LAND USE CONSOLIDATION AND SOCIO-ECONOMIC LIVELIHOODS OF RURAL FARMERS: A CASE STUDY OF CYUVE SECTOR, MUSANZE DISTRICT, RWANDA

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DECLARATION

I, MAFARANGA Kizito, Registration Number MPA/28767/91/DF-KBL do declare that this dissertation is my original work. It has not been presented for any award in any University, college or institution of higher learning.

Signed: .................................

Date: 4th Nov 2012 ............
APPROVAL

This dissertation has been submitted with my approval as the Supervisor.

Signed: OKETCH CHRISOSTOM
Names: OKETCH CHRISOSTOM
Date: 17th Nov, 2012
DEDICATION

This research work is dedicated to my wife, NYIRATABARO Concilie and my daughters, INEZA Alida and IHIRWE Benedicte, for their support when I was conducting the research.
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First and foremost, I owe my thanks to the Lord for his abundant blessing, guidance and protecting my life during the course of my studies.

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LIST OF ACRONYMS

EDPRS : Economic Development and poverty Reduction Strategies
FAO : Food and Agriculture Organisation
GDP : Gross Domestic Product
GoR : Government of Rwanda
Ha : Hectare
IFAD : International Fund for Agricultural Development
KIU : Kampala International University
MINAGRI : Ministry of Agriculture and Animal Resources
MINECOFIN : Ministry of Economic Planning and Finance
NARD : National Agricultural Research Organisation
NISR : National Institute of Statistics of Rwanda
RADA : Rwanda Agricultural Development Authority
Rfws : Rwandan Francs
SPSS : Statistical Package for Social Science
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ABSTRACT

This study on Land Use Consolidation and Socio-Economic Livelihoods of Farmers carried out in Cyuve Sector, Musanze District sought to analyse the contribution of Land Use Consolidation towards the socio-economic livelihoods of farmers in Rwanda. The study was guided by the following specific objectives: to assess the crops grown before and after land use consolidation; to determine the yield and profitability of crops grown before and after land use consolidation; to identify the problems faced by farmers in the implementation of the land use consolidation and to evaluate the extent and measure used to train farmers on land use consolidation.

The review of literature showed that Land Use Consolidation was used as one of the strategies of the government of Rwanda with the aim of giving farmers the large plots of land with one productive crop rather than scattered, small parcels of land with different non productive crops. This strategy aims to increase of agricultural productivity and to improve the livelihoods of farmers.

The study used quantitative, correlational and cross-sectional survey approaches. The target population involves the farmers of Cyuve sector. Questionnaires were administered to the head of family or to others members of family who participate in agricultural activities. The data collected from the households of the farmers was analyzed and presented in tables and figures using Microsoft Excel. The researcher analysed the data collected basing on the number of respondents using Friedman as Chi-square analytical tools. The results of the study showed that in Cyuve sector the farmers cultivate three crops: maize, Irish potatoes and beans under land use consolidation instead of multi-crops cultivated before. The profitability of crops in Cyuve sector was marginally positive after land use consolidation. However, the crop gross margin was negative before land use consolidation. The problems faced by farmers in the implementation of the land use consolidation relate to the challenges of delay in payment. As far as the extent and measure used to train farmers on land use consolidation is concerned, the results revealed that there are few farmers trained in land use consolidation implementation. Basing on the findings, the study recommends that farmers should change mind set and involve themselves in modern agriculture and abandon the former habit of mixing many crops on a small plot of land, local leaders should avail seeds of more profitable crops, government and agriculture partners should invest more effort in training farmers in modern agriculture in general and in land use consolidation in particular.
CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background of the study where it captures historical, conceptual, contextual and theoretical perspectives of the work. The second point highlights the problem statement.

1.1 Background to the study

Life in many rural areas is characterised by decreasing opportunities to earn a decent living in both the agricultural and non-agricultural sectors. This situation occurred for many reasons, and efforts to enhance the quality of rural life must combine improvements to agricultural production, employment, infrastructure, housing and the protection of natural resources. Such integrated rural development must take into account the land tenure structure which includes vast numbers of small and fragmented farms. In fact, Rwanda is a developing country whose population largely depends on agriculture for their livelihood. In spite of its social economic importance, agriculture is still dominated by subsistence farming which is estimated to be about 33% of the Gross Domestic Product (Kalibata, 2010). With its projected contribution to economic growth, modernization of agriculture is seen as one of the six pillars of Vision 2020 along with sustainable land-use management and basic infrastructure (GOR, 2000).

Agriculture is also explicitly recognized in the EDPRS as one of the four priority sectors that will both stimulate economic expansion and make the greatest contribution to GDP estimated at 33.7% for agriculture (Faustine, 2001). Generally landholdings are very small with more than 25 per cent of households cultivating less than 0.7 ha, 50 per cent cultivating less than 0.5 ha, and more than 25 per cent cultivating less than 0.2 ha (GOR, 2007). This constraint is aggravated by the fact that most farms have multiple, scattered plots, many of them tiny. The small size of farms emanates from high population pressure on a small land area. Moreover, cultural and inheritance patterns of dividing land among sons has also aggravated the situation (GOR, 2007).

In Musanze District, the farmers practice agriculture on fragmented land. Ministry of Agriculture and Animal Resource (MINAGRI) and Rwanda Agriculture Development
Authority (RADA) have the mandate to guide rural development and prompting agricultural transformation that increases agricultural production to improve the lives of Rwanda's rural poor. Adopted in 2007, the land use consolidation is a type of land reform which aims to give each farmer one relatively large plot of land rather than scattered, small parcels of land also aims in increasing productivity of agriculture (MINAGRI, 2008). It is therefore important to do a research on analysis of socio-economy contribution of land use consolidation to the livelihoods of rural farmers' our selected case study is Cyuve Sector, Musanze District.

Land fragmentation, where a single farm consists of a large number of separate land plots is a common agricultural phenomenon in many areas of Rwanda. Land fragmentation is said to be a constraint to efficient crop production and agricultural modernization. Fragmented parcels are obstacles to spatial and territorial planning, as well as to improved land-use planning and land management. In several countries this has resulted in the implementation of land consolidation programs. Since recently, land use consolidation is the policy of the government of Rwanda that has the aim of challenging the problem of shortage of important food products and hunger. The backbone of the economies of these countries is therefore, quite obviously agriculture. Rapid economic development can only take place if agriculture is also developed so that it can make its contribution to the total national economic development. There are some specific contributions to economic development which can only come from agriculture as discussed in this section (United Nations, 2009).

The population of the developing world is growing at the high rate; the supply of food must just to keep up with the population, growth at the same rate as the population. If there is to be improvement in nutrition from present levels, the growth in food output must be accordingly high. The same applies to such raw materials as cotton for textiles and various oil seed maize for edible oils and soaps (United Nations, 2009).

With the increasing urbanisation in the world, the number of wage earners or self-employed persons outside agriculture is increasing steadily. This non-agriculture population depends on agriculture for food and raw materials. Adequate supplies of food at prices population can afford are especially essential for efficient functioning of this population. This in turn will enhance the non-agricultural population's contribution to the total economy.

Most of developing countries cannot hope to export industrial products outside the region. Since the majority of the population are engaged in agriculture, expansion of industrial production will very much depend on the capacity of the agricultural population to buy inputs.
Hence the development of the industrial sector will depend on the development of the agricultural sector (Marara & al, 2000).

The rate of population increase is not matched by the expansion of the economy in different countries of the world. Consequently, there is growing unemployment, especially in developing world. The development of agriculture, which raises the productivity of the land, should raise both incomes and improve the livelihood of farmers. Thus, the main objective of this research is to analyze the socio-economic aspects of land use consolidation to the livelihoods of rural farmers in Cyuve Sector, in Musanze District.

1.2 Problem statement

Rwanda is a developing country whose population largely depends on agriculture for their livelihood. This shows that the agriculture is the main sector of the economy. At least 45% of the people face problem of food insecurity (MINECOFIN, 2004). This is exacerbated by land fragmentation. The government introduced the land use consolidation in order to increase the agricultural production and household income. However, there is a lack of systematic analysis related to the contribution of this strategy to rural livelihoods. Thus, the main objective of this research was to analyze the socio-economic aspects of land use consolidation to the livelihoods of rural farmers in Cyuve Sector, Musanze District, in Rwanda.

1.3. Purpose of study

The purpose of this study was to analyse the contribution of land use consolidation toward improving the socio-economic livelihoods of farmers in Cyuve sector, Musanze District, Rwanda.

1.4 General objective

The general objective of this study was to analyze the contribution of land use consolidation towards improving the socio-economic livelihood of rural farmers in Cyuve Sector, Musanze District, Rwanda.

1.5 Specific Objectives

This study was guided by the following specific objectives:

1. To assess the crops grown before and after land use consolidation;
2. To determine the yield and profitability of crops grown before and after land use consolidation;
3. To identify the problems faced by citizens in the implementation of a public policy of the land use consolidation.
4. To evaluate the extent and measures used to train farmers on land use consolidation towards socio-economic development.

1.6. Research questions
The study was guided by the following research questions
1. What are the crops grown before and after land use consolidation?
2. What are the yield and profitability of crops before and after land use consolidation?
3. What are the problems faced by citizens in implementation of public policy of the land use consolidation?
4. To what extent and what measures are used to train farmers on land use consolidation towards socio-economic development?

1.7. Hypothesis
H\textsubscript{1}: There is a significant difference in crops yield of farmers before and after the implementation of Land Use Consolidation Policy

H\textsubscript{0}: There is no significant difference in crops yield of farmers before and after the implementation of Land Use Consolidation Policy

1.8. Scope of the Study
Geographical scope
The research was carried out in Cyuve sector, Musanze District, in the Republic of Rwanda. Cyuve Sector results from the merger of the former areas of Gashangiro, Rwankuba, Gitinda, Kinigi and Bukamba cell. It was established by the Organic Law N° 29/2005 of 23/12/2005 administrative entities of the Republic of Rwanda, especially in Article 2.
Cyuve Sector is divided into 6 cells that are Buruba; Bukinanyana; Kabeza; Cyanya; Migeshi and Rwebeya. Cyuve Sector, administratively is limited as follows: in the North, by Gahuga and Nyange Sectors; in the West by Musanze Sector; the South by Muhoza Sector; to the East by Gacaca Sector. It is divided into two areas, one rural and one urban area and its surface estimated at 33.77 km\textsuperscript{2}. This sector is crossed by two main paved roads: Musanze -Cyanika and Musanze- Kinigi.
Cyuve Sector enjoys a tropical climate. The average altitude is 1860 m above sea level and as a result of the altitude, the annual rainfall is 1400-1800 mm and the average temperature is 20° C which makes it favourable for agriculture. The rainiest months are September, October, November, April and May (Csaki & al, 2002). The climate is cold, with regular rainfall from a height of 1527.7 mm of precipitation per year. Cyuve Sector essentially consists of volcanic soil (lava) which has high fertility.

Content scope

The study concerns general introduction, the literature review, methodology, presentation, interpretation, analysis and recommendation related land use consolidation and socio-economic livelihoods of rural farmers, case study of Cyuve sector, Musanze District, Rwanda.

Time scope

The research was carried down from July 2011 to October of 2012; this is the period of implementation of Land Use Consolidation strategy in Rwanda. During this period, the researcher concentrated himself on topic definition, research proposal submission, literature review, decision on method of data collection, preparation of materials for data collection, data collection, and data organization for analysis, data analysis, writing results and report submission.

1.9. Significance of the Study

The study was intended to analyse the socio-economic livelihood of farmers contribution of land use consolidation policy in Rwanda. It could therefore be of assistance to policy-makers notably to the government of Rwanda, to academicians and future researchers, to farmer’s communities and to the researcher himself.

To the government of Rwanda and policy makers

This study enables the government of Rwanda to know the results of land use consolidation policy and its socio-economic impact to the livelihood of rural farmers in Rwanda, in general and in Cyuve sector in particular. From this, the government and other policy maker can know weak points of this policy and improve them.
To academicians and future researchers
This research meets the academic requirements according to which any student who completes his/her masters’ studies must conduct research on a problem of general interest and scientific. The results of this research have increased knowledge about the effectiveness land use consolidation and its impact on socio-economic livelihood of farmers of Rwanda in general and of Cyuve sector in particular. After this research is successfully conducted, a copy will be submitted to the library of KIU- Western Campus. This will avail information to those who may be interested in this research or other related studies.

To farmers
This research has a particular importance for farmers of Rwanda, in general, and of Cyuve sector in particular, because it shows them the roles of the practice of land use consolidation and its positive impact on the socio-economic livelihood. Farmers will change some negative attitudes against the land use consolidation policy because they felt that its practice could harm their socio-economic livelihood.

Personal significance:
This study allowed the researcher to know the impact of land use consolidation policy on the livelihood of farmers. This study deepened and applied the theoretical knowledge about the reality of land use consolidation, as a new policy and its contribution to the development of the people.
CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents definition of concepts, overview of agriculture sector in Rwanda, role of agriculture in economic development, challenges facing agriculture sector in Rwanda, characteristics of agriculture in Africa, strategy to improve agriculture productivity and the concept of livelihoods.

2.1. Definition of concepts

2.1.1. Agriculture

The word agriculture is used to connote a range of activities to the extent that it is difficult to find a satisfactory definition. However, different authors have attempted to define it. According to Youdeowei, et al., (2008) agriculture can be understood as the life of the rural population in which production is intimately bound to consumption. Alternatively, agriculture is seen as an occupation or profession from which to deliver a livelihood. Looked at another way, agriculture is an industry or business employing knowledge of various sciences for the production of food, feed, fibre and fuel. A useful definition is to regard agriculture as purposeful work through which the elements in nature are harnessed to produce plants and animals to meet human needs. It is a biological production process which depends on the growth and development of selected plants and animals within the local environment. Agriculture is defined as science and practice of producing crops and livestock from the natural resources of the earth. The primary aim of agriculture is to cause the land to produce more abundantly and at the same time to protect it from deterioration and misuse.

2.1.2. Livelihoods

In literature, the term livelihood is defined in many ways. However, according to Ellis, (2000), livelihoods constitute the assets in the form of human: knowledge, skills, ability to labor and good health, social: the resources people can draw upon in pursuit of their livelihood objectives, including social networks and relationships of trust and
reciprocity, natural resources available, physical: basic infrastructure and producer goods available and the activities and the access to those (mediated by institutional and social relation) that together determine the living gained by individual or household. This is very important because it is used to determine whether such community or household lives below poverty line poverty.

2.1.3. Land Use Consolidation

Land consolidation is a standard tool for ensuring rural development and for increasing land use effectiveness. It is also a very useful instrument for erosion control in rural landscapes (Mihara, 1996) and dealing with nature conservation and environmental issues (Uhling, 1989). It also rationalizes urban development (Gonzalez et al., 2004) and other social and economic issues in managing the development of rural areas (Quadflieg, 2007). Land Use Consolidation can also be conceptualized as the process whereby agricultural production efforts of individual landholdings are integrated, coordinated, or facilitated to achieve a unified production situation characterized by collaboration in types of crops grown, sale of agricultural products, processing of agricultural products, and/or distribution and marketing of agricultural products.

2.2 Review of Related Literature

2.2.1 Overview of Agriculture Sector in Rwanda

Rwanda is one of the fastest growing economies in Eastern Africa. Although the country is still poor and mostly agricultural (90% of the population is engaged in subsistence agriculture), the nation has made a significant progress in recent years. Rwanda’s economy is dominated by the agricultural sector. According to the estimates, in 2009/10 the agricultural sector contributed 33.7 percent of the GDP while 14.2 percent and 46.2 percent were generated respectively by the industrial and services industry (Calestous J., 2000). Most of Rwanda’s population is engaged in some form of subsistence agriculture, producing goods for their own consumption and not for sale. Nowadays, the agricultural sector in Rwanda has been given a high priority by the government’s planning for development. The current national thrust is for the sector to move from subsistence to commercial mode of production. This strategy aims to increase household incomes and lead to a 50 percent reduction in poverty over twenty years (GoR, 2008). With its projected contribution to economic growth,
modernization of agriculture is seen as one of the six pillars of Vision 2020 along with sustainable land-use management and basic infrastructure (GoR, 2000). Agriculture is also explicitly recognized in the Economic Development and Poverty Reduction Strategy (EDPRS) as one of the four priority sectors that will both stimulate economic expansion and make the greatest contribution to poverty reduction (GoR, 2007). In general, agricultural productivity is hindered by a plethora of technical, socio-economic and institutional factors which include population pressure (which leads to environmental degradation), declining soil fertility, limited access to strategic resources such as agricultural credits, lack of improved seeds and erratic rainfall patterns. A number of programs have been enunciated to respond to the aforementioned production and environmental related constraints. These include the environmental protection program (bench terraces and ditches), Plans of Action (Imihigo), Watershed management program (Agasoz Ndatwa) and crop production programs on very steep slopes which seek to reduce soil erosion and promote sustainable crop production (GoR, 2008). In view of these challenges, the government of Rwanda has been crafting various policies to improve agricultural productivity, ensuring food security and developing export-oriented agriculture.

2.2.2. Role of Agriculture in Economic Development

In agricultural based economies such as those found in the developing world, it can be supported on the land. One can therefore, see the role that a developing agriculture can play in increasing employment.

Increased agricultural and industrial production in developing countries depends on the availability of capital goods: machinery and equipment necessary for production processes (Frankenberg, 1992). These have to be imported from abroad. This is only possible if foreign exchange is available.

Makes explicit the links between policy and institutional issues, and micro level realities; and helps in understanding how individual, possibly sector-specific, development programmes and projects fit into the wider livelihoods agenda and objectives.

Livelihood strategies are the combination of activities that people choose to undertake in order to achieve their livelihood goals. They include productive activities, investment strategies and reproductive choices. Livelihoods approaches try to understand the strategies
pursued and the factors behind people’s decisions; to reinforce the positive aspects of these strategies and mitigate against constraints.

Household food, nutrition and income security can be enhanced by one or a combination of the three intervention strategies described below.

Livelihood promotion involves improving the resilience of household livelihoods so that food and other basic needs can be met on a sustainable basis (i.e. development) (Frankenberg, 1992. Interventions of this type often aim to reduce the structural vulnerability of livelihood systems by focusing on:

- Improving production to stabilize yields through diversification into agro-ecologically appropriate crops and natural resource management measures (e.g. soil and water conservation);
- Creating alternative income-generating activities (e.g. activities to develop small enterprise);
- Reinforcing coping strategies that are economically and environmentally sustainable (e.g. seasonally appropriate off-farm employment);
- Improving on-farm storage capacity to increase the availability of buffer stocks;
- Improving common property management through community participation.

Livelihood protection involves protecting household livelihood systems to prevent an erosion of productive assets or to assist in their recovery (rehabilitation/mitigation). These types of interventions entail timely food and income transfers which can reduce long-term vulnerability resulting from the forced selling of productive assets to meet immediate food and other needs.

Livelihood provisioning involves providing food and meeting other essential needs for households to maintain nutritional levels and save lives. Interventions of this type usually entail food and health relief for people in an emergency or people who are chronically vulnerable (IFAD, 2003).

Livelihood outcomes are the achievements of livelihood strategies. Individuals and households will usually try to achieve multiple outcomes, which may include:

- More income
- Increased well-being
- Reduced vulnerability
• Improved food security
• More sustainable use of natural resource

An important feature of rural livelihoods is diversification which is defined as "the exports foreign exchange. Expansion of agricultural exports should lead to an increase in foreign exchange earnings which should increase the country's purchasing power of necessary capital imports of machinery and equipment (Frankenberg, 1992. This calls for greater efficiency in agriculture to produce various commodities such as coffee, tea, cotton, pyrethrum and livestock products of a high quality and at prices which are competitive in the world market.

If agricultural incomes rise appreciably, there should be an increase in saving made by the agricultural population. Such saving should be available for investment in different sector of economy as well as other agricultural, industrial and commercial undertakings. This in turn should accelerate the pace of economic development in the country as a whole (Sharnie, 2006).

Agriculture is the major factor in the economies of underdeveloped country including Rwanda where a sizeable number of labour forces are engaged in agriculture and other agriculture-related activities, for example in Rwanda at least 90% of the people are directly or indirectly dependent on agriculture. And the great majority of the people of Rwanda live in the rural area where agriculture is virtually the only occupation and source of livelihood. Agriculture is economically important in economies of different countries for the following major ways (United Nations, 2009).

It is the duty of every nation to feed its people because a well feed nation is a healthy one. Except in cases of prolonged drought, agriculture provides virtually all the food required to feed the population. These foods may be plant or animal. The task of providing food is a very important issue in developing countries because countries are going to succeed in adequately feeding the growing population. Therefore in order to cope with this rapid increase in food demand, agricultural production must increase (ICARRD: 2006).

Agricultural production provides employment directly, for example workers in ranches, coffee, tea and on smallholder farmers. In Rwanda for example, agriculture and allied industries are the biggest source of employment. Some of the key agriculture-allied industries which employ large numbers include: food processing industries e.g. SORWATOM, SOTIRU, textile manufacturing industries etc.

The greatest percentage of exports from Rwanda and in most developing world consists of agricultural commodities. The revenue thus obtained is used by the government to provide
such services as medical care (hospitals), schools and roads for the public (Muller, 1997). Hence it is correct to say that the improvement in the standards of living of the Rwandan.

Most agriculture products require some processing before they are eventually utilised. For example, cotton, coffee, tea, and wool do require some processing before they eventually reach the consumer. Thus agriculture generates industry and trade as well as increasing job-opportunities for the citizens. The main industries in Rwanda are, therefore, based on agricultural raw materials.

Agricultural products are a major source of domestic and international trade which provides revenue for the government and people of a country. Increased agricultural production enables many farmers to become rich and pay more taxes. Government revenue, then, increases and more funds become available for development projects like education, health, manufacturing industries, roads and communication (Muller, 1997).

2.2.3. The problem facing the agricultural sector

2.2.3.1. The problem facing the agricultural sector at global level

In spite of the enormous progress made in agriculture, there is still a long way to go before the whole or a great proportion of the industry is transformed into a modern, economically viable business. Numerous problems still hinder agricultural development around the world and the standards of living of the people occupied in farming still remain relatively low compared with urban communities (Muller, 1997). Some of the salient problems facing agriculture includes the following.

Due to the low level of education and sometimes conservatism, farmers do not practice the recommended husbandry practices. Thus they will often plant late, fail to control pests, plant poor seed and as a result the yields obtained are very low compared with yields in the developed countries.

Sometimes the transport system is inefficient or unavailable thereby leading to spoilage of produce due to the delay in delivering it to the market. Sometimes the middlemen involved in the marketing of farmers' produce take too large a profit with a result that the farmers receive too low a price for his produce. Hence he has no incentive to produce more.

Every farmer requires capital to invest in the development of his farm. Capital is required for buying fencing material or fertilisers. Mostly the farmers obtain their capital as loans (Muller, 1997). The main sources of capital are Commercial banks which advance the money to the farmers in the form of loans on which an interest is payable. In addition to commercial banks
there are government owned financial institutions such as development banks that assist the farmers with credit. In order to be given credit by the credit agencies the farmers must present security against which the loan is given. The security could be a land or certificates showing legal ownership of a property e.g. a building. But most farmers do not have security and, therefore, the level of investment in their farms remains low. The position is made worse by the fact that most small-scale farmers do not save much as most of their output is for subsistence.

In most rural areas the farmers still use the traditional hand tools, e.g. the hoe, panga, fork, etc. which are rather inefficient. Consequently various critical operations in farming e.g. seedbed preparation and planting are often completed late, besides the quality of the operation being poor. This leads to low yields and, therefore, poor income for the farmer. When the size of the land is not too large, hand tools do achieve goods result, provided proper planning of the operations in done (Cheam, 2009).

In most developing world, farmer is confronting by many pests and diseases of both crops and animals. Hence farming is a constant battle between the farmer and these pests and diseases. The battle is financially very costly. Where the farmer neglects the control of these pests and diseases, he incurs heavy crop and animal losses.

Due to changes in supply and demand; prices of most agricultural products do change from time to time with very unsettling effects on farming. As the price of production inputs does not necessarily follow the same trend, the farmers’ profit may fluctuate so much that he may be discouraged from producing the commodity in question.

2.3. Challenges facing agriculture sector in Rwanda

There are many challenges in agriculture sector; (Kalibata, 2010) listed the following:

- Smallness of farms due to high population pressure, low productivity of lands resulting from excessive use of land and low application of input including fertilizers, improved seeds and pesticides, low level of commercial exchanges in agriculture, absence of well defined extension system with clear orientation and suitable for the country, poor market and market access, climate change, etc.

According to André & al. (1998), characteristics of agriculture in Africa are listed as follows:

- Largest contributor to GDP (32 %)
- Main source of income for 70-80 % of population
• Low productive
• Food balance sheet characterized by import and food aid 30-50% of population not receiving adequate food
• Main source of foreign exchange (80%) coffee, tea, pyrethrum
• Poor average annual growth (less than the pledged 6%)
• Low investment below the pledged 10% of the budget
• Small part of the population 25% is urban (poor purchasing power)

2.4. Strategies to improve agricultural productivity

Land use consolidation
There are two main groups of approaches to land consolidation in World practice (FAO, 2003). One group relies on formally defined, government sponsored consolidation projects, which involve reallocation of parcels (with or without reliance on specialised land banks) and are sometimes supplemented by development of rural infrastructure. These formal projects are quite costly to implement and may take a long time to reach agreement among the many participating landowners. The other group includes individual or market driven consolidation, which implies consolidation of land parcels on an informal and sporadic basis, without direct involvement of the State or participation in any formal consolidation project. Individual consolidation proceeds through land market transactions, whether by leasing or buying and selling of land, initiated by individuals from their own economic considerations. The role of the state is restricted to the creation of the necessary conditions for the development of appropriate market mechanisms, such as joint land use agreements, retirement schemes, leasing, or buying and selling of agricultural land. Land consolidation is sometimes incorrectly interpreted to be only the simple reallocation of parcels to remove effects of fragmentation. In reality, land consolidation has been associated with broader social and economic reforms from the time of its earliest applications in Western Europe. The first consolidation initiatives of Denmark in the 1750s were part of a profound social reform to free people from obligations to noble landlords by assessing privately-owned family farms.

Comprehensive land consolidation projects usually have extensive public works and so they require the participation of a large number of central government agencies such as the Ministry of Agriculture, Ministry of Justice, Cadastre offices, and Registry offices, Ministry
of Public Works, Ministry of Environment, Ministry of Transportation and Ministry of Rural Development.

Individual consolidation affects one or a few individual holdings, comprised of many parcels each, and depend on the voluntary decision of households that see the benefit of consolidating their land (Zhou, 1999). The consolidation in Rwanda will most likely be comprehensive since the land policy indicates that consolidation will be implemented together with sensitisation. In this case, policy has to be coherent and consistent in terms of how these two measures, consolidation and sensitisation will be harmonized and how it will affect the lives of the peasants. It is also crucial to think through the coordination mechanisms of policies in different sectors and their possible impacts on poor people (ICARRD, 2006).

Rwanda through Rwanda Agricultural Development Authority (RADA) have the responsibilities to facilitate the consolidation of agricultural land. The program was enunciated in 2007 in order to reduce tenure security through forced consolidation of use or inappropriate land takings to improve land management and productivity. Agricultural land use consolidation and new agricultural production models seek to:

1. Increase agricultural yields
2. Protect of smallholder land rights
3. Improve the status, livelihoods, and lives of millions of rural Rwandans
4. Promote efficient and sustainable use of land resources
5. Promote the equitable distribution of land resources that recognizes the importance of agriculture to the subsistence needs of Rwanda's rural population
6. Preserve individual choice in farming operations
7. Increase opportunities for and benefits derived from private investment in the agricultural sector
8. Increase off-farm employment opportunities
9. Protect and promote women's access to and benefits from land and other resources

The Ministry of Agriculture, landowners, and other stakeholders in or otherwise concerned with the identified local farming areas will collaborate to select an appropriate land use consolidation model for implementation of each consolidation project in a particular locale. Three models are identified such as: facilitated contract farming; cooperative farming; joint corporate farming (Li You, 2010).

Facilitated contract farming is defined as collaborative farming by a group of individual farmers, growing a single or limited number of agreed-upon crops, and where there is a
contractual relationship between the farmers and one or more buyers for the purchase of all or part of the collaboratively produced crops. The terms of the contract are negotiated between farmer and buyer, but may be facilitated by the government (FAO: 2003). The collaborative crop sale and purchase eliminates the prospect of individual farmers retaining the majority of their agricultural production for their own use or individual farmers selling their crops to any and all buyers as they so choose. The government may provide assistance to local landholders with such things as:

Understanding and participating in market-based crop selection and pricing setting, provision of inputs, credit, extension advice, and facilitation of the sale of the crop to buyers. The farmer may pay for the inputs at the time of purchase or after harvest using the proceeds the sale of the crop. Individual farmers retain their land rights to individual plots. After voluntarily signing formal agreements, farmers and investors are bound to the terms of the contract which the government facilitated.

Until the 1970s, cooperative farming was considered to be an effective instrument through which small and fragmented landholdings could be consolidated into economically operational units. Lerman (2011) considered such farming as capable of transforming South Asian agrarian economy and overcoming obstructions to efficiency, improved productivity and efficient utilization of labour. Cooperative farming will be done pursuant to the Law Determining the Establishment, Organization, and Facilitation of Cooperative Societies in Rwanda. A cooperative is defined as an autonomous association of persons who voluntarily pool resources to accomplish an economic objective through joint participation of its members. Membership is open and voluntary. Depending upon the cooperative’s bylaws, farmers may choose to cooperate in their farming activities in such things as crop selection, planting, fertilizing, and harvesting. Member-users control the cooperative. Input procurement, sales of marketed surplus, technology use and extension advice is coordinated by the management of the cooperative.

Joint corporate farming is defined as the means and result of combining the efforts of joint landholders into a common legal enterprise, whereby the farmers own shares in the corporation in an amount proportionate to the land and other capital contributed to the corporation. In a joint corporate farm, farmers exchange all or a portion of their land for shares in the legal enterprise. Some or all of the contributing owners also work as farm labours on the joint corporate farm, and they are paid a wage in exchange for their labour. Proceeds and profits from the operation of the corporate farm are shared in proportion to the amount of capital contributed by each farmer. Joint corporate farming can also involve cash
equity contributed by a private investor such that the investor and farmers both own shares in a single enterprise; or farmers own an enterprise that includes land, while investors own a separate enterprise that provides processing, marketing, transportation or other services. In such cases, farmers and investors enter into an operation agreement. Creation and structure of the joint corporation are dictated by national corporations’ laws; the corporate farm may also create by-laws at its inception to address rights and obligations not covered in the corporations’ law. MINAGRI and RADA may facilitate the creation and operation of such joint corporate farms, including assistance with assessing the legal entities; advising on crop selection; providing inputs such as seeds and fertilizers; providing extension services; facilitating crop purchase by commercial interests; and facilitating processing, distribution, and marketing agreements with private commercial investors.

Principles guiding the facilitation of Farms Intended to Consolidate Agricultural Land

Use when designing and implementing agricultural land use consolidation program, MINAGRI and RADA, shall:

• Aim to improve rural livelihoods rather than to improve only the primary production levels of agricultural commodities.
• Base the program upon voluntary participation.
• Ensure that identified potential land use consolidation locations and programs are market oriented.
• Perform a detailed cost analysis of land use consolidation before implementation begins.
• Provide incentives and subsidies to farmers and private investors to encourage voluntary participation and to retain their support throughout the program.
• Ensure that women and members of vulnerable groups participate in and benefit from the land use consolidation program.
• Ensure that no land holder, man, woman or child, will lose property to land use consolidation if they decide not participate or invest in the program proposed.
• Recognize that the existing Rwandan rural communities are diverse, and consider the impact of land use consolidation on non-agricultural activities and poorer farmers.
• Ensure that land use consolidation promotes protection and sustainable management of natural resources.
• Acknowledge that small land plots and land fragmentation are not inherently problematic.
• Support the creation of off-farm employment opportunities to support the farm labourers that may lose employment due to land use consolidation.
• Minimize the vulnerability of participating landholders to possible food insecurity as they reduce production of subsistence crops and increase production of cash crops on their land.

• Create an improved legal environment to ensure efficient, fair, just, and transparent contract enforcement and dispute resolution.

• Solicit and use the input of farmers, farmers groups, agricultural value chain representatives, representatives of civil society, consumers, and potential private investors when designing and also throughout the life of the program.

• Select the specific project sites, in part, because local residents and community authorities have expressed a desire to participate in the land use consolidation program.

• Implement the program in phases, project-by-project, monitoring and evaluating at each step.

• Undertake projects that are consistent with the National Land Use Policy, land use plans and an adopted rural development strategy, such as the Strategic Plan for Agricultural Transformation in Rwanda, and with the protection and sustainable management of natural resources.

• Create and then operate pursuant to appropriate legislation and implementing regulations and procedures that provide a clear and standardized legal and procedural basis for land use consolidation programs.

Evaluation applied to land consolidation includes three constituents and corresponding indicators: economic, social evaluation (European Commission, 1999).

Land consolidation changes parcel shape, size and distance, saving time and triggering innovation by way of mechanization (Van Dijk, 2000). This calls for reducing production costs mainly labour with mechanization, and hence adapting parcels for mechanization. The degree of parcel scattering measures the distance among the parcels owned by a farmer. As demonstrated the success of the performance in terms of potential time savings for vehicles using the local road network before and after land consolidation FAO (2003). Evaluation is a component of the planning process that may be accomplished at different stages: selecting among planning options (ex ante evaluation), mid-term evaluation (monitoring) and final evaluation of achieved goals (ex post evaluation).

One way to assess whether an effect is caused by the land use consolidation is a comparison of the development of the area with and without the project execution (both in future and thus
hypothetical). Construction of these two scenarios must be based on the past evolution of the adoption of agricultural innovation by farmers, which is based on their sociological characteristics. This involves identification of the social and personal household characteristics that influence the adoption of agricultural innovations and linking of these characteristics to variation in the ability of farmers to respond to farm re-organisation (Coelho et al, 1996)

The changes resulting from land use consolidation and their effects on agricultural productivity, available arable area and farmers' incomes need to be estimated. Generally, these changes can be split into five main categories: Farm size and plot size and shape; farm-road quality and distance between field plots and farm buildings; irrigation water management system; drainage system and cropping system (Coelho, 1992)

The success of land use consolidation program rests on how well farmers' needs, capabilities and aspirations are reconciled and integrated into it (Conway and Barbier, 1990). Both cash family income and imputed family income (including the value of farm products from own production consumed in the household) increase with the amount of land cultivated by the household (Csaki, & al, 2002). Households with land enjoy higher incomes than rural households without land. Larger individual farms produce higher incomes and achieve higher levels of family welfare than smaller farms (Csaki & al, 2002).

There are several measures that have been taken in order to improve their agricultural sector. Among these measures they are: encouraging farmers not to fragment land and to use new methods of production, giving production loans to both large scale and small-scale farmers, encouraging research through national agricultural research organisation, improvement of extension services through the agricultural extension programme, encouraging agricultural cooperative societies and association, liberalisation of agricultural exports market by removal of taxes on agricultural exports, removal of taxes on importation of most agricultural inputs, encouraging investors to engage in agricultural processing, increased budget allocation to the agricultural sector, construction of storage facilities especially for grains, population control through family planning programmes, mechanisation of agriculture etc (Csaki & al, 2002).

2.5. Sustainable livelihoods

A livelihood is sustainable when it can not cope and recover from stresses and shocks and maintain or enhance its capabilities and asset both now and in the future, while nor undermining resources base (Chambers et al., 1992).
Identifies existing assets and strategies available to poor women and men and uses these as a starting point. Helps keep the focus on poor people and their varied livelihood assets, strategies and outcomes (rather than resources and activities);
Recognises differences based on sex, gender, age, ethnicity, power and poverty status;
Builds on strengths as a means to addressing needs and constraints;

Process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival. Diversification of livelihoods may be done for instance livestock offering manure for crops residues acting as fodder for livestock. It is important to highlight that the choice to diversify livelihoods presents a major disconnect form common economic reasoning since it negates the advantages realized with specialization (Barrett et al., 2001).
CHAPTER THREE

METHODOLOGY

3.0. Introduction

This chapter presents the design, population, sampling strategies, data collection methods and instruments, data quality control, procedure and analysis followed in the study.

3.1. Design

The study is a quantitative, correlational, cross-sectional survey. It employed the quantitative approach or paradigm since its focus is the testing of variables measured with numbers and analyzed with statistical procedures (Creswell, 2003). The study is correlational since it is interested in relating how to estimate the profitability of crops before and after land use consolidation. The study is a survey since it involves a relatively large number of respondent (Best and Kahn, 1993), and cross-sectional since data required to answer the research questions were collected from the respondents at once so as to reduce the costs involved in terms of time, money for facilitation among others (Creswell, 2003).

3.2. Population

In this survey the target population involves the 64 farmers of Cyuve sector considering sexes, ages and levels of education: 26 female farmers and 38 male farmers.

These categories of people were involved because they are householders who are at the center of implementing the land use consolidation policy.

A sample is a portion of the population selected to achieve the objectives of the study.
### Table 1: Distribution of the population of Cyuve sector by cell and sex

<table>
<thead>
<tr>
<th>CELLS</th>
<th>FEMALE</th>
<th>MALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migeshi</td>
<td>2292</td>
<td>2773</td>
<td>5065</td>
</tr>
<tr>
<td>Buruba</td>
<td>1734</td>
<td>2111</td>
<td>3845</td>
</tr>
<tr>
<td>Rwebeya</td>
<td>2804</td>
<td>3588</td>
<td>6392</td>
</tr>
<tr>
<td>Cyanya</td>
<td>1341</td>
<td>3277</td>
<td>5618</td>
</tr>
<tr>
<td>Bukinanyana</td>
<td>2047</td>
<td>2619</td>
<td>4666</td>
</tr>
<tr>
<td>Kabeza</td>
<td>3329</td>
<td>3200</td>
<td>6529</td>
</tr>
<tr>
<td>Total</td>
<td>13547</td>
<td>17568</td>
<td>31115</td>
</tr>
</tbody>
</table>

Source: Cyuve Sector Records, (2011)

The table above shows that the population of Cyuve Sector is 31115 among of them, 13547 are females and 17568 are males.

Regarding sample size, Krejcie and Morgan (1970 in Amin, 2005) suggest minimum samples. This study adopted a simple Random sampling method where sample was selected from the list of farmers randomly.

### Table 2: Distribution of the householders of Cyuve sector by cell and their occupations

<table>
<thead>
<tr>
<th>CELLS</th>
<th>GOVERNMENT EMPLOYEES</th>
<th>PRIVATE EMPLOYEES</th>
<th>VOCATIONAL AND TECHNICAL JOBS</th>
<th>NOT SPECIFIED</th>
<th>Farmers</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migeshi</td>
<td>258</td>
<td>242</td>
<td>342</td>
<td>165</td>
<td>160</td>
<td>1167</td>
</tr>
<tr>
<td>Buruba</td>
<td>395</td>
<td>332</td>
<td>105</td>
<td>114</td>
<td>200</td>
<td>1146</td>
</tr>
<tr>
<td>Rwebeya</td>
<td>263</td>
<td>431</td>
<td>342</td>
<td>146</td>
<td>140</td>
<td>1322</td>
</tr>
<tr>
<td>Cyanya</td>
<td>475</td>
<td>345</td>
<td>108</td>
<td>169</td>
<td>152</td>
<td>1249</td>
</tr>
<tr>
<td>Bukinanyana</td>
<td>329</td>
<td>291</td>
<td>176</td>
<td>143</td>
<td>170</td>
<td>1109</td>
</tr>
<tr>
<td>Kabeza</td>
<td>299</td>
<td>454</td>
<td>543</td>
<td>145</td>
<td>102</td>
<td>1343</td>
</tr>
<tr>
<td>Total</td>
<td>2019</td>
<td>2095</td>
<td>1616</td>
<td>882</td>
<td>924</td>
<td>7336</td>
</tr>
</tbody>
</table>

Source: Cyuve Sector Records, (2011)

The table above shows that the number of the farmer household is 924.
3.3. Sampling strategies

Because of the big number of respondents reached for relevant information, the study is based on sampling.

N private households were selected by using the following formula of Dagnelie (1999):

\[
n = \frac{z^2 \times p \times q \times N}{d^2(N - 1) + z^2 \times p \times q}
\]

Where:  
- \( n \) = sample size,
- \( N \) = size of population (number of household),
- \( Z \) = coefficient normal distribution,
- \( q \) = probability of failure,
- \( d \) = margin error,
- \( p \) = probability of success.

For KOTHAR, the margin error varies between 5% and 10%. The researcher used a margin error of 10%, confidence level of 90%. The probability of success is \( p = 0.5 \), failure probability of \( q = 0.5 \), and \( Z^2 \) (\( Z_{0.25} \) is 1.65).

The total households on this selected sector was 946

\[
n = \frac{(1.65)^2 \times 0.5 \times 0.5 \times 946}{(0.1)^2(946-1) + (1.65)^2 \times 0.5 \times 0.5} = 643.87125 = 63.556 = 64
\]

The number of householders who were selected as respondents in this sector was 64.

The above mentioned category of respondents are stratified according to proportionate systematic random samples was chosen from household’s occupation and sex of the stratum sampling frames.

3.4. Data collection methods

The data was obtained from primary and secondary sources. Primary data refers to the information a researcher obtains from the field. Primary data was made up of involving self-administered questionnaires (SAQs) as the main data collection instruments because of their cost-effectiveness in a survey involving literate respondents.
Secondary data refers to the information a researcher obtain from research finding, articles, books, etc. It was also obtained from documentation of different categories. This includes textbooks, journals, government reports, news papers and websites.

3.5. **Data collection instruments**

Referring to the objectives of the present research; the research was conducted by the use of research instruments including questionnaire.

Questionnaires were administered to the head of family and or to others members of family who participate in agricultural activities. The questionnaires were designed to include close ended questions. Close ended in the case that they required definite answers.

The questionnaire was divided into 5 sections including household demographic data, the land use consolidation, crops grown before and after land use consolidation and access to extension after land use consolidation.

3.6. **Data quality control**

To ensure validity of the mentioned instrument the researcher ensure that questions or items in it conform to the study’s objectives, colleagues from the School of Post-Graduate Studies, lecturers and supervisors are requested to evaluate the relevance, wording, omissions, and clarity of questions or items in the instrument. Thus, a content validity index of 0.77 led the questionnaire be declared reasonably content valid. Reliability of the instrument on multi-item variables was tested using Statistical Program for Social Sciences (SPSS) and a Cronbach alpha (α) of 0.99 led the questionnaire to be declared reasonably reliable or consistent.

3.8. **Procedure**

After the researcher has successfully defended the proposal through the viva voce, the next step was securing permission to do research in CYUVE sector, Musanze District. The final version of the proposal was submitted to the Faculty of Business and Management, Western Campus. The researcher nominated research assistants in the chosen cells of Cyuve sector who help with the distribution, follow-up and collection of the filled instruments.

3.9. **Analysis**

The data collected from the households of the farmers was analyzed and presented in tables and figure using SPSS 14.0 Windows (c) program (statistical packages for social science) and
3.10. Ethical Consideration

Informed Consent

Respondents were requested to sign an informed consent committing themselves to be part of the study and that they will be given information they provide if they so asked.

Respect of persons

Researchers must treat respondents as autonomous persons and must respect their decisions, including the decision of not to participate also the less powerful groups such as children, the mentally ill need special protection. This research was conducted with the respect of persons.

Beneficence

The researcher has the obligation to cause no harm to the respondents; he or she should be concerned about the welfare of respondent including mental, physical health, safety and take all precautions to avoid injury. The researcher should avoid questions or issues that may cause embarrassment, guilt, discomfort or risks.

As we know that individuals who participate in the study have a right to know that all information about them will be treated in a responsible manner, we ensure that data will be handled in the way that will not harm our participants. We promise our respondents anonymity and confidentiality as a way of safeguarding their identity.

3.11. Limitation

During the course of this study, the researcher faced different constraints such as finance constraints in terms of transport and access on relevant research documentation concerning the study. To solve the problem of finance, the researcher borrowed money from friends and sought financial assistance from relatives.

Since the library of KIU, Kabale Study Centre had limited books on topic, the researcher visited different libraries and organization in Rwanda. Getting a book from those libraries and organizations was hard but because the researcher was committed to the study, he took time, sat in those libraries, and collected the required data for the study. Some respondents mistook the study to be a benefit to the researcher financially and asked for money. However, the
researcher convinced them by presenting a letter given to him by the university administration indicating that the researcher is a student on research for academic purposes.

There was also a problem of misplacing 10 questionnaires by the respondents, which required the researcher to print more questionnaires to replace those that got lost on several occasions.
CHAPTER FOUR
DATA PRESENTATION, INTERPRETATION AND ANALYSIS

4.0. Introduction

The broad objective of this study is to assess the impact of land use consolidation on the livelihoods of rural farmers domiciled in Cyuve sector in Musanze District. In order to achieve the objectives, this chapter deals with data presentation, analysis, interpretation and analysis. To achieve this objective the paper answer to research questions. The principal data collection instrument used was a structured questionnaire containing a number of social, economic and demographic variables which are presented and analyzed in this section.

4.1. Household demographic characteristics

4.1.1. Gender Distribution

![Gender Distribution Chart]

Figure 1: Gender distribution
Source: Primary data, July 2011

The pie chart above shows the gender distribution of farmers in Cyuve sector. The majority of respondents were male accounting for 59% of the sample while 41% were female. These results reflect the demographic situation of Cyuve Sector whereby males are dominant. According to Cyuve Sector Report (2011) there were 17568 males and 13547 females.
4.1.2 Level of education

Figure 2: Education level

Source: Primary data, July 2011

The researcher considered the educational attainment of the respondents. This is because of the close linkage between uptake of technology and educational level. In this study, 25% of the respondents never attended, 14.1% have vocational education, 57.8% have primary education level and 3.1% have secondary educational level. This indicates the pre-eminence of primary education among the respondents and hence the low technical skills among farmers. The results are corroborated by the national observation that many people in rural areas have low educational level (National Institute of Statistics, 2010).
4.1.3 Household decision making structures/processes

Figure 3: Nature of households in terms of decision making

Source: Primary data, July 2011

In Rwanda, the rural society has a patriarchal structure implying that men dominate in all spheres of decision making (ICARRD: 2006). This structure determines access and control over strategic resources including land and livestock. In Cyuve sector, 81.3% of the households are male headed, 17.2% are female headed and 1.6% is child headed.
4.1.4 Age Distribution

![Age Distribution Chart]

Figure 4: Age distribution

Source: Primary data, July 2011

This chart shows that 38% farmers are between 41-50 years, 17% farmers are between 31-40 years, 14% farmers are between 20-30 years and 31% are above 52 years. The bulk of the respondents in the sample were between 41 and 50 years. This pattern is largely attributed to the proximity of Cyuve sector to Musanze town which could have resulted in the rural to urban migration especially among the youths (Crecente C, 1990) many of the youths migrate to seek for urban jobs in nearby Musanze town.
Figure 5: Marital status

Source: Primary data, July 2011

The marital status of farmers involved in Land Use Consolidation is depicted above. It is observed that 9.4% are single, 75% are married, 14.1% are widowed, and 1.6% are separated. In the area of study, the majority of farmers are married.

Table 1: Household size

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household size</td>
<td>2.00</td>
<td>11.00</td>
<td>5.4063</td>
</tr>
</tbody>
</table>

Source: Primary data, July 2011

In the context of this research, a household was conceptualized as the number of people living together in the same house, sharing the same meals over at least one year (Frankenberg, 1992). The table above shows that the minimum household size is 2 persons and maximum is 11 persons and the average is 5.0. This result is consistent with the national average of 5
people per household. Many rural people don't use family planning because of lack of appropriate training and cultural factors.

4.1.5 Training status of farmers

Table 2: Access to training

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trained</td>
<td>21</td>
<td>32.8</td>
</tr>
<tr>
<td>not trained</td>
<td>43</td>
<td>67.2</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, July 2011

The table above indicates that the majority (67.2 %) of the rural farmers in Buruba were not trained. This tends to limit their ability to take advantage of economic and labor market opportunities (Lemnand Z, 2002). Lack of relevant training in agriculture has been shown to be a handicap in agriculture in Rwanda (MINAGRI, 2004). Few farmers were trained (32.8 %) and they got their training from Urugaga Imbaraga which is strategically stationed near Cyuve Sector.

4.2 Farmers' knowledge toward land use consolidation

It was necessary to assess farmers' knowledge toward the government's land use consolidation strategy.

4.2.1 Awareness about land use consolidation

Table 3: Farmers' awareness about Land Use Consolidation

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>63</td>
<td>98.4</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, July 2011

Virtually all the farmers are aware about Land Use Consolidation (98.4 %) and 1.6 % is not aware. Agriculture is now a major concern for the government of Rwanda and land use
consolidation is one of the strategies used to boost food security, incomes and fight against poverty (MINAGRI, 2004). These results underscore the role of local districts in raising awareness about the strategic importance of land use consolidation among rural farmers. In Cyuve sector, the minimum amount of land contributed by each farmer is 0.80 ares while the maximum is 1300 ares. This finding is connected with the issues of Rwanda related to land where landholdings are very small with more than 25 per cent of households cultivating less than 0.2 ha (GoR, 2007). This emanates from high population pressure on a small land area. Moreover, cultural and inheritance patterns of dividing land among sons has also aggravated the situation (GoR, 2007).

4.2.2 Starting of land use consolidation

![Graph showing the year of starting land use consolidation](image)

**Figure 6: Year of starting Land Use Consolidation**

Source: Primary data, July 2011

The land use consolidation program commenced in the 2007/08 cropping season in Cyuve sector and after sensitization, farmers voluntarily join the program. Figure 6 demonstrates that many farmers joined the program in 2009 and 2010.
4.2.3 Conceptualization of Land Use Consolidation

Table 3: Conceptualization of Land Use Consolidation by farmers

<table>
<thead>
<tr>
<th>Land consolidation means</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>putting land plots together</td>
<td>64</td>
<td>100.0</td>
</tr>
<tr>
<td>Land consolidation means to grow one crop</td>
<td>60</td>
<td>93.8</td>
</tr>
</tbody>
</table>

Source: Primary data, July 2011

The table above shows the meaning of the land use consolidation according to the farmers. All farmers defined the land use consolidation as putting land plots together and 93.8% define the land use consolidation as to grow one crop. Those definitions are not different from the definition given by MINAGRI (2004) where the land use consolidation is a type of land reform which aims to give each farmer one relatively large plot of land rather than scattered, small parcels of land also aims in increasing productivity of agriculture.

4.2.4. Perceptions toward Land Use Consolidation

All farmers have positive perception towards land use consolidation; due to increasing production, improvement of security from pilferage group managements of pests and diseases and improved market access. This finding is consistent with the global objective of agricultural policy of creating conditions favourable to sustainable development and promotion of agricultural in order to ensure food security, integration of agriculture in a market-oriented economy and to generate increasing incomes to the producers. (MINAGRI, 2004).
4.3 Objective number one: To assess the crops grown before and after land use consolidation

4.3.1 Crops grown before involvement in Land Use Consolidation

![Bar Chart: Crops grown before involvement in Land Use Consolidation](image)

**Figure 7: Crops grown before involvement in Land Use Consolidation**

Source: Primary data, July 2011

This chart above shows that the farmers who grow maize are 49, the farmers who grow beans are 61, the farmers who grow wheat are 1, the farmers who grow bananas are 7 the farmers who grow Irish potatoes are 17 and the farmers who grow sorghum are 47. This finding is not different from multi crops practice characterizing agriculture in Rwanda (MINAGRI, 2004).
The regional specialization will allow producers to take advantages of agro-bio-climatic condition in various ecological zones to maximize production (MINAGRI, 2004). In this context, the chart above shows that in Cyuve sector 42% of farmers cultivate maize, 32% of farmers cultivate beans and 26% of farmers cultivate Irish potatoes. This implies that in Cyuve sector the farmers cultivate three crops: maize, Irish potatoes and beans under land use consolidation: due to their potential production. It is because of strategic importance of aforementioned crops to the achievement of household food security.
4.4 Objective number two: To determine the yield and profitability of crops grown before and after land use consolidation

Table 4: Yield and profitability of crops before land use consolidation

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops yield kg per are</td>
<td>0.35</td>
<td>187.50</td>
<td>22.7208</td>
</tr>
<tr>
<td>Crops gross income per are</td>
<td>35</td>
<td>1875</td>
<td>2185.1193</td>
</tr>
<tr>
<td>Crops labor cost per are</td>
<td>25.60</td>
<td>5600</td>
<td>915.8818</td>
</tr>
<tr>
<td>Crops fertilizer cost</td>
<td>20</td>
<td>5000</td>
<td>447.1026</td>
</tr>
<tr>
<td>Crops land cost per are before</td>
<td>12.50</td>
<td>9375</td>
<td>1516.7179</td>
</tr>
<tr>
<td>Crops seed cost per are</td>
<td>1</td>
<td>625</td>
<td>50.2610</td>
</tr>
<tr>
<td>Crops gross margin per are</td>
<td>-5755.56</td>
<td>3050</td>
<td>-538.7676</td>
</tr>
</tbody>
</table>

Source: Primary data, July 2011

The table above shows that in Cuvve sector the farmers experienced losses as explained by crops gross margin (-538.7676). This loss was due to low utilization of fertilizers and use of seeds which are not selected. This is attributed to high price of chemicals fertilizers, low level farmer’s knowledge how to use the chemicals fertilizers properly (MINAGRI, 2004).
Table 5: Yield and profitability of crops after land use consolidation

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average crops yield kg per are</td>
<td>0.80</td>
<td>375</td>
<td>51.1011</td>
</tr>
<tr>
<td>Crops gross income per are</td>
<td>280</td>
<td>112500</td>
<td>16783.10</td>
</tr>
<tr>
<td>Crops labor cost per are</td>
<td>80</td>
<td>20563.33</td>
<td>3452.3728</td>
</tr>
<tr>
<td>Crops fertilizer cost</td>
<td>16.60</td>
<td>10387.50</td>
<td>1481.7994</td>
</tr>
<tr>
<td>Crops land cost per are</td>
<td>25</td>
<td>18750</td>
<td>3074.2688</td>
</tr>
<tr>
<td>Crops seed cost per are</td>
<td>1.60</td>
<td>1500</td>
<td>125.2697</td>
</tr>
<tr>
<td>Crops gross margin per are</td>
<td>8649.3932</td>
<td>68500</td>
<td>8649.3932</td>
</tr>
</tbody>
</table>

Source: Primary data, July 2011

Summer crops are profitable on the basis of returns to investment (Idris, 1992). Crops gross margin per hectare after Land use consolidation is 8649.3932 Rwfs. This shows that the crops yield after land use consolidation increased considerably compared to the situation before land use consolidation. This implies that in Cuyuve sector, to cultivate crops is profitable because the crops gross margin is positive due to utilization of fertilizers, utilization of selected seeds and access to the market. This is the result of objective of National Agriculture Policy of Rwanda to transform agriculture (MINAGRI, 2004).

**Market of crops output produced under land use consolidation**

All farmers have sold part of crops output to RADA. This finding responds to objective of National Agricultural Policy of Rwanda which highlights that the development of market provides adequate motivation to increase production and revenues to the producers. This is achieved through marketing, strengthening of production capacities, and development of market, transportation and communication infrastructures in rural areas (MINAGRI, 2004).
4.5 Objective Number three:

4.5.1 Challenges associated with implementation of land use consolidation

Table 6: Marketing challenges associated with implementation of land use consolidation

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay in payment</td>
<td>60</td>
<td>93.8</td>
</tr>
<tr>
<td>Transport</td>
<td>4</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Source: Primary data, July 2011

The table above shows that 93.8% of farmers faced the challenges of delay in payment. This becomes an obstacle of their agricultural activities. For instance, the farmers miss the money to pay for example labors, seeds, hiring the land in order to expand their activities.
4.6. Objective number four: To evaluate the extent and measures used to train farmers on land use consolidation for socio-economic development

4.6.1 Access to training after land use consolidation

Table 7: Characterization of trainers

<table>
<thead>
<tr>
<th>Trainers</th>
<th>Types</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urugaga</td>
<td>Training related to land use consolidation</td>
<td>14</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>Agronomic practices in Irish potatoes</td>
<td>15</td>
<td>23.4</td>
</tr>
<tr>
<td></td>
<td>Trained in basic farm management</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>IAM</td>
<td>Training related to land use consolidation</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Agronomic practices in Irish potatoes</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>Trained in basic farm management</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>PACINEVA</td>
<td>Training related to land use consolidation</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Agronomic practices in Irish potatoes</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Trained in basic farm management</td>
<td>.00</td>
<td>.00</td>
</tr>
</tbody>
</table>

Source: Primary data, July 2011

Concerning providers of training, it was found that 21.9% of farmers have been trained in Land Use Consolidation, 23.9% in Agronomic practices of Irish potatoes, 3.1% trained in basic farm management trained by Imbaraga. This is facilitated by the proximity to Cyuve Sector. 3.1% of farmers have been trained by IAM in Agronomic practices of Irish potatoes and PACINEVA trained 1.6% in Agronomic practices in Irish potatoes. Those providers work in collaboration with Imbaraga but their participation still at low level. Lack of relevant
training in agriculture is a handicap in agriculture in Rwanda (MINAGRI, 2004). This implies that in Cyuve sector there are few farmers trained in training related to land use consolidation, agronomic practices in Irish potatoes and very few in basic farm management.

4.6.2. The trainings required by farmers

![Suggested training areas required by farmers](image)

**Figure 9: Suggested training areas required by farmers**

Source: Primary data, July 2011

The chart above shows that the proportion of farmers (56%) suggested more training in local seed production. This is very important because it will provide the farmers the ability to produce their seeds and 44% suggested more training on livestock production. That finding is consistent with the national agricultural policy that emphasis the creation of condition favourable to sustainable development and promotion of agricultural and livestock produces ensure national food security, integration of agriculture and livestock in a market-oriented economy and to generate increasing incomes to the producers (MINAGRI, 2004).
Table 8: Challenges related to implementation of land use consolidation

<table>
<thead>
<tr>
<th>Source: Primary data, July 2011</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>very high</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>High</td>
<td>16</td>
<td>25.0</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>26</td>
<td>40.6</td>
</tr>
<tr>
<td>Low</td>
<td>11</td>
<td>17.2</td>
</tr>
<tr>
<td>Very low</td>
<td>8</td>
<td>12.5</td>
</tr>
<tr>
<td>Lack of knowledge about LUC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>very high</td>
<td>28</td>
<td>43.8</td>
</tr>
<tr>
<td>High</td>
<td>10</td>
<td>15.6</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>15</td>
<td>23.4</td>
</tr>
<tr>
<td>Low</td>
<td>9</td>
<td>14.1</td>
</tr>
<tr>
<td>Very low</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Lack of knowledge of using fertilizer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>very high</td>
<td>10</td>
<td>15.6</td>
</tr>
<tr>
<td>High</td>
<td>8</td>
<td>12.5</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>29</td>
<td>45.3</td>
</tr>
<tr>
<td>Low</td>
<td>8</td>
<td>12.5</td>
</tr>
<tr>
<td>Very low</td>
<td>9</td>
<td>14.1</td>
</tr>
<tr>
<td>Resistant to change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>very high</td>
<td>34</td>
<td>53.1</td>
</tr>
<tr>
<td>High</td>
<td>10</td>
<td>15.6</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>Low</td>
<td>7</td>
<td>10.9</td>
</tr>
<tr>
<td>Very low</td>
<td>10</td>
<td>15.6</td>
</tr>
<tr>
<td>Lack of markets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>very high</td>
<td>5</td>
<td>7.8</td>
</tr>
<tr>
<td>High</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Very low</td>
<td>53</td>
<td>82.8</td>
</tr>
<tr>
<td>Lack of seeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>very high</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>High</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>7</td>
<td>10.9</td>
</tr>
<tr>
<td>Low</td>
<td>15</td>
<td>23.4</td>
</tr>
<tr>
<td>Very low</td>
<td>40</td>
<td>62.5</td>
</tr>
</tbody>
</table>
The table above shows the different challenges that the farmers met with, during the implementation of land use consolidation. According to the result above, the farmers who met the challenge of small land are 4.7% and this is convergent to smallness of farms (MINAGRI, 2004). 43.8% farmers met with the challenge of lack of knowledge about land use consolidation because it is a new program while 15.6% farmers indicated lack of knowledge of using fertilizer. This is the reality of Rwanda where the farmers have low level knowledge how to use the chemicals fertilizers properly (MINAGRI, 2004). Concerning the results above the most important challenge of land use consolidation is traditional farming (53.1%).

4.7 Hypothesis tests

Table 9: Hypothesis tests

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pair 1:</strong> Crop yield before Land Use Consolidation per are</td>
<td>22.9227 kgs</td>
</tr>
<tr>
<td></td>
<td>51.1010 kgs</td>
</tr>
<tr>
<td>Crop yield after Land Use Consolidation per are</td>
<td></td>
</tr>
<tr>
<td><strong>Pair 2:</strong> Crop gross margin per are before land use consolidation</td>
<td>-538.7676 Rfws</td>
</tr>
<tr>
<td>Crop gross margin per are after land use consolidation</td>
<td>9827.4712 Rfws</td>
</tr>
</tbody>
</table>
The mean of crops yield per are was calculated by the value production (output) divided the size of land. Crop margin gross is determined by gross income less variable cost which includes organic and inorganic fertilizer, labor (including family members, relatives, and hired workers), and land rent. The results obtained are shown in the table above. It is observed that gross margin per are increased than without land use consolidation.

H₁: there is difference in the crops yield of farmers before and after the implementation of Land Use Consolidation.

H₀: There is no difference in the crops yield of farmers before and after the implementation of Land Use Consolidation;

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval of the Difference</th>
<th>Lower</th>
<th>Upper</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 2 mzygmaaf - mzygmaraf</td>
<td>-10366.2</td>
<td>11916.15747</td>
<td>1860.991</td>
<td>-14127.4 -6605.04</td>
<td>-5.570</td>
<td>40</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table above shows that crops yield and crops gross margin per are before and after land use consolidation are -28.1783 and -10366.2 respectively. It also shows that crops yield per are and crops gross margin per are before and after land use consolidation the lower value are -35.44500, -14127.4 and the upper values are -20.91171, -6605.04 at 95 % confidence interval of the difference. The p-value crops yield before-crops yield after and crops gross margin per are before-crops gross margin per are after is 0.001.

Since the p-value is less than 0.05, we reject null hypothesis, we conclude that there is statistically significant difference between the crops yield before and after Land Use Consolidation. Furthermore, crops gross margin per are before and after land use consolidation is statistically different (p < 0.05).

Table 10: Test Statistics (a)

<table>
<thead>
<tr>
<th>N</th>
<th>64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
<td>138.653</td>
</tr>
<tr>
<td>Degree of freedom</td>
<td>5</td>
</tr>
<tr>
<td>Asymptotic significance</td>
<td>.000</td>
</tr>
</tbody>
</table>

Source: Friedman Test
Lack of knowledge about Land Use Consolidation and resistant to change have the lowest value then, we conclude that lack of knowledge about land use consolidation and resistant to change are statistically significant as the most important challenges that farmers faced during the implementation of land use consolidation.
CHAPTER FIVE
DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.0. Introduction
This chapter presents the brief discussion of results by relating them to the problems of research and settled objectives. It gives also recommendations to some important stakeholders interested in the domain of study especially to the government of Rwanda, local administration and farmers.

5.1. Discussion

Objective one: To assess the crops grown before and after land use consolidation

The results of the research show that before land use consolidation the farmers who grow maize are 49, the farmers who grow beans are 61, the farmers who grow wheat are 1, the farmers who grow bananas are 7 the farmers who grow Irish potatoes are 17 and the farmers who grow sorghum are 47. This finding is not different from multi crops practice characterizing ancient agriculture.

The results of research show that after land use consolidation in Cyuve sector 42 % of farmers cultivate maize, 32 % of farmers cultivate beans and 26 % of farmers cultivate Irish potatoes. This implies that in Cyuve sector the farmers cultivate three crops: maize, Irish potatoes and beans under land use consolidation: due to their potential production. It is because of strategic importance of aforementioned crops to the achievement of household food security. Some of farmers were not happy that they were not allowed to grow sorghum, banana and wheat. The local administration observed that before when people used to grow beans, Irish potatoes, sorghum, banana and wheat all together in the same plot of land it didn’t help them much and some failed to get what to eat and would go to Uganda or neighboring sectors to find the other means of living.

Objective Two: To determine the yield and profitability of crops grown before and after land use consolidation

The analysis confirmed that after land use consolidation the farmers obtained high yield and profit. There was statistically difference between the yield before and after land use consolidation. Despite the fact that some types of crops set for selection to be used in some
approaches in agriculture to give the farmers the opportunity to try and discover the difference between traditional and improved practices, hence facilitating the adoption of new techniques.

5.2. Conclusion

Agriculture is recognized in the EDPRS as one of the priority sectors that will both stimulate economic expansion and make the greatest contribution to poverty reduction and food security, land use consolidation is one of the strategies settled down to increase the agriculture sector and to improve the livelihood of Rwandans. The results of this study revealed that land use consolidation policy is improving the livelihood of rural farmers. It has increased agricultural yields, protected smallholder's land rights and improved the livelihoods of rural Rwandan farmers. It has also promoted efficient and sustainable use of land resources, promoted their equitable distribution and at the same time recognized the importance of agriculture to the subsistence needs of the rural population. In addition, it has increased opportunities for and benefits derived from private investment in the agricultural sector, as well as employment opportunities.

In regard of the above mentioned points this research has set some recommendations:

5.3. Recommendations

The findings in the present study led to address recommendations the government of Rwanda, local leaders, private agencies, farmers:

- The government of Rwanda and other partners in agriculture should increase the number and the quality of training of farmers in modern agriculture
- The government of Rwanda and other partners in agriculture should invest more money in building communication infrastructures in rural areas.
- Local authorities should avail enough selected seeds that can provide great yield according to specific areas
- Farmers should abandon the former habit of mixing many crops on a small plot of land and adopt the new strategy of growing one crop on a relatively large plot of land

5.4 Areas of further research

The scope of the study was limited by time, space, objectives and research questions. In additional the researcher does not pretend to have been exhaustive in his research. That is why he suggests further research to complement the present study. Therefore, it is suggested a national research covering the whole country be undertaken on:
• Factors affecting the land use consolidation implementation in Rwanda
• Perception and attitude of community members towards the implementation of Land Use Consolidation
REFERENCES


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Herman, M (2001). *Land and poverty in Rwanda*, Orinfor, Kigali


**Reports**


APPENDICES

Appendix 1: Informed Consent Form

KAMPALA INTERNATIONAL UNIVERSITY FACULTY OF BUSINESS AND MANAGEMENT

I am MAFARANGA KIZITO and invite you to participate in the study on Land Use Consolidation and Socio Economic Livelihoods of Rural Farmers: Case Of Cyuve Sector, Musanze District, Rwanda.

The objective of this study is to find out the contribution of land use consolidation toward improving the socio-economic livelihoods of farmers in Rwanda. By participating in this study, you will help to increase our understanding of the above problem in other words to improve on the socio-economic livelihoods of farmers in Rwanda.

We are going to ask you for information about land use consolidation and socio-economic livelihoods of rural farmers as well as background characteristics and/or conduct an investigation/take a specimen (specify) for examination. Should you agree to take part in this study, there is a chance that we might contact you again to re-interview you or follow up on the procedure. The information/specimen that provide during the study will be kept confidential. Only the Researchers and assistants will have access to them.

Your participation in this study is voluntary and you have the right to refuse to participate or answer any question that feel uncomfortable with. If you change your mind about participating during the course of the study. You have the right to withdraw at any time. The decision to withdraw will not affect you in any way.

If there is anything that is unclear or you need further information. We shall be delighted to provide it.

Declaration of the Volunteer

I have understood the purpose of the study. I realise that I might be contacted again if need be. I have read the above information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a subject in this study and understand that I have the right to withdraw from the study at any time without in any way affecting me.

........................................
Name/Signature of Volunteer

Parent/Guardian

Date: ......................................

........................................
Name/Signature of Investigator

Contact Tel 0788531450

Date: 9th November 2011
Appendix 2: Research Questionnaire for farmers

My name is MAFARANGA Kizito and I am a fifth year student masters of arts in Public Administration and Management in Kampala International University (KIU). I am carrying out a study on the impact of land use consolidation to the livelihoods of rural farmers. I assume you that data for the research will be kept private and confidential.

Instruction: you put ✓ in the box and make comments where is necessary.

Section 1: Household Demographic data

Cell......................................................

Gender: 1. male □ 2. Female □

Age ......................................................

-marital status: married ..............................................................

-Single..............................................................................

-Divorced...........................................................................

-Widowed............................................................................

-Separated...........................................................................

What is the size of your household..........................

Who is the head of household; 1: male headed □ 2. female headed □ children below 18 years □ 4. child □

-Educational level: ......................................................

-Never attended ..........................................................

-Vocational training ......................................................

-Primary education ......................................................

-Secondary education ......................................................

-Farmers training status:

-Trained............................................................................

-Not trained........................................................................

Section 2: The Land use consolidation

1. Have you ever heard about land use consolidation? 1. Yes □ 2. no □
2. In your understanding, what is land use consolidation?

3. When did you start to be involved in land use consolidation?

4. Please indicate the size of consolidated land.

Section 3 crops grown before and after Land Use Consolidation

3.1 Indicate the crops that you grew before your involvement in Land Use Consolidation.

Maize ☐; beans ☐; wheat ☐; bananas ☐; Irish potatoes ☐; sorghum ☐

3.2 Please, indicate the crops grown after land use consolidation.

Maize ☐; beans ☐; Irish potatoes ☐

3.3 Fill in the following information

<table>
<thead>
<tr>
<th>Crop</th>
<th>Before land use consolidation</th>
<th>After land use consolidation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crops output in kg</td>
<td>Quantity in kg</td>
</tr>
<tr>
<td></td>
<td>In put used</td>
<td>Quantity in kg</td>
</tr>
<tr>
<td></td>
<td>labour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>fertilizers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>seeds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>land</td>
<td></td>
</tr>
<tr>
<td></td>
<td>transport</td>
<td></td>
</tr>
<tr>
<td></td>
<td>other specify</td>
<td></td>
</tr>
</tbody>
</table>
3.4 Market information and extension

3.4.1 Do you market your crops after land use consolidation? 1. Yes [ ] 2. No [ ]

3.4.2 If yes, where do you sell your crops?

3.4.3 What problem, if any, are faced in the marketing of output

4. Access to extension after land use consolidation

4.1 Have you receive any training related to Land Use Consolidation? 1. Yes [ ] 2. No [ ]

4.2 If yes, what kind of training has been received?

4.3 Fill in the following information

<table>
<thead>
<tr>
<th>Source of training</th>
<th>frequency of training</th>
<th>type training received</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4 what new training is required, if any?

5 Attitudes and perception
5.1 do you think that Land Use Consolidation is an important tool for improving food security
    no 1  Yes 2
    If yes/no, support your answer

5.2 What suggestion do you think can be implemented to improve Land Use Consolidation?
5.3 problems faced in Land Use Consolidation
<table>
<thead>
<tr>
<th></th>
<th>very high</th>
<th>high</th>
<th>satisfactory</th>
<th>low</th>
<th>very low</th>
</tr>
</thead>
<tbody>
<tr>
<td>small land fragmented</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lack of knowledge about land use consolidation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lack of knowledge of using fertilizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>resistant to traditional farming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of market</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other (specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thanks a lot for your time.
Appendix 3: Administrative map of Musanze District