	10	10	100
Total	**150**	**150**	**100**

Source: Primary data

All the 140 sampled farmers and the 10 identified key informants were interviewed. This resulted into a 100% response rate implying that the study met its targeted response rate.

4.3 Background Characteristics of the Respondents

The background characteristic of the respondents considered in this study was the major activity carried out by the farmers.

4.3.3 Major Activity of the Respondents

The Major Activities of the respondents were also considered with the purpose of establishing the major agricultural activities being carried out by farmers of Rwanyamahembe Sub-County. The findings are presented in the Figure 3

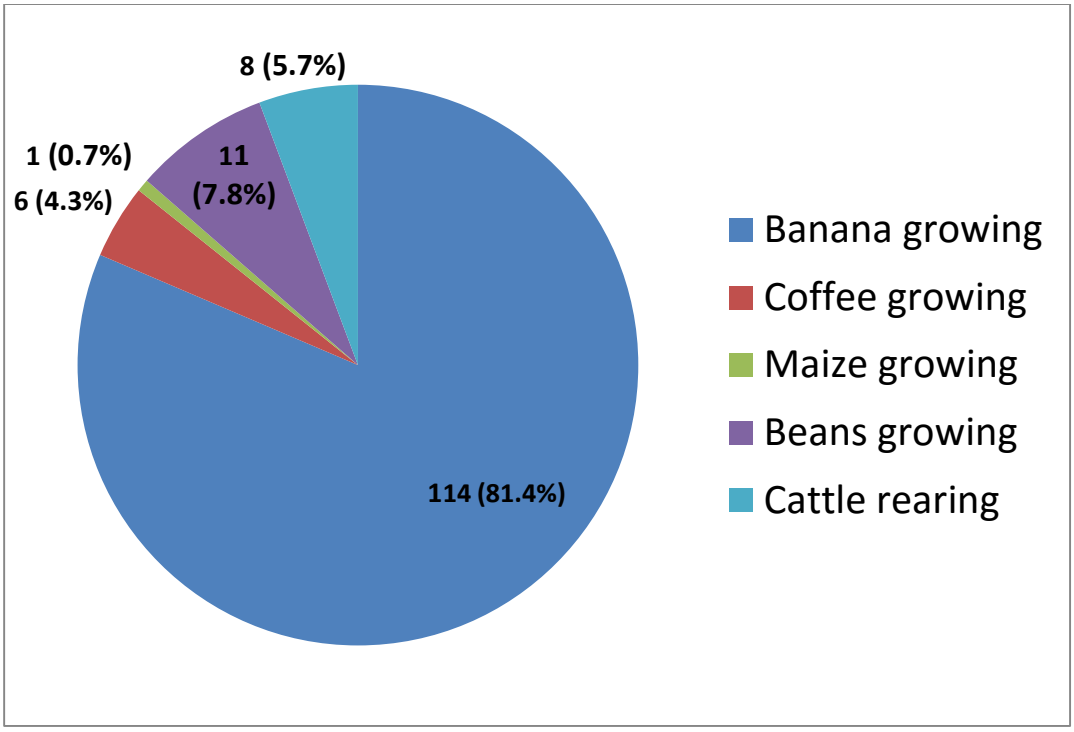

Figure 2: Major Activities of the Respondents

Source: Generated Using SPSS from Primary Data

From Figure 3, it is shown that the majority of the respondents (81.4%) had banana growing as their major activity. This is followed by beans growing (7.8%), Cattle rearing (5.7%), Coffee growing (4.3%) and maize growing (0.7%).

4.4 Empirical Findings

The aim of this study was to examine the socio-economic challenges affecting agricultural modernization in Rwanyamahembe Sub-county, Kashari County, Mbarara District. Each component of the independent variable was analyzed across the components of the dependent variable and interpretations made according to the objectives of the study on a case by case basis. The four components of the independent variable: education, land, infrastructure and market all had sub components which in the analysis, were cross tabulated with the components of agricultural modernization.

4.4.1 Education of the Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

The first objective of the study sought to find out the role of education of farmers in agricultural modernization in Rwanyamahembe Sub-county. Farmers were asked questions relating to their education level, literacy levels in terms of reading and writing as well as their numeracy (counting skills). Farmers were also asked whether they ever received agricultural extension services. The three components of education as a component of the independent variable were each cross tabulated with the three components of agricultural modernization as the dependent variable to establish how each of; education level, literacy and numeracy respectively affected agricultural modernization. Education level was considered first, and then farmer's literacy and numeracy in that order. The results of farmers who received agricultural extension services were also included across the results of farmers' level of education which was aimed at understanding whether there is a relationship between the farmers' education level and seeking of agricultural extension services. All the findings on the component of the independent variable "Education" were generated, tabulated and presented in tables; 5, 6 and 7 respectively. Table 5 presents results on

the cross tabulation of the level of education of farmers and the components of agricultural modernization.

Table 5: Education of the Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

EDUCATION OF THE FARMERS				**AGRICULTURAL MODERNIZATION**					
ITEM			1	2		3		4	
Education level `			Ever received Agriculture Extension Services	Mechanisation (those using modern tools)		Often or rarely use Improved Seeds and Breeds		High yeilds (%tage extent of improvement in farm yeilds)	
	No.	%tage	%tage	No.	%tage	No.	%tage	High	Low
Never been to school	30	21.4	6.7	0	0	0	0	0	93.3
Primary	82	58.5	25.6	0	0	5	6.1	2.4	86.6
O-level	21	15.0	33.3	0	0	3	14.3	9.5	90.5
A-level	2	1.6	50	0	0	2	100	50	50
Diploma	5	3.5	60	2	40	4	80	20	80
Total	**140**	**100**	**24.3**	**2**	**1.4**	**14**	**10**	**4.3**	**87.9**

Source: Generated Using SPSS from Primary Data.

Table 5 shows that majority of the respondents had completed Primary level of education (58.5%), followed by those who have never been to school (21.4%). Others were O-level (15%), A-level (1%) and Diploma level (4%). There were neither Graduates nor Post graduate holders among the respondents. Only 24.3% of all the respondents had received agriculture extension services. This is a bad indicator of service delivery in the agriculture sector in Rwanyamahembe Sub-county. Further analysis shows that receiving of agricultural extension services increased with the higher

levels of education. In fact 60% of the respondents who were diploma holders had received agricultural extension services followed by those with A-level at 50% while 33.3%, 25.6% and 6.7% had received agricultural extension services amongst the farmers with O-level, Primary and those never been to school respectively. Information gathered from the key informants revealed that farmers were not enthusiastic in seeking agricultural extension services citing low education levels as one of the causes.

Education level was then cross tabulated with the response on the components of agricultural modernization namely; mechanization (use of modern farm tools), use of improved seeds and breeds and improvement in farm yields. It was found out that only those who had Diploma level of education were using modern farm tools and yet still the number was very small (40%) among these diploma holders. Generally only 1.4% of all the respondents were using modern farm tools. This therefore shows that higher education level of the farmers greatly influences use of modern tools and machines. Results further show low use of improved seeds and breeds at an overall 10% usage. No one among the respondents who had never been to school said was using improved seeds and breeds (0%) and still those with primary and secondary levels showed minimal use with 6.1% and 14.3% respectively. However it was found out that use of improved seeds and breeds increased with levels of education especially with those with A-level education (100%) and amongst Diploma holders (80%). This shows that use of improved seeds is influenced by the level of education of the farmers where by the higher the level of education the higher a farmer is likely to use improved seeds and breeds as key components of agricultural modernization.

Improvement in farm yields was rated to be low other than being high by the respondents. The majority (87.8%) of the respondents rated the extent of improvement in farm yield as low, compared to only 4.3% who rated the extent of improvement as high. Generally the extent of

improvement was found out to be high amongst the respondents with higher levels of education. Of the respondents with A-level education, 50% of them rated the extent of improvement in their farm yields as high while it was 20% amongst the Diploma holders. No one (0%) amongst the respondents who had not attended school rated the extent of improvement as high.

Table 6: Literacy of Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

EDUCATION OF THE FARMERS								**AGRICULTURAL MODERNIZATION**					
ITEM			1					2		3		4	
Literacy of Farmers			Rating of literacy levels by the farmers					Mechanization (those using modern tools)		Used Improved Seeds and Breeds		High yields (%tage extent of improvement in farm yeilds)	
			Excellent	Very good	Good	Poor	Very poor						
Can Read and Write	No.	%tage	% tage					No.	%tage	No.	%tage	High	Low
Yes	112	80	0.9	2.6	92	3.5	1	2	1.8	14	12.5	5.3	87.5
No	28	20						0	0	0	0	0	89.2
TOTAL	**140**	**100**	**0.9**	**2.6**	**92**	**5.5**	**1**	**2**	**1.4**	**14**	**10**	**4.3**	**87.9**

Source: Generated Using SPSS from Primary Data.

Results in table 6 reveal that the majority of the respondents (80%) said that they were able to read and write while 20% said they did not know how to read and write. This places Literacy level of Farmers in Rwanyamahembe Sub-county at 80 percent. It was also established that majority of the respondents (95.5%) rated their reading to be at least good. The findings also show that none of the respondents who were unable to read and write used modern farm tools. Whereas the number

of farmers using modern farm tools was generally small (1.4%) overall, usage was only amongst the respondents who said could both read and write at (1.8%). The use of improved seeds and breeds was also recorded only amongst the respondents who knew how to read and write although the number was still relatively small (12.5%). There was also significant relationship between literacy levels and improvement in farm yields whereby 5.3% of the respondents who knew how to read and write rated their improvement in farm yields as very high. No one amongst the respondents who did not know how to read and write rated or recorded a high improvement in farm yields.

Table 7: Numeracy of Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

EDUCATION OF THE FARMERS								**AGRICULTURAL MODERNIZATION**					
ITEM			1					2		3		4	
Numeracy of the Farmers `			Rating of Counting skills by the Farmers					Mechanization (those using modern tools)		Used Improved Seeds and Breeds		High yields (%tage extent of improvement in farm yeilds)	
			Excellent	Very good	Good	Poor	Very poor						
Can Count	No.	%tage	% tage					No.	%tage	No.	%tage	High	Low
Yes	132	94.3	0.8	2.3	83	13	0.8	2	1.5	14	10.6	4.5	87.9
No	8	5.7						0	0	0	0	0	87.5
TOTAL	**140**	**100**	**0.8**	**2.3**	**83**	**13**	**0.8**	**2**	**1.4**	**14**	**10**	**4.3**	**87.9**

Source: Generated using SPSS from Primary data.

Results in table 7 reflects a 94.3% numeracy rate for the respondent implying that only 5.7% of them said did not know how to count. In fact findings from key informants revealed that most of the farmers in Rwanyamahembe Sub-county knew how to count. This is further supported by the

fact that 86.1% at least rated their numeracy skills as good. Use of modern tools, use of improved seeds and breeds and as well as high rating of improvement in farm yields was also only amongst the respondents who knew how to count standing at 1.5%, 10.6% and 4.5% respectively.

4.4.2 Land Availability and Agricultural Modernization in Rwanyamahembe Sub-county.

The second objective was to examine the contribution of land availability to farmers to agricultural modernization in Rwanyamahembe Sub-county. Land availability to farmers by ownership and acreage (size) were considered. Farmers were asked to questions about the ownership of the land on which they carried out their activities, the size of the land and as well how they rated the size of the land accessible to them. The findings are presented in the table 8 and table 9.

Table 8: Land ownership and Agricultural Modernization in Rwanyamahembe Sub-county

LAND AVAILABILITY TO FARMERS					**AGRICULTURAL MODERNIZATION**					
ITEM			1		2		3		4	
Ownership of Land			Rating of the size of Land by the Farmers		Mechanization (those using machines)		Often Use Improved Seeds and Breeds		High yeilds (%tage extent of improvement in farm yeilds)	
			Said Enough	Not Enough						
	No.	%tage	%tage	%tage	No.	%tage	No.	%tage	High	Low
Personal	110	78.6	5.5	94.5	2	1.8	3	2.7	5.5	86.4
Family	23	16.4	8.7	91.3	0	0	0	0	0	95.6
Rented	7	5	14.3	85.7	0	0	0	0	0	85.7
Total	140	100	6.4	93.6	2	1.4	3	2.1	4.2	87.9

Source: Generated using SPSS from Primary Data

Table 8 above shows that there exist three forms of land ownership namely; personally owned, family owned and rented. The results show that majority (78.6%) of the respondents personally owned the land on which they carried out their agricultural activities. Those who said were using

family land were 16.4% while 5% said they were renting the land on which they carried out their agricultural activities. Of the respondents who personally owned their land, 72.7% owned land less than five acres, while 27.3% owned more than five acres and further analysis showed that 94.5% of these respondents said that the land which they owned was not enough for their agricultural activities. Findings from key informants revealed that access to land was not the biggest problem but instead the accessed land was not enough for the farmers. It was also established from the key informants that the majority of the farmers in Rwanyamahembe Sub-county do own the pieces of land by inheritance from their parents and as such land has very much been subdivided by processes of sharing this land amongst children of the elderly and the deceased citizens. This further confirms our quantitative findings that the majority of the farmers own the land on which they carry out their agricultural activities and the fact that is has been subdivided further explains why the majority rated the land available to not being enough for their agricultural activities.

The study attempted to examine the linkage between land ownership and mechanization. Table 9 item 2, shows that only the respondents who personally owned the land on which they carried out their activities used some modern farm tools. However the use of modern farm tools was still very low (1.8%) amongst the respondents who personally owned their land and this translates to an overall 1.4% use of modern farm tools amongst all the respondents. Considering land ownership and use of improved breeds, it was also found out that only those who personally owned their land, although at a very low level (2.7%) often used improved seeds and breeds.

Land ownership was also analyzed with respect to improvement in farm yields and results in item 4 in table 8 reveal that only the respondents who personally owned their land said had realized a high extent improvement of their farm yields. However the number was so small constituting to 5.5% only. Most of the respondents rated a low extent of improvement in their farm yields with

95.6% being those who use family land, 86.4% for those who personally own their land and 85.7% those who rented the land for their agricultural activities.

Table 9: Land Size and Agricultural Modernization in Rwanyamahembe Sub-county

LAND AVAILABILITY TO FARMERS					AGRICULTURAL MODERNIZATION					
ITEM			1		2		3		4	
Size of Land (Acreage)			Rating of the size of Land by the farmers		Mechanization (those using machines)		Often Use Improved Seeds and Breeds		High yeilds (%tage extent of improvement in farm yeilds)	
			Said Enough	Not Enough						
Acres	No.	%tage	%tage	%tage	No.	%tage	No.	%tage	High	Low
Less than 5	97	69.3	3	97	2	1.8	3	2.7	5.5	86.4
5-10	28	20	10.7	89.3	0	0	0	0	0	95.6
10 and above	15	10.7	20	80	0	0	0	0	0	85.7
Total	140	100	6.4	93.6	2	1.4	3	2.1	4.2	87.9

Source: Generated using SPSS from Primary Data.

Results in Table 9 show that the majority of respondents (69.3%) had Land less than five acres for their agricultural activities while 20% and 10.7% of the respondents had access to land between five–ten acres and above ten acres respectively. It is also significantly noticed that 93.6% of all the respondents rated the size of land accessed as being not enough. However the results show less evidence of relationship between bigger size of land accessed and agricultural modernization whereby use of modern farm tools, use of improved seeds and breeds and high rating of improvement in farm yields were all only recorded amongst the respondents who only had less than five acres of land with 1.8%, 2.7% and 5.5% respectively.

4.4.3 Infrastructure and Agricultural Modernization in Rwanyamahembe Sub-county

The third Objective was to establish the effect of infrastructure on agricultural modernization in Rwanyamahembe Sub-county. Roads access in terms of status and distance, and water in terms

of source type and quantity available, were emphasized. The respondents were asked about the type of water source nearest to their farms and how they rated the amount of water available for their farm activities. The results are presented in the tables 10 and 11.

Table 10: Road access and Agricultural Modernization in Rwanyamahembe Sub-county

INFRASTRUCTURE (ROADS)							**AGRICULTURAL MODERNIZATION**					
ITEM			1				2		3		4	
Status of roads			Rating of the Distance of Roads from farm				Mechanisation (those using machines)		Use Improved Seeds and Breeds		High yeilds (%tage extent of improvement in farm yeilds)	
			Very near	Rel. Near	Far	Very far			Often	Rarely		
	No.	%tage	%tage	%tage	%tage	%tage	No.	%tage	%tage	%tage	High	Low
Very good	9	6.4	100	0	0	0	0	0	11.1	0	1	77.8
Good	121	86.4	63.6	29.8	6.6	0	1	0.8	1.7	7.4	4	90
Poor	0	0	0	0	0	0	0	0	0	0	0	0
Very poor	10	7.2	20	20	20	40	1	10	0	20	10	70
Total	140	100	62.9	27.1	7.1	2.9	2	1.4	2.1	7.9	4.3	87.9

Source: Generated using SPSS from Primary Data

Results from table 10, show the status of roads cross tabulated with distance of the roads from the respondents farms, and the three components of modernized agriculture namely; use of modern farm tools, use of improved seeds and breeds and as well as the rating of the extent of improvement in farm yields. The study found out that roads in Rwanyamahembe Sub-county are in a good state since majority of the respondents (86.4%) said so. Of the respondents who said the roads were good 63.6% of them rated the road distance from their farm as very near which is in line with the general view of all the respondents 62.9%, who said that the roads are very near to their farms. Whereas all the key informants rated road network in Rwanyamahembe Sub-county as good and

reaching every corner of the Sub-county, it was hinted upon that some roads are very poor and impassable with the situation worsening during the rainy seasons. Table 10 also shows that none of the respondents who rated roads as very good and very near used modern farm tools, although, results show that these very respondents were using improved seeds and breeds and had a high rating of the extent of improvement in farm yields than the rest. However the usage was very low constituting to only 6.3% and so was the high extent of improvement in farm yields (6.2%).

Table 11: Water Availability and Agricultural Modernization in Rwanyamahembe Sub-County

INFRASTRUCTURE (WATER)							**AGRICULTURAL MODERNIZATION**					
ITEM			1				2		3		4	
Type of water source			Amount of water available for farm activities				Mechanisation (those using machines)		Use Improved Seeds and Breeds		High yeilds (%tage extent of improvement in farm yeilds)	
			Enough		Not enough							
	No.	%tage	No.	%tage	No.	%tage	No.	%tage	No.	%tage	High	Low
Piped	8	5.7	1	14.3	7	85.7	0	0	1	12.5	0	100
Borehole	7	5	3	42.8	4	57.2	0	0	0	0	0	100
Stream	13	9.3	9	69.2	4	30.8	1	7.7	1	7.7	23	77
Shallow well	86	61.4	24	28	62	72	0	0	5	5.8	9.3	88.3
Dams	6	4.3	6	100	0	0	0	0	1	16.7	0	100
Roof Harvested	5	3.6	2	40	3	60	0	0	1	20	0	100
Spring	15	10.7	14	93	1	7	1	6.7	5	33.3	0	73.3
Total	140	100	59	35.7	81	57.9	2	1.4	14	10	4.3	87.9

Source: Generated Using SPSS from Primary Data

Results from table 11 show that majority (61.4%) of the respondents said that the type of the nearest water source to their farms were shallow wells but only 28% of them said that water available for their farms was enough. All (100%) respondents whose nearest source was a dam

rated the water available as enough for their farm activities. The majority (85.7%) of the respondents, who rated water as not enough for their farm activities, were those using piped water as their nearest source.

However, findings from the Key informants revealed that generally water was not a big problem. One of the key informants was quoted as saying "water is not a very big problem except in some parishes during the prolonged dry spells". The key informants also revealed that piped water especially under the Gravity Flow Scheme was extended to most of the sub-county parts which solved past water crisis experiences in some parts of Rwanyamahembe Sub-county. Besides, the informants articulated that there are various seasonal and permanent river tributaries and sub-tributaries that run through the most of the parts of the sub-county. This generally shows that water was not a big problem to the farmers although no irrigation practices were being practiced by farmers in the Sub-county according to the Key informants.

The Highest percentage use of improved seeds and breeds was among the respondents whose source of water was a spring while the lowest use was among those whose source was a borehole. Highest improvement in farm yields was amongst respondents who had their source as shallow wells (9.3%).

4.4.4 Market availability and Agricultural Modernization in Rwanyamahembe Sub-county

The fourth objective was to analyze the effect of market availability to farmers on agricultural modernization in Rwanyamahembe Sub-county. Respondents were asked to rate the distance of market places from their farm, how easy they found it to sell their products and whether they ever got unsold products and were wasted. The findings are presented in tables 12 and 13 respectively.

Table 12: Market availability and Agricultural Modernization in Rwanyamahembe

Sub-county

MARKET AVAILABILITY TO THE FARMERS				**AGRICULTURAL MODERNIZATION**					
ITEM			1	2		3		4	
Market Distance from the Farmers' Farms			Ever got un sold products and were wasted	Mechanisation (those using machines)		Use Improved Seeds and Breeds		High yeilds (%tage extent of improvement in farm yeilds)	
	No.	%tage	%tage	No	%tage	No.	%tage	High	Low
Very Near	16	11.4	17.5	0	0	2	12.5	6.2	75
Near	85	60.7	18.1	1	1.2	8	9.4	3.5	89.4
Far	35	25	80	1	2.9	4	11.4	5.7	94.3
Very Far	4	2.9	100	0	0	0	0	0	50
Total	140	100	26.4	2	1.4	14	10	4.3	87.8

Source: Generated Using SPSS from Primary data.

Result in table 12 show that majority of the respondents (60.7%) rated the market place distance from their farms as being near while the least 11.4% rated the market distance as very near to their farms while 25% and 2.9% rated the distance as far and very far respectively. It was also established that the 80% and 100% of the respondents whose farms were far and very far respectively reported to have ever had unsold products which were wasted.

The majority (93%) of those who said market places were near to their farms found it easy to sell their farm products and 100% of those who said markets were near found it very easy indeed to sell their products. 100% and 77.1% of those who said markets were very far and far respectively found it very difficult to sell their products. Findings from the key informants further support the

above results, and indicated that some parts of Rwanyamahembe Sub-county are far away from major market places and often move longer distances to sell their farm products.

The findings further reveal no relationship between the market distance from the farms and use of modern tools whereby none of those who said the distance was very near used modern farm tools. This was however, established to be as result of affordability other than nearness of the distance to market places. It was revealed by the key informants that the maiden users of modern farm tools and machines in the entire Sub-county were only the rich farmers who could afford hiring tractors and owned milking machines and other farm implements. Generally use of modern farm tools and machines was rated as very low by the key informants and among the farm tools used were wheel barrows, bicycles for transporting farm products, milk cans, spray-pumps among others. All these are rudimentary tools which explain the absence of mechanization in the Sub-county.

Use of modern tools was highest (2.9%) among the respondents whose distance was far. However, highest use of improved seeds (12.5%) and highest extent of improvement in farm yields (6.2%) were recorded amongst the respondents whose farms were very near to the market places. There was no use of modern, no use of improved seeds and breeds nor high rated improvement in farm yields amongst farmers whose farms were very far and distant from the market places. Findings from the key informants also revealed not only a limited use of modern farm tools by farmers in Rwanyamahembe sub-county but also reluctance amongst them to adopt, use and apply modern technologies in their agricultural practices.

Market Size was also analyzed in terms of the ease of selling of farm products by farmers and agricultural modernization. The findings are presented in table 13.

Table 13: Market Size and Agricultural Modernization in Rwanyamahembe Sub-county

MARKET AVAILABILITY TO THE FARMERS				**AGRICULTURAL MODERNIZATION**					
ITEM			1	2		3		4	
Market size (Ease of selling agricultural products by farmers)			Ever got un sold products and were wasted	Mechanisation (those using machines)		Use Improved Seeds and Breeds		High yeilds (%tage extent of improvement in farm yeilds)	
	No.	%tage	%tage	No	%tage	No.	%tage	High	Low
Very easy	17	12.1	11.8	0	0	2	11.8	14.3	76.5
Easy	87	62.1	12.6	1	1.1	9	10.3	5.7	88.5
Difficult	34	24.3	64	1	2.9	3	8.8	0	97
Very Difficult	2	1.5	100	0	0	0	0	0	0
Total	140	100	26.4	2	1.4	14	10	4.3	87.8

Source: Generated by SPSS from Primary Data

Results in table 13, show that the majority of the respondents found it easy to sell their farm products. This is evidenced by 12.1% and 62.1% responses for both "very easy" and "easy" to sell farm products respectively. 24.3% and 1.5% of the respondents said they found it difficult and very difficult to sell their products respectively. The key informants also supported these findings by saying that farmers easily accessed market for their farm products and some buyers especially for bananas, animals, beans and cereals reach out to farmers and buy from their farms directly. However, it was also significant that all (100%) who found it very difficult to sell their products ever got unsold products which were thus wasted.

Findings from the key informants confirmed that in most cases farmers' products perish as a result of not being all sold and that farmers lack proper storage facilities for their products which means

that the remaining unsold products brought to market places have always been observed to perish or deteriorate in quality and hence a loss to farmers. The most affected farmers are those who are from areas that are a little bit distant from the market places. Results in table 14 further reveal that all the respondents who were far away from the markets did not use modern farm tools or machines, improved seeds and breeds and neither did they experience any high improvement in their farm yields. This shows clearly that far distances of farms from market places negatively affected the farmers' adoption and use of modern farm tools and machines and as well as use of improved seeds and breeds in their agricultural practices.

Highest use of improved seed and breeds (11.8%) and high extent improvement in farm yields (14.3%) was recorded for each amongst respondents who very easily sold their farm products.
The results therefore reveal that nearness of farmers' farms to market places in Rwanyamahembe Sub-county had positive influence on the farmers' decisions to adopt and hence use improved seeds and breeds and as a result such farmers realized high improvements in their farm yields.

The key informants in fact informed the study that Rwanyamahembe Sub-county has some farmers who adopted some new technologies in form of improved seeds especially maize and beans which mature in a very short time and these were observed to have had realized some increased output in form of high yields. Those who adopted new breeds in dairy farming were also said to have improved milk production.

4.5 Summary of Empirical Findings

Chapter 4 presented the empirical findings on a case basis, objective by objective. A cross tabulation approach was used to generate the tables using SPSS and this clearly showed the relationship of the independent variable and the dependent variable.

Findings revealed that majority of the farmers in Rwanyamahembe Sub-county had primary level of education (58.5%) while 21.4% were the second majority and had never been to school. The majority (80%) of the farmers knew how to read and write (literate) while 94.3% said that they knew how to count. Agricultural Extension Services were found out to have been received by only 23.4% of the farmers.

The majority of the farmers (78.6%) owned the land on which they carried their agricultural activities while the majority of the land available to farmers was rated as not enough and findings revealed that majority farmers (69.3%) accessed land whose size was less than five acres. Only Farmers who owned the land on which they carried out their agricultural activities, were using modern farm tools and as well had bigger proportion of the number that was using improved seeds and breeds.

Majority farmers (92.8%) rated roads accessed to be at least good and relatively near. The commonest water source to farmers was established to be shallow wells (61.4%) and generally water was rated not to be enough by the majority farmers (57.9%). The key informants further reaffirmed and supported these findings emphasizing that the road network is fairly good and reaching every part of the sub-county although they categorically mentioned of such roads being affected by rainy seasons and some reaching an extent of being impassable.

Market distance was rated as relatively near by the majority farmers (72.1%) while only 12.1% of the farmers said it was very easy to sell their products. Information obtained from the key informants revealed that farmers in Rwanyamahembe had access to markets and other selling opportunities for their products.

Use of modern farm tools or machines, and use of improved seeds and breeds were very low at 1.4% and 10% respectively. The majority (87.8%) of the farmers rated a low extent of improvement in their farm yields. Only 4.3% had realized a high extent improvement in their farm yields while 7.9% said they had never realized any improvement in their farm yields.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the researcher makes a summary of the study, discussion, conclusions and recommendations which have been arrived at as a result of this study. These conclusions and recommendations apply to the case study, and to other areas in Uganda. Deliberate attempts were

made to link the findings to the earlier studies and literature on the concept of agricultural modernization.

5.2 Summary of Findings

This section presents a brief summary of the findings for the purposes of giving direction to the readers and users about the key findings of this study later on discussed. The summary of the findings has been made objective by objective in chronological order.

5.2.1 Farmers' Education and Agricultural Modernization in Rwanyamahembe Sub-county

The hypothesis which stated that "there is a relationship between the level of education of the farmers and agricultural modernization in Rwanyamahembe Sub-county", was accepted since both the level of education, Literacy and numeracy were found out to significantly influence the use of modern farm tools, use of improved seeds and breeds as well as the high extent of improvement in farm yields which were the three basic sub-variables of agricultural modernization in this study. Findings revealed that majority of the farmers in Rwanyamahembe Sub-county were those who had Primary level of education and the ones who had never been to school respectively. This shows that with such farmers, advocacy for adoption of modern farming methods needs more intensification. More efforts are also needed in agricultural extension services which were found to be insufficient and limited according to the findings of this study.

5.2.2 Land availability to Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

The hypothesis which stated that "there is a relationship between land available to farmers and Agricultural Modernization in Rwanyamahembe Sub-county", was accepted. This was because

the findings revealed that both land ownership and the size of land available to farmers for agricultural activities were found out to significantly influence; the use of modern farm tools, use of improved seeds and breeds as well as the high extent of improvement in farm yields which were the three basic components of agricultural modernization in this study. Farmers who owned the land on which they carried out their agricultural activities were observed to be more able to use modern farm tools, use improved seeds and breeds than those who were using family land and those who rented the land on which they carried out their agricultural activities. In addition, findings revealed that farmers who owned the land, on which they carried out their agricultural activities, were the only ones who had realized a high extent of improvement in their farm yields. This study therefore found a significant relationship between land availability to farmers and agricultural modernization.

5.2.3 Infrastructure and Agricultural Modernization in Rwanyamahembe Sub-county

The hypothesis which stated that "there is a relationship between infrastructure and agricultural modernization in Rwanyamahembe Sub-county", was accepted since the findings showed that both the accessed roads by the farmers and water available to farmers for their agricultural activities were found out to significantly influence; the use of modern farm tools, use of improved seeds and breeds as well as the high extent of improvement in farm yields which were the three components of agricultural modernization in this study. Results from key informants revealed that whereas the road network is relatively good, some roads are impassable especially in the rainy season which affects transportation of products to market places and farm inputs.

Besides, farmers rated water as not being enough for their agricultural activities which affects their agricultural practices especially during the dry spells. In fact key informants revealed that irrigation practices were non-existing amongst farmers in Rwanyamahembe Sub-county.

5.2.4 Market availability to Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

The hypothesis which stated that "there is a relationship between market availability and agricultural modernization in Rwanyamahembe Sub-county", was accepted since the findings revealed that market availability in terms of distance and size (ease of selling farm products) significantly influenced; the use of modern farm tools, use of improved seeds and breeds as well as the high extent of improvement in farm yields which were the three basic components of agricultural modernization in this study.

5.3 Discussion of Findings

This section presents a detailed and narrative discussion of the study findings. Each of the objectives is discussed separately for the purposes of making this dissertation as more user friendly as possible. As such the findings are chronologically discussed objective by objective.

5.3.1 Education of the Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

From the findings, there was a significant relationship between the level of education of farmers and agricultural modernization in Rwanyamahembe Sub-county. This implied that farmers with higher levels of education were more likely to use; modern farm tools, improved seeds and breeds than their counterparts with lower levels of education and those who have never attended school.

This is in line with Caffarella (2002), who noted that adult education programs assist adults to bring about changes in societal norms and values.

Findings too revealed that the farmers do not receive adequate extension services and yet still the rating of the extent of improvement in farm yields was majorly low. This is also in line with Hagins (2011), who noted that need for agricultural literacy is becoming increasingly evident and that without agricultural literacy there is a potential threat to a nation. Braverman and Rilla (1991) had also noted that agricultural literacy among adults is an important area of education and research. In addition, Birkenholz (1993), noted that "failure to educate the American public about the production and marketing of agricultural products may place the industry in jeopardy". The study found out that majority of the farmers in Rwanyamahembe Sub-county had low levels of education, were receiving less and inadequate agricultural extension services which impacted negatively on adoption of new technologies and use of improved farm tools, improved seeds and breeds all of which left these farmers with low farm yields.

5.3.2 Land Availability to Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

The study findings revealed a positive significant relationship between land availability to farmers and agricultural modernization in Rwanyamahembe Sub-county. Findings also revealed that it was only the farmers who personally owned the land on which they carried out their farming activities that were using modern farm tools, used improved seeds and breeds who rated the extent of improvement in farm yields as high although the percentages were very low. However findings also showed that majority of these farmers who personally owned their land said it was not enough for their farming activities. This is in line with Keeler (2009) who noted that deadlocks between

land owners and tenants, vague and often disputed communal rights, and a lack of clear administration have kept the country from developing much of its land.

The findings further reveal that the pieces of land accessed by the farmers for agricultural activities were not only insufficient in terms of size, but also the study established that ownership was majorly out of inheritance and some members owned such pieces by family status which symbolizes a poor land tenure system of ownership. Besides, the key informants reaffirmed that some people who owned big chunks of land were not necessarily using such land for agricultural activities. This further is in line with the works of Besely (1995) who writes that, better tenure security increases the likelihood that farmers will capture the returns from their investments and as a result demand for short term inputs such as farm chemicals and labour will also increase. Therefore, the findings from the study show that limited access to land by farmers for their agricultural activities hampers use of improved methods of farming and hence impacts negatively on agricultural modernization.

5.3.3 Infrastructure and Agricultural Modernization in Rwanyamahembe Sub-county

The findings of the study established that roads in Rwanyamahembe Sub-county were generally in a good state except for some being impassable during the rainy seasons. The study further found out that these roads were easily accessed by the majority farmers in Rwanyamahembe Sub-county.

However, farmers who were from places whose road network and distance from roads were poor and far respectively showed poor results of use of improved seeds and breeds. It was thus established that roads in terms of network and distance from farms was quite a big factor to agricultural modernization especially in the process of accessing market places for sale of farm

products. This is in line with Li and Liu (2009), who observed that the status of rural infrastructure such as roads influence agricultural productivity and operation modes directly.

Water sources and the amount of water available for agricultural activities was also a major focus in this study as a form of infrastructure. The findings revealed that the majority of the farmers get their water from shallow wells. Generally findings show that water available to the farmers for their agricultural activities was inadequate. Indeed, there was a positive relationship between having enough water and use of modern farm tools, improved seeds and breeds and a high extent improvement in farm yields. The fact that majority of the farmers were found to have inadequate water for their farming activities, translates into limited productivity which directly hinders agricultural modernization. This is also in line with Li and Liu (2009) who wrote that deficient rural infrastructure may hinder agricultural production and induce poor technical performance.

The study established from the key informants that irrigation was not anywhere practiced by the farmers in the sub-county as farmers were only depending on natural rains for farming practices and in almost all agricultural practices especially crop production. After the dry spells, food is always scarce and prices shoot due to supply shortages which cannot sustain both the external demand and that of the local populace. However most of the informants stressed that if water available to farmers was sufficient, irrigation practices would be feasible especially during the dry spells and thus farmers would be able to sustain their supply and be able to meet the food demand and gain more profits in times of shortage. This is in line with the submission made by Ki-Moon, the United Nations Secretary General at the World Water Day cerebrations in 2012 where he stressed that “over coming decades, feeding a growing global population and ensuring food and nutrition security for all will depend on increasing food production and this will in turn mean ensuring sustainable use of our most critical finite resource-water”.

5.3.4 Market availability to Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

The findings of the study revealed that although majority of the farmers had access to market places, it was significant to note that those whose farms were far and very far away from market places, found it very difficult to sell their farm products and were more often vulnerable to experiencing unsold products which got spoilt. Findings also revealed that most farmers during the harvest season normally have excess products which get spoilt. This was attributed to lack of value addition with examples sighted in banana growers during the months of July-August when these bananas ripen in plantations and prices fall, yet they get very scarce in the following months of September, October and November. The same scenario happens with most fruits especially with mangoes. This is in line with the observations of Tayebwa (2008), that most of the commodities in Uganda are produced by small scale farmers and there are several marketing problems which include inadequacy of funds, limited value addition, poor flow of market information, small quantities difficult to market, high costs leading to buying of inputs in small quantities, after harvest losses due to poor storage, weak bargaining power, weak institutions and selling after harvest when prices are low.

Findings further showed that there was a positive relationship between access to markets and use of modern farm tools, use of improved seeds and breeds and as well as the high extent rating of improvement in farm yields. This also acknowledges the fact that "the distance to markets can influence farmers' decisions in various ways. Better access, apart from influencing availability of technology, can influence the use of output and input markets and the availability of information and support organizations (Jensen 2006).

5.4 Conclusions

The section presents conclusions that are based on evidence and drawn from the analysis. The conclusions are presented chronologically objective by objective.

5.4.1 Education of farmers and Agricultural Modernization in Rwanyamahembe Sub-county

The study concluded that the level of education significantly affected agricultural modernization. Whereas majority of the farmers were found out to be literate and knew how to count, their low education levels had a negative impact on agricultural modernization in that such farmers could not have a self drive or could not positively be self induced to adopt and hence use modern farm tools or machines, adopt the use of improved seeds and breeds all which led to low farm yields. The study also concluded that farmers' failure to receive adequate agricultural extension services negatively was to a large extent a result of their low levels of education (Also see 4.4.1).

5.4.2 Land Availability to Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

The study concluded that availability of land by farmers in Rwanyamahembe Sub-county was of significant importance towards achieving agricultural modernization. Unclear land ownership and insufficient sizes of land to carry out agricultural activities all negatively affected agricultural modernization. (See also 4.4.2).

5.4.3 Infrastructure and Agricultural Modernization in Rwanyamahembe Sub-county

The study concluded that poor roads negatively affected agricultural modernization. This is because during the rainy seasons the roads were impassable making it difficult for farmers to transport their farm outputs to the markets. Accessing farm inputs as well as agricultural extension services was equally difficult. The study also concluded that insufficient water available for

farming activities hindered agricultural modernization. During dry spells shallow wells which are a major source of water to the farmers dry which makes it difficult for the livestock keepers to find water for their animals. Equally, farmers who would wish to irrigate their crops on a small scale cannot do it. (See also 4.4.3)

5.4.4 Market Availability to Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

The study concluded that insufficient market negatively affected agricultural modernization. This is because long distances to the market places made it difficult for the farmers to either sell l their products or bring farm inputs to their farms. Few buyers would render some of the farm output unsold and thus getting wasted. (See also 4.4.4).

5.5 Recommendations

Basing on the findings and conclusions of the study, the following recommendations are made. They are proposed to address the problems identified which would lead to an improvement in agricultural practices of farmers in Rwanyamahembe Sub-county and translate into agricultural modernization.

5.5.1 Education of Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

Mbarara District Local Government should ensure an overall improvement in provision of agricultural extension services to farmers from the current situation of having one agricultural extension staff serving over 3000 farmers (1:3000) as reported by one of the key informants to at

least a ratio of (1:500). This will increase agricultural literacy among the farmers and induce adoption of modern farming skills.

Similarly, the political leadership of Rwanyamahembe Sub-county should strengthen farmers' sensitization campaigns especially on adoption of improved seeds and breeds. This is because the farmers' levels of education are quite low and cannot induce a self driven initiative towards adoption of new technologies. As a result of strengthened sensitization, farmers will be able to realize an improvement in their farm yields and hence will move towards agricultural modernization.

5.5.2 Land Availability to Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

There is need to create clear land ownership policies to enable farmers easily access land for agriculture especially land acquisition through leases to the potential farmers but who are land-less. Whereas this looks to be quite a difficult venture given the complexities involved in land policies and reforms, at household levels the farmers could be aided by local authorities to sign some agreements with the landlords (for those who rent land on which they carry on their agricultural activities) to use such land with certainty over a reasonable length of the period. This will hopefully enable the farmers to be able to adopt better methods of farming in order to make profits and venture in long term projects as uncertainties over tenancy are not foresighted. This is in line with the findings in 4.4.2.

The Agriculture department should encourage farmers to practice collective plantation farming in form of societies formed at village levels where the subdivided pieces of land can be collectively used to produce a given crop. This will increase the sizes of farms and further enable farmers;

realize increment in total quantity output; enhance their potentials to apply new technologies as well as increase their agriculture extension services seeking capacity for it will be easy for service providers to meet such organized groups. Besides, farmers will also benefit from larger economies of scale especially skill gaining, collective marketing and all this will transform into agricultural modernization.

The government should venture in provision of credit facilities at low interest rates to farmers who own land so as to empower them to afford some new farming technologies and buy improved seeds and breeds to increase both their quality and quantity of their farm yields / products. These pieces of land can be used as securities to acquire such finances and pay back at the end of the seasons. This can also be complemented by subsidizing agricultural farm inputs, strengthening the provision of such inputs such as hoes, improved seeds and breeds to farmers under the NAADS programme. This will induce farmers to put to use their land optimally and even those who are not engaged in agriculture may be encouraged to start.

5.5.3 Infrastructure and Agricultural Modernization in Rwanyamahembe Sub-county

The Sub-county leadership should prioritize the improvement of feeder and community access roads to enable farmers easily access markets for both their farm products and farm inputs. Government should increase allocations for rural development schemes with emphasis being put on areas of rural roads, gravity flow schemes and piped water supply. This will enable farmers to easily access and adopt new farming technologies like irrigation. With good roads, tractors can be hired by farmers as they can reach their farms easily and hence mechanization can be made feasible.

Rural electrification is yet another venture the government of Uganda should strengthen. This will have double-ended benefits to the agricultural sector in that, it will enable the business sector to establish processing plants near the places of agricultural production (rural areas) and this will enable farmers be able to find ready market for their products which will induce them to produce more. Such an inducement will translate into adoption of modern technologies in quest to realize higher output quantities for the established market. This will thus facilitate the processes of making agricultural modernization in the Uganda feasible and more particularly in Rwanyamahembe Sub-county.

5.5.4 Market Availability to Farmers and Agricultural Modernization in Rwanyamahembe Sub-county

Government should help farmers in finding markets for their products especially to enable these farm products to be transported to other areas in the country where some of the majorly produced crops in Rwanyamahembe Sub-county such as bananas, millet, beans and milk are less produced.

Mbarara District Local Government authorities within the agriculture sector should embed the prospect of value addition to agricultural products in form of providing farmer groups and societies with processing plants especially milk processing plants, as well as storage facilities like milk coolers to dairy farmers, grain millers, banana driers and ware housing facilities which can be accessed by farmers to ensure food security. All this will provide an incentive for unlimited production which will not only ensure food security but will make the agriculture sector very profitable and thus motivate farmers to adopt new technologies with intentions of maximizing returns from such this profitable business.

Similarly, the local authorities of Rwanyamahembe Sub-county should venture into agricultural market planning with an intention to gazette more land for market places possibly in the sections of the Sub-county which are quite distant from the existing market places and which do not easily access the main roads. This will provide farmers with more options of selling their products and hence be able to make profits which indeed will induce these farmers to afford new technologies and adopt modern farming methods. This may make it possible for agricultural modernization to be achieved in Rwanyamahembe Sub-county.

5.6 Limitations

The main limitation of the study was met in the analysis whereby the researcher found it quite difficult to directly correlate and regress the independent variable with the dependent variable because each of the variables had dimensions and thus could not stand out alone. As such, whereas the findings could clearly show significant relationships between each of the components of the dependent and independent variables, the study was limited on measuring the magnitude of such significance and instead relied on percentages to explain the results of the findings. The other limitation was in methodology. The researcher used a questionnaire and an interview guide to collect data and feels that may be the use of other methods like Focus Group Discussions could have enriched the findings more.

5.7 Contribution of the Study

The study has provided information to the administrators of Mbarara District Local Government and those of Rwanyamahembe Sub-county and as well as other stakeholders in the agricultural

service delivery about what is transpiring in Rwanyamahembe Sub-county as far as agricultural modernization is concerned.

The study also serves as a source of literature for other researchers in the context of agricultural modernization in Uganda.

The Findings also provide a basis for purposes of supervision, monitoring, evaluation and assessment of agricultural extension services and other efforts being put in place to enhance agricultural productivity especially under the NAADS programme.

The Study findings too explored the progress made in Rwanyamahembe Sub-county especially on rural infrastructural development with particular reference to roads and water sectors where gaps were established and hence will enable stake holders in planning possible interventions.

5.8 Areas of Further Research

Future research could use another approach such as a survey to cover a wider population especially at a District, Regional or National level.

A related research could be carried out to establish the underlying factors responsible for the very low use of modern farm tools and reluctance by farmers to adoption of new technologies and use of improved seeds and breeds despite the various interventions being put in place especially under the NAADS programme. This is because this trend is a significant limitation to agricultural modernization in Uganda.

REFERENCES

Amin, E. M. (2005). *Social Science Research Conception, Methodology and Analysis*. Kampala, Uganda: Makerere University Printery.

Belay, K. (2008). *Linkage of higher education with agricultural research extension and development in Ethiopia*. Higher Education Policy 1-25.

Bell, E. (1999). Business Research Methods. Oxford-Uk: Oxford University press.

Bibangambah, J. (2002). *Review of information on marketing, processing and storage of Uganda's agricultural commodities*. Kampala, Uganda: Fountain publishers.

Birkenholz, R.H. (1993). *Pilot Study of Agricultural Literacy*. Missouri, Columbia: Missouri University press

Braverman, M.T. and Rilla, E.L. (1991). *How California Educators and CE Directors View Agricultural Literacy Programs*. Calfornia Agriculture 45(6): 4-9 doi: 10.3733/ca.V045n06p4.

Brushett, S. and Abraham J. I. (2006). *Infrastructure for Improved Rural Livelihoods.* En breve ; no. 93. Washington D.C. - The Worldbank. http://documents.worldbank.org/curated/en/2006/09/7154085/infrastructure-improved-rural-livelihoods

Caffarella, R.S.(2002). *Planning Programs for Adult Learners.* San Francisco: Jossey-Bass

Carroll, J. E. (2012). *Meeting food security and needs*. Virginia: College of Life Sciences and Agriculture, College printery

Cochran, G. W. (1977). *Sampling techniques*. New York: Harvard University press.

Ellis, F. and Biggs, S. (2001). *Evolving Themes in Rural Development 1950s-2000s*. Development

Policy Review, 19: 437–448. doi: 10.1111/1467-7679.00143

FAO (2008). *Market-oriented agricultural infrastructure*. Appraisal of public-private partnerships. Project Briefing, New York: Food and Agriculture Organisation of the United Nations and Overseas Development Institute(ODI)

FAO (2010). *An ecosystem approach to sustainable crop production intensification*: A conceptual framework. Paris: FTA Publishers; France

FAO (2011). *Price volatility in food and agricultural markets*. Rome: Published online 2011 May 22. doi: 10.1371/journal.pone.0064582PMCID: PMC3661712

George, A. L. and Bennett, A. (2005). *Case studies and theory development in the social sciences.* Oxford-Uk: Oxford University Press.

Ghunain, A. (2008). *Water management in the Disi Basin in Jordan*. Las Cruces: New Mexico University press.

Hagins, S. A. (2001). *Associated Press Wire Service Coverage of Agricultural Issues*: A Content Analysis. Texas: Texas Tech University.

Hardin, G. (1968). The tragedy of the commons: Cardiff-Wales: Newton publishers UK.

Hussain A, Tribe K, Allen T. and Korten, D.C (1981). *Marxism and the Agrarian Question: German Social Democracy and the Peasantry 1890-1907*. Hong Kong: MacMillain Press Ltd.

Jensen, H. F (2006) Agricultural Policy indicators: An economic analysis to guide policy in

developing countries. Manhattan: Progress Publishers.

Keeler, R. (2009). *Challenges of Modernizing Land Legislation*. Nairobi – Kenya: Jomo Kenyatta University Printery.

Krejcie, R. V. and, Morgan, D. W. (1970), Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30, 607-610.

Ki-Moon, B. (2012). *United Nations' General Secretary's message for World Water Day, observed on 22 March 2012*: New YorK: Department of Public Information, News and Media Division.

Kyomuhendo, J.B. (1997). *The Farmer`s Voice. Uganda National Farmers Association (UNFA) Magazine*. Kampala, Uganda. PTF Publishers

Lauridsen, J. (2005) *Systematic and stratified sampling*. Copenhagen-Denmark: University of Southern Copenhagen.

Li, Z. and Liu, X. (2009). *The effect of rural infrastructure development on agricultural production technology efficiency*. Beijing – China: Chinese Academy of Sciences, 11A Datun Road, Anwai, Beijing 100101, China

Marx, K.H. and Engels, F. (1848). *The Communist Manifesto*. New York: Haymarket Books Ltd.

Mbarara, District Local Government (2012). District NAADS 4th Quarter Report for Financial Year 2011/2012.
Mbarara: Mbarara District Local Government, unpublished report.

Mbarara, District Local Government (2012). District production and Marketing department Annual

Report for Financial Year 2011/2012. Mbarara: Mbarara District Local Government, unpublished report.

MoFPED (1997). *Operationalization of the medium-term plan for modernization of agriculture – 1996/1997 – 2000/2001*. Kampala: Government of Uganda.

Mugenda, M. O. and Mugenda, G. A. (2003). *Research methods, quantitative and qualitative approaches. Nairobi: African Centre for Technology Studies (ACTS*

Mwanje, E. E. and Duvel, G. H. (1998). *Coping with changes in agricultural extension in Uganda and implications for program evaluation*: a review of recent experiences. Cape town- South Africa: Cornell University Press.

NAADS (2010). *NAADS Implementation Guidelines*: Farmers selection and support for progress from subsistence to commercialization. Kampala: NAADS Secretariat.

Parsons, T. (1967). *Sociological Theory and Modern Society*: New York, Free Press.

Petit, M. (2010). *The Benefits of Modern Agriculture*. A reassessment following recent controversies. Global Harvest Initiative. Paris: Free Press.

Robinson, C. (2002). *Real world research*. A Resource for Social Scientists and Practitioner-Researchers. Oxford: Blackwell publishers.

Rostow, W. W. (1962). *The Stages of Economic Growth*: London: Cambridge University press.

Rwanyamahembe, Sub-county (2011). Agriculture and production Annual Report. Mbarara: Mbarara District Local Government, unpublished report.

Starkey, P. (1998). *Integrating mechanization into strategies for sustainable agriculture.* Wageningen, the Netherlands: *Technical Centre for Agricultural and Rural Cooperation (CTA)*

Yair, M. (1992). Agricultural Productivity and Economic Policies: Concepts and Measurements. New York: Havard University Press.

Yin, R. K. (2009). *Case Study Research. Design and Methods*. (4th ed.). Applied Social Research Methods Series. Vol. 5. California.

APPENDICES

APPENDIX (1) QUESTIONNAIRE FOR FARMERS

QUESTIONNAIRE NUMBER:

CONFIDENTIAL

UGANDA MANAGEMENT INSTITUTE

(UMI)

SOCIO-ECONOMIC CHALLENGES AFFECTING AGRICULTURAL MODERNISATION IN UGANDA:

A CASE STUDY OF RWANYAMAHEMBE SUB-COUNTY

KASHARI, MBARARA DISTRICT (QUESTIONNAIRE FOR FARMERS)

	DD	MONTH	YEAR
DATE OF INTERVIEW			

NAME OF INTERVIEWER: ……..

NAME OF PARISH: ……..……..

RESEARCH BACKGROUND AND OBJECTIVE

Dear respondent,

You have been identified to provide information on socio-economic challenges that affect agricultural modernization in Rwanyamahembe Sub-county. The information is for research purposes. Research is a requirement for the award of Masters Degree in Public Administration of Uganda Management Institute (UMI). The information obtained will be kept confidential and will be used for only Academic purposes.

This is therefore to request you to provide information to the given questions and give comments where required.

Thank you for your cooperation.

Godfrey Ndyahikaho Tumusiime
Researcher.

SECTION –ONE (BACKGROUND INFORMATION)

Qn-1. Which of the following is your major activity?

1- Banana growing…… ☐
2- Coffee growing…… ☐
3- Maize growing…….. ☐
4- Beans growing…… ☐
5- Cassava growing….. ☐
6- Sweet potatoes ……. ☐
7- Tomato growing…… ☐
8- Vegetable growing.. ☐
9 - Cattle rearing…….. ☐
10 - Goat rearing……. ☐
11 - Sheep rearing…… ☐
12 – Piggery…… ☐
13 – Poultry……. ☐

SECTION – TWO (EDUCATION: LEVEL, LITERACY AND NUMERACY)

Qn-2 What is your education level?

1- Never been to school….. ☐
2- Primary …… ☐
3- O-level ……. ☐
4- A-Alevel……..…. ☐
5- Diploma.…… ☐
6- Graduate……. ☐
7- Post-Graduate… ☐

Qn-3 Do you know how to read and write? 1-Yes ☐ 2-No ☐ (go to question 6)

Qn-4 If yes, how do you rate your literacy skills in reading and writing?

1 Excellent ☐ 2 Very good ☐ 3 Good ☐
4 Poor ☐ 5 Very poor ☐

Qn-5 Do you know how to count? 1-Yes ☐ 2-No ☐ (go to question 8)

Qn-5 If yes, how do you rate your skills in counting?

1 Excellent ☐ 2 Very good ☐ 3 Good ☐
4 Poor ☐ 5 Very poor ☐

Qn-10 Have you ever received of any agriculture extension services in the last one year? 1-Yes ☐ 2-No ☐ (go to question 12)

SECTION – THREE (LAND: OWNERSHIP & SIZE)

Qn-12 Who owns the land on which you carry out your activities above?

1- Personally owned……☐
2- Family land…….……....☐
3- Communally owned…..….☐
4- Rented…….....☐
5- Others Specify…….……...

Qn-13 How big is the land?

1 - 0.1 to 4 acres……..….☐
2 - 5 to 9 acres…….…☐
3 - 10 to 14 acres……...☐
4 - 15-19 acres……...☐
5 - 20 acres and above…...☐

Qn-14 How do you rate the size of the land accessible to you?

1- Not enough ☐ 2- Enough ☐ 3-More than enough ☐

SECTION – FOUR (INFRASTRUCTURE: ROADS AND WATER)

Qn-15 How do you rate the distance of your farm to the road?

1. Very near……☐
2. Reasonably near …☐
3. Far……..….☐
4. Very Far……☐

Qn-16 How do you rate the status of the roads nearest to your farm?

1. Very good…… ☐ 2. Good……. ☐

2. Poor……. ☐ 4. Very poor….. ☐

Qn-17 What is the type of the nearest water source to your farm?

1- Piped ……☐ 5- Gravity flow…..☐

2- Borehole……..☐ 6- Dams……..…. ☐

3- Stream ……..☐ 7- Roof harvested..☐

4- Shallow well….☐ 8- Spring……. ☐

9. Others Specify…….

Qn-18 How do you rate the amount of water available for your farm activities?

1- More than enough ☐ 2- Enough ☐ 3-Not Enough ☐

SECTION – FIVE (MARKETS: DISTANCE & SIZE)

Qn-19 How far is your farm from the market place?

1-Very near ☐ 2- Near ☐ 3-Far ☐ 4- Very far ☐

Qn-20 How easy do you find it to sell your products?

1-Very easy ☐ 2- Easy ☐ 3- Difficult ☐ 4- Very difficult ☐

Qn-21 Have you ever got unsold products and were wasted?

1-Yes ☐ 2-No ☐

SECTION: SIX (MODERNISED AGRICULTURE)

Qn-22 (a) How often do you use modern farm tools or machines on your farm?

1-Often ☐ 2- Rarely ☐ 3-Never ☐ [go to question 21(c)]

Qn-23 (a) How often do you use improved seeds or breeds in your farming?

1-Often ☐ 2- Rarely ☐ 3-Never ☐ [go to question 23(c)]

Qn-24(a) To what extent have your farm yields improved in the last two years?

1- High extent ☐ 2- Low extent ☐ 3- Never ☐

END

CONFIDENTIAL

APPENDIX (2) KEY INFORMANTS INTERVIEW GUIDE:

No. | |

UGANDA MANAGEMENT INSTITUTE

(UMI)

SOCIO-ECONOMIC CHALLENGES AFFECTING AGRICULTURAL MODERNISATION IN UGANDA:

A CASE STUDY OF RWANYAMAHEMBE SUB-COUNTY

KASHARI, MBARARA DISTRICT.

RESEARCH BACKGROUND AND OBJECTIVE

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This is therefore to request you to provide information to the given questions and give comments where required.

Thank you for your cooperation.

Godfrey Ndyahikaho Tumusiime.

Researcher

BASIC INFORMATION

Title of the respondent……

Venue of interview……..…

Date of interview ……

Time started ……..

QN.1 - What is your role in managing agriculture in Mbarara District, Rwanyamahembe Sub-county in particular?

QN.2 - What activities are being implemented towards agricultural modernization in Rwanyamahembe sub-county?

QN.3 - How do you rate the literacy levels of farmers in Rwanyamahembe sub-county?

QN.4 - How do you rate the numeracy levels of farmers in Rwanyamahembe Sub-county?

QN.5 - What is your view on the accessibility of land to farmers in Rwanyamahembe Sub-county?

QN.6 - In your view, how do the roads in Rwanyamahembe Sub-county affect agricultural activities?

QN.7 - What do you comment about water sources available to farmers in Rwanyamahembe Sub-county?

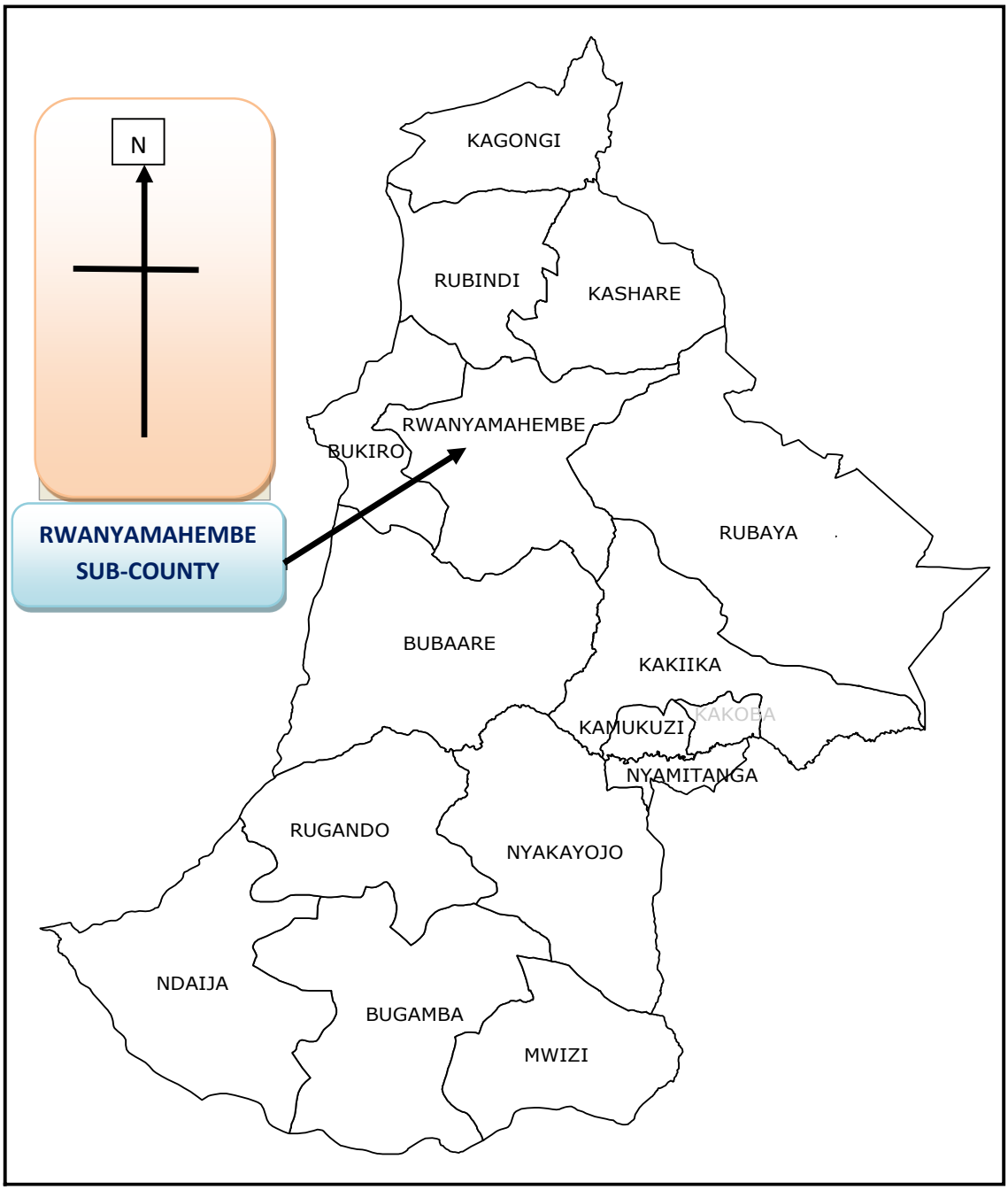
QN.8 - Give your Opinion, on market accessibility to the farmers of Rwanyamahembe Sub-county.

QN.9 - What type of machines if any do farmers in Rwanyamahembe sub-county use?

QN.10 - What do you consider to be the major socio-economic challenges to agricultural modernization in Rwanyamahembe Sub-county?

QN.11 - How best do you think agricultural modernization can be achieved in Rwanyamahembe Sub-county?

APPENDIX (3) MAP OF MBARARA DISTRICT SHOWING THE LOCATION OF RWANYAMAHEMBE SUB-COUNTY.



Source: 2002 Uganda Population and Housing Census.

END.