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The Impact of Agricultural Extension Services Delivery on Farmer Livelihood Empowerment in Rwanda; Evidence from the Land Use Consolidation Policy (Crop Intensification Programme) Case Study Muhoza Sector Musanze District

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Abstract:
It is now over eight years since the LUC-CIP programme was set up by the ministry of agriculture. Among its key principles is farmer empowerment. Therefore, this study intends to assess the extent to which the delivery of agricultural extension services under the LUC-CIP programme has empowered the farmers. However, in order to achieve this, it is imperative to establish how extension services are delivered in the study area and also identify other farmer empowerment programmes being or ever implemented in the study area so as to control possible confounders. Using a sample of 135 respondents that have been drawn from 14 villages (Imudugudu) out of 46 that make up Muhoza sector , the researcher have assessed the empowerment levels of both farmers who are participating in the LUC-CIP programme, and those who are not. In order to get a representative sample, a disproportionate stratified random sampling technique has been used in the selection of both the villages and respondents.
A researcher administered questionnaire has been used to collect data from farmers while an interview guide has been used to collect data from the key informants and an observation checklist to get information regarding farming practices of farmers. data have been analyzed using SPSS ,Descriptive statistics, Chi-square and regression analysis the study revealed that the majority of the farmers who were participating in the CIP programme were performing better than their counterparts on several indicators of empowerment, implying that the delivery of agricultural extension services under the CIP programme has been instrumental in the empowerment of farmers. It was further revealed that some farmers who were not participating in the CIP programme were also empowered in some areas as a result of programmes like liberalization of the economy, UPE and USE, civic education programmes some relative prominence. It was concluded that while the delivery of agricultural extension services under the CIP programme has been paramount in the empowerment of farmers, some others factors can never be negated.
From all the above, the researcher recommends that periodic programme review not only in Muhoza sector, but also other areas in RWANDA should be done, and that the programme implementation should put practical emphasis on gender issues in order to ensure that the programme empowers both male and female farmers equitably. This study, if anything, has shown that the link from reducing food losses and/or waste to food security and welfare for producers and consumers is not as straightforward as the literature seems to suggest using standard economic theory. Many factors are shown to play a role, which should be taken on board by further applied research to investigate broader societal impacts. This would greatly improve the information base for policy making, which is currently being driven by mere considerations of the size of food losses and waste, not their impacts on society, and in turn focuses too much on addressing the size of the problem, thereby often ignoring the underlying causes. It would allow for better targeted policies and resources being devoted to areas where impacts are shown to be most beneficial.

Keywords: *Empowerment, agricultural extension, crop intensification programe and land use consolidation policy*

1. General Introduction

1.0. Introduction

This study assesses the impact of agricultural extension service delivery under the LUC-CIP programme on the empowerment of farmers in Muhoza sector, Musanze District. This chapter places emphasis on the study background, statement of the problem, study objectives and research questions, the scope of the study, significance of the study and its justification, the conceptual frame work as well as the definition of key concepts.

1.1. Background of the Study

Agriculture forms the backbone of most economies worldwide but more especially in Sub- Saharan Africa where it contributes over 70% of GDP besides being the major source of livelihoods in terms of food and employment to over 80% of the population in the region (Meijerink and Roza, 2007). Subsistence agriculture dominates in most of the countries although in the recent past governments and non-governmental organizations have labored to commercialize the sector (Jorge, 2004).

However, the powerlessness of farmers to influence the agricultural development processes and consequently the outcomes has been detrimental and has stagnated the process (Jorge, 2004). In view of this, a number of interventions have been designed and implemented with the purpose of empowering farmers to gain control and influence the direction of agricultural development. Notable ones include; increased farmer-centred investment in the agricultural sector, liberalization of most world economies, and encouragement of the farmer group formation as well as decentralized agricultural extension services (World bank, 1994).

As such, the need to strengthen farmers' organizations and farmer empowerment, especially smallholder and women farmers to take charge of and drive the agricultural productivity agenda has been widely recognized in recent years, especially in relation to challenges of increased agricultural productivity and achievement of the Millennium Development Goals (MGDs) (Zziwa, 2009). It stems from this that farmer empowerment has been an integral component of the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA).

In Rwanda, farmer empowerment has also been highly recognized and as such it is a primary principle of the CIP programme. Since its inception in 2007, the CIP programme has been committed to empowering the beneficiaries to enable them take charge of their development agenda. Through its implementation strategy, farmers have been encouraged to form groups in order to effectively and efficiently access agricultural extension services.

The CIP programme, within the multi-dimensional policy framework of Plan for Modernisation of Agriculture (PMA) aims at overcoming some of the key factors undermining agricultural productivity, namely: poor husbandry, low use of improved inputs, limited access to technical advice, poor access to credit and marketing infrastructures which perpetuate the farmers' powerlessness (CIP Master Document, 2000).

As Boserup (1970) notes, the economic power determines all other forms of power and as such once people are empowered economically, this will automatically promote their empowerment in other spheres of life. Related to this assertion, the CIP programme was introduced with the primary objective of sustainably enhancing rural livelihoods by increasing agricultural productivity and profitability hence farmers' empowerment.

In Musanze district the programme was introduced in the government's fiscal year of 2003/2004 and particularly for Muhoza Sector (Sub-county) it was rolled over in the 2007/2008 fiscal year. Although it started with a few farmers, available records from the sub-county coordination office show that 67% of the farmers are currently benefiting from the programme. In respect to the programme implementation guidelines of 2010, farmers are organized in groups and institutions right from the local council one (L.C.1) up to the district for purposes of effectively and efficiently demanding, controlling and accessing agricultural extension services.

In fulfillment of this goal, the programme supports provision of a wide range agricultural advisory services that entail advice, information and knowledge to the primary target group who are the farmers, within their registered institutions. This is intended to enable them make informed decisions and manage their farming enterprises better so that they may achieve increased output per unit resource and profits. Such advice, information and knowledge consist of technical know-how to use improved technologies, methods and approaches to improve quantity, quality, and value of their agricultural produce. The know-how is also related to record keeping, business management of their farming enterprises, and marketing of their produce.

The agricultural advisory services provided, therefore, are intended to empower farmers by building their capacity to overcome the key challenges that undermine agricultural productivity and profitability, specifically at the farm, which is the primary source of production.

1.2. Problem Statement

The adoption of recommended agricultural practices as well as technologies has remained an insurmountable challenge among the majority of small holder farmers, despite the 8-year period of CIP existence and increased attention the government and other development partners have put on the programme.

According to the CIP implementation strategy, the farmer-led institutional structures are the entry points for CIP services, and they have an upper hand in managing the whole delivery of the agricultural extension services under the programme. In spite of this, surprisingly, many cases of non-responsiveness of extension services to farmers' needs, low adoption rate of modern agricultural techniques by the farmers**,** poor farmer participation, particularly in needs identification and priority setting, supply of sub-standard technology inputs, much less contact of farmers with the extension agents, a low extension staff to farmer ratio as well as lack of requisite skills by the extension and have been reported in national-level workshops, media and study reports This raises questions on

the relevance, efficiency and effectiveness of the extension services provided under the CIP programme with respect to addressing the real needs of the farming community. This state of affairs painfully slows down almost all the agricultural modernization efforts, heavily invested in by the government and development partners, yet the philosophical underpinning of the CIP is all-round farmer empowerment for sustainable improvement in farmers' quality of life.

This, therefore, warranted this study to investigate how the agricultural extension services delivered under the CIP programme have empowered the farmers to better their farm enterprises and lives.

1.3. Objectives of the Study

1.3.1. General Objective

To establish the impact of the agricultural extension service delivery under the CIP programme on the livelihood empowerment of the beneficiaries in Muhoza Sector, Musanze district.

1.3.2. Specific Objectives

1. To analyze the delivery strategies of agricultural extension services under the CIP programme in Muhoza Sector, Musanze district.
2. To find out how the delivery of agricultural extension services under the CIP programme in the study area has empowered the beneficiaries.
3. To examine the links between agriculture extension service delivery, livestock ownership, gender and food security and participation in markets by women in Muhoza sector.

1.4. Research Questions

1. How are agricultural extension services under the CIP programme delivered in Muhoza Sector, Musanze district?
2. To what extent has the delivery of the agricultural extension services in Muhoza Sector, Musanze district empowered the beneficiaries in the area?
3. What contribution does Agriculture extension service delivery make to women livelihood sustenance, livestock ,participation in market and food security in Muhoza sector?

1.5. Scope of the Study

1.5.1. Contextual Scope

In context, the study have been limited to analyzing how agricultural extension services under the CIP programme has empowered the beneficiaries. In order to vividly capture this, the delivery methods of agricultural extension services under the CIP programme and how they influence the farmers' access to resources and services to improve the quality of their lives have been assessed. However, in order to avoid possible confounders, it is imperative for the study to analyze the other empowerment strategies besides the agricultural extension services being implemented in the study area.

1.5.2. Geographical Scope

Geographically, the study intends to concentrate on Muhoza Sector,although some key informants have been picked from the district CIP coordination office since it is the overseer of the programme in the district.

1.5.3. Time Scope

The time under study stretches from 2007 to date since this is the time when the CIP programme was introduced in Rwanda. This is in relation to the CIP related documents that were reviewed during the Pre pilot study However, the review of documents on empowerment extended way back to 1980's which represents a period when participatory approaches in programme implementation gained popularity in development circles (Cohen and Uphoff, 1987).

2. Literature Review

2.0. Introduction

This chapter presents a review of the relevant secondary data from books, journal articles, government and NGO publications, news papers and internet sources. This is aimed at identifying the knowledge gaps which have been filled by the primary data. This review have been guided by the study objectives mentioned earlier in chapter one and have been used to compare and contrast both the secondary and primary data.

2.1. Conceptual Frame Work

In order to achieve the study objectives and answer the research questions, a systematic pattern of analysis has been adopted in order to vividly capture the relationship between the study variables. This framework is diagrammatically presented hereunder.

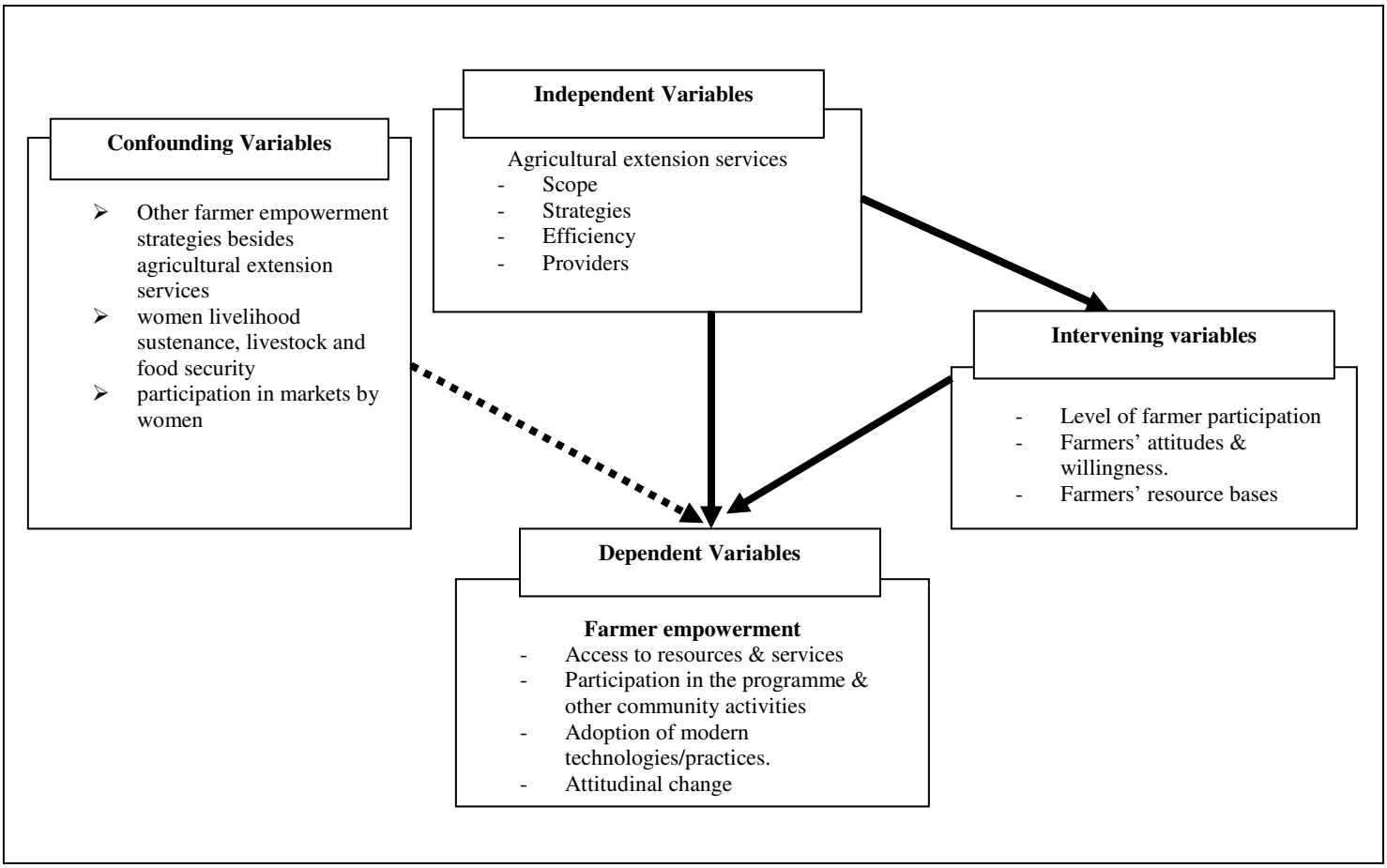

Figure 1

As seen in the diagram above, farmer empowerment (dependent variable) in terms of access to resources and services as well as participation in the CIP programme and other community activities depends on the scope, delivery strategies, efficiency and availability as well as competence of the providers of agricultural extension services. However, both the direct and indirect relationships between the two variables were hypothesized as depicted by the flow of arrows in the diagram above. This is influenced by the assertions of Zimmerman and Rappaport (1988) that the level of empowerment depends on the level of participation in the programme.

As Giddens (1984) notes, empowerment depends on several factors of which extension services are among and for this reason, it is imperative for the study to unearth other strategies other than agricultural extension services which are being implemented in the study area lest the study findings could be confounded by these factors.

2.2. Theories of Agricultural Extension

2.2.1. Agricultural Extension Service Delivery under CIP

The CIP programme is a Government of Rwanda Programme under the Ministry of Agriculture, Animal resources (MINAGRI). As a new approach to agricultural extension, it was put in place to increase the efficiency and effectiveness of agricultural extension service delivery. It is a semi-autonomous body formed under the CIP Act of June, 2006 with a mandate to develop a demand driven, client-oriented and farmer-led agricultural service delivery system targeting the poor subsistence farmers, with emphasis to women, youth and people with disabilities (MINAGRI, 2001). As seen in its vision, the CIP programme has at its helm the advancement of agricultural extension services which are geared towards farmer empowerment and prosperity.

According to the CIP Implementation Guidelines of 2010, the programme provides farmers with a wide range of advice; information and knowledge to enable them make decisions and manage their farming enterprises better so that they may achieve increased output per unit resource and profits. Such advice, information and knowledge consist of technical know-how to use improved technologies, methods and approaches to improve quantity, quality, and value of their agricultural produce. It also covers areas related to record keeping, business management of their farming enterprises, and marketing of their produce.

It is, therefore, vivid that the agricultural advisory services provided to farmers under the CIP programme are intended to empower farmers by giving them the capacity to overcome some of the key challenges that undermine their farming enterprises so that they may have sustainable food and income security for improved livelihoods.

However, the majority of the farmers are small-scale, resource-constrained operators who, as individuals, cannot easily have access and control over the structures and processes that are intended to transform their natural resource assets into outcomes that they desire.

As such the CIP programme encourages and supports the establishment of farmer-led institutions, for example, farmer groups; parish coordination committees; higher level farmers' organizations and village, sub-county, district and national farmer for a, so that they can control and gain access to advisory services and be able to make their voices heard in decision making processes, and, ultimately, determine, control and own their development agenda.

Farmers under the programme have been organized in institutions, popularly called farmer forum from the local council one up to the national level, and it is through their structures that they access extension and other programme services (Mugarura et al, 2007). Through a bottom-up participatory planning process, in a sub-county, workplans pertaining to farmers' identified problems and needs associated with the key farming enterprises for which agricultural advisory and technology development services are sought originate from the farmer interest groups within a village farmer forum; they are submitted to the sector coordination committee (PCC) for aggregation and, thereafter, workplans of the various PCCs get to the sub-county farmer forum (SFF) for evaluation and consideration with the support of the technical team made up of subject matter specialists from the district and the sector CIP Coordinator, the resultant product of which is a sector CIP workplan, that is recommended to the SFF for approval. The approved workplan is the basis for provision of services to the farmers by the professional service providers, who may be contracted on long or short-term basis. There is the sub-county procurement committee that awards contracts for the provision of the requested CIP services and goods (MINAGRI, 2007).

To extend the reach and coverage of the contracted service providers, farmers are identified from among the selected market-oriented and commercializing farmers among others, to be deployed as Community Based Facilitators (CBFs) to deepen provision of services to farmers (CIP Implementation Guidelines, 2010). The methodologies for provision of agricultural advisory services to farmers which may include among others farmer field schools (FFS) and participatory technology development should be designed to facilitate participatory learning.

Stemming from all the above, it is evident that there is a well-designed implementation strategy for the CIP programme, however, as Semana (2004) notes, it is imperative to note that the actual implementation of such a design is challenged by several factors which are context specific and this hinders the realization of the intended outcomes. Therefore, prior to this study, little was known about how specifically the CIP programme is actually being implemented in Muhoza Sector and how the implementation strategy has helped to empower the beneficiaries.

2.2.2. Empowerment of Beneficiaries Theory

Semana (1998) explains the understanding of extension concept as being based on three premises namely being educational, having a philosophy and scope with responsibilities. He adds that the educational element of extension is two fold: being informal and non-formal. The informal type of education is one that has no syllabus. Its syllabus is the farmers' problems and needs. It also has no classroom, as its classroom is the farmer's home or farm and, therefore, the teaching of the extension worker to the farmers is based on the farmers' conditions and setting.

The non-formal type of extension education on the other hand is planned, has written objectives and content, can be examined but in most cases it is not. This type of education is carried out through short courses of one or two days at community centres, sub-county headquarters or one to two weeks or one to two months at District Farm Institute which are sometimes called District Agricultural Training and Information Centres .

The author argues that looking at extension as being educational presupposes that doing extension work involves teaching and learning. This means that the extension worker like a teacher needs to prepare and rehearse before hand and teach well like a good teacher. The teaching should stimulate the farmer to learn and understand and on the other hand, the farmer as a learner should have interest and the willingness to learn.

Semana further asserts that the seriousness and thoroughness of the extension worker is governed by the second premise of the extension concept – the philosophy of extension. According to Semana, the philosophy concept states the extension worker has to start from where the people are, with what they have and help them to help themselves. This implies studying the farmers through visits and surveys in order to identify their level of farming knowledge, their communication skills, their attitudes, their socio-cultural system, way of life, problems and felt needs. The primary goal of all these is their empowerment (Zziwa, 2009).

In view of the CIP implementation strategy seen in the previous section, it is apparent that this is the same philosophy that is being followed, however, what was not explicitly clear prior to this study was how this philosophy has helped to empower the beneficiaries in muhoza sub-county in particular and Rwanda in general.

Other studies done in the different parts of the world strongly link community empowerment to extension services and worthy to mention here include; Mugarura et al (2007; Jorge, 2004; Dreier, 2006 and World bank, 1999). According to Mugarura et al, the effective and efficient delivery of agricultural extension services is vital in empowering both individuals and the communities. In their national survey on the impact of CIP, the researchers established that respondents from participating sub-counties in the CIP pragramme were more empowered than their counterparts, but only in a few areas like access to information and participation in community activities. However, this could not be taken as gospel truth since in surveys, because of bigger sample size, they tend to under score detailedness more especially from a qualitative view point. It was against this background that this study was thought to be timely and well-intentioned as it used a different design from the one used by Mugarura and colleagues.

According to Nikkhah (2009) extension service delivery is potentially important in the empowerment process of both the individual and the community, but added that the delivery process has to be participatory in nature if this is to materialize. The author discusses participation from two view points; participation as a means, and participation as an end, and argues that it is latter which brings about a higher degree of empowerment.

This linkage between participation and empowerment has also featured in the work of several other authors like; Rakodi (1991); Friedmann (1996); Lyons, Smuts et al. 2001 and Abott (1996) who in agreement with Nikkhah posit that it is when the beneficiaries have been given a meaningful platform to participate in all the processes of a programme that they will be empowered. Abott goes on to argue that real empowerment will only be achieved if service delivery systems use bottom-up approaches.

Another source of evidence linking participation to empowerment is found in the work of Rappaport (1987); Zimmerman and Rappaport (1988) only that for them they look at participation as an indicator of empowerment. Although the authors do not categorise participation, their argument is in a way consistent with Nikkhah (2009) at a point where she looks at participation as both a means and an end. No matter the type, what is apparent is that participation and empowerment go hand in hand, and this can probably explain why the two concepts have gained popularity in development circles more especially in the projects funded by the World bank (World bank, 1999).

From the analysis of the CIP implementation strategy, it is made explicitly clear that the principle of participation are highly cherished and adhered to as seen in the farmer fora arrangement. However, as Jules and Röling (2006) argue, participation, if it is to become part of extension, must clearly be interactive and empowering. Any pretence to participation will result in little change. Allowing farmers just to come to meetings or letting a few representatives sit on committees is insufficient in empowering the farmers.

In view of all the above, what was not clear prior to this study was the nature of participation that is being followed in the CIP programme and the extent to which it has empowered the beneficiaries. Owing to this knowledge gap, this study was very necessary.

2.2.3. Land Use Consolidation Policy Theory

There are studies that were carried out much before the Land Policy and Land Law were passed in 2004. Most of these were on agricultural production, intensification and land use in Rwanda in the 1908s through 1990s. They all pointed to a growing pressure exerted on agriculture by a growing population under limited productivity enhancing techniques. Rwandans situation was variously referred to as a Neo Malthusian Trap, a defiance of the Boserup Hypothesis and a case of environmental stress (Reitsma 1981, Waller 1990, World Bank 1992, Clay, Byiringiro, Kangasniemi, Reardon, Sibomana and Uwamariya 1995, Clay 1998, Kelly, Mpyisi, Shingiro and Nyarwaya 2001, Musahara 2004).A number of these had pointed out the need for land reform.

In early 2000s the debate on land reform had taken pace and by 2003 draft policies on land policy and law had started circulating (MINITERE 2003). It had then become clear that land use, crop intensification, matters and villagization would be linked. In 2000 drafts of Vision 2020 had been produced and were published in 2002(GoR 2002a). The paper was about a strategy to transform Rwanda into a middle income country by 2020 with a clear implication to land use and agriculture. The Poverty Reduction Strategy to run for three years was enacted in 2002 and referred to land reform and consolidation (GoR 2002b). These papers and drafts also ushered in a set of new papers debating the prospective approach (Musahara and Huggins 2004, RISD LandNet 2000). For instance the PRSP states that households will be „encouraged"; and the policy states that, "one need to carry out the regrouping of plots". MINITERE personnel suggested that land consolidation will be focused on encouraging increased production, through formation of adjacent plots with similar crops. According to policy-makers, this means that, "nobody will lose their plot". Farmers will be encouraged to adopt cash crops including tea, coffee, flower, and rice, in large mono-cropped areas, but each person will have the possibility to register his/her plot separately (GoR 2004). Even much earlier the voices of skepticism on villagisation and land consolidation had started to appear. Blarel (1992) mentioned earlier had argued even much earlier that land consolidation was unlikely to increase land productivity significantly.

Other issues on consolidation before it was implemented relate to mono cropping and methods of implementation. The question was what would be offered as safety net when emphasis was shifted to mono – cropping (Liversage 2003) land consolidation would be implemented through cooperatives and associations. The question was on how strong were the cooperatives to oversee the implementation of land consolidation.

The current study is different as it is an *ex poste* look into what has happened after the LUC has taken place. It is not based on narrative debates from documentary analysis only but will be based on collected data.. The current study will assist in informing current debates that seem to have been influenced by earlier predictive studies but without actual and quality data.

Ultimately land policy was passed in 2004 and law in 2005. It is clear that both the policy and law were concerned with the enduring land and agricultural problems that Rwanda was facing and that originate from the narrative provided in previous sections (GoR 2004). These were as follows;

i. strong pressure on limited land resources by a rapidly growing population
ii. land tenure system dominated by customary laws that favoured land fragmentation reducing the size of family farms below the threshold of economically viable family holdings
iii. excessive parceling had reached a critical threshold below which family nutritional requirements were constrained
iv. agricultural practices which lacked specialization to reduce pressure on land resources
v. landless people that that required resettlement
vi. scattered farms plots that are difficult to manage due to scattered mode of human settlement
vii. lack of land registration system to guarantee security of land tenure
viii. inadequate exiting land use planning and land development methods
ix. disorderly and fraudulent land transactions without recognized and controlled land market leading to loss of revenue by government

x. unplanned use of marshlands
xi. loss and degradation of soil due to natural and manmade causes
xii. inappropriate farming methods and inadequate soil conservation
xiii. unfavorable customary land system that favored male land inheritance excluding women.

It cannot be conceived that land consolidation would be the answer to all these. Indeed land use consolidation has nothing to do with land tenure. But being pronounced in the land policy and defined it was part and parcel of the land reform ushered in by the policy and. In the the Organic Land Law No. 08/2005 of 14 July 2005, Land Consolidation is "a procedure of putting together small plots of land in order to manage the land and use it in an efficient manner so that the land may give more productivity" (Official Gazette of the Republic of Rwanda, Year 44 no.18, 15 September 2005). The CIP was initiated in September 2007 to increase the agricultural productivity of high potential food crops and to provide Rwanda with greater food security and self-sufficiency.

There are generic principles of consolidation by FAO and those spelt by the Rwandan government for Land Use Consolidation. The generic principles are given as being participatory, democratic and community driven. The focus should be on improving rural livelihoods rather than improving basic agricultural production, and the end result should be community renewal and assist communities to redefine new uses of its resources and reorganize the parcels. Specifically land consolidation would improve agricultural production and rural livelihoods, encourage voluntary participation in the programme by farmers and private investors, support existing off farm employment opportunities to support labourers who may lose employment as a result of land consolidation, attract private investors and use of democratic principles through use of consultative methods (GoR 2004). Land Use Consolidation has tended to focus more on cooperative farming although the law also provides for Land Use Consolidation involving contracting farming and farming associations. The law also considers Land Use Consolidation together with Rwanda Settlement schemes of *Imidugudu.* We come back to this in the next section.

2.2.4. Other Theories on Empowerment

From the review of literature, a number of empowerment strategies have been identified and they are socio-economic and political in nature, but what was found common across all of them was the reliance on training as the most popular delivery strategy.

From the political point of view, decentralization and democratization programmes wherever they have been implemented have had the objective of empowering the populations. According to Fumihiko (2000), both programmes are intended to give power to the people although wide variations are noticeable in the manner in which this has been done across the world, thus bringing differential impact on the extent to which the target populations have been empowered in the due course (Golooba, 1999).

In Rwanda, both programmes have been implemented together with many others, and the gist of this study was to assess how people have been empowered through the many strategies that are in place. Still from the political point of view, there has been the liberalization policy which has been implemented in most world economies with the purpose of breaking monopolies which according to Shafaeddin (2005) are the causes of powerlessness. In Rwanda the policy has been implemented since early 1990s, and according to Yoweri (1992) this has helped the producers to gain more control over their products which they had lost to state monopolies.

Political sensitization on peoples' fundamental human rights is also used as an empowerment strategy in many parts of the world (Kagwa, 2009). According to the author, once people are aware of their human rights, they will be empowered to demand for rights and accountability from duty bearers. In Rwanda, this work has mostly been done by civil society through a number of campaigns which they have launched in different parts of the country. However, prior to the study, no documentation was found on the particular empowerment strategies that had been implemented in Muhoza sector in particular, and Musanze district in general. Thus, the study was intended to assess how the delivery of extension services under the CIP programme has empowered the people, particularly the farmers in the study area vis-à-vis other strategies.

Economically, peoples' access to financial resources increases their economic power and as Boserup (1970) asserts that once people are empowered economically, this will be transferred to other areas of empowerment. In Rwanda, the establishment of microfinance institutions and village banks has been targeted at achieving this (Bategeka, 1999). From the literature review, it is apparent that policies to increase access to financial resources have had differing impacts in terms of empowering the target groups in many parts of the world. For example, while micro-credit programmes were found to be instrumental in women empowerment in countries like, India (Binswanger & Khandker, 1995) and Thailand (Coleman, 1999), a different story was reported in Bangladesh (Goetz & Sen Gupta, 1994). The authors established that although the Bangladesh government had introduced micro-credit scheme to empower rural women, instead the programme disempowered them the more as their husbands hijacked the programme. However, a critical look at their argument reveals that the problem was not with the programme per se but the design, implying that like many authors have asserted the strategy is vital in the empowerment of the poor and rural populations.

Coming back to the local context, programmes like, Universal Primary Education, Universal Secondary Education and many others have all been designed with the purpose of increasing peoples' access to knowledge, skills, information and economic resources, hence empowerment. These were some of the empowerment strategies the researcher thought to have ever been implemented in the study area which would have confounded the study findings. However, prior to the study, little was known about how the delivery of agricultural extension services under the CIP programme had empowered the beneficiaries vis-à-vis other strategies in the study area. For this reason there was a noble cause for this study to be undertaken.

Following from the review of literature as seen above, it is apparent that a number of strategies have been simultaneously or independently implemented but what is portrayed is that different strategies have yielded different results in as far as the

empowerment of the target population is concerned in different parts of the world. However, what was found in common in most empowerment strategies was the approach of targeting the intended beneficiaries from their local communities which is often referred to as extension service delivery. Therefore, what was intriguing and warranted this study was how this approach has empowered the people in Muhoza sector, Musanze district as this information was noted to be missing in the current literature.

2.3. Agriculture Extension Service Delivery and Livelihood Sustenance and Food Security in Rwanda

Food security is not just about increasing production. It is also about improving livelihoods, income, nutrition and resiliency. African countries have made good progress on many Millennium Development Goals (MDGs), especially related to education, health and gender equality. Average incomes have been increasing and malnutrition has been decreasing, however, malnutrition remains the highest in the world in Africa (with 26.8% of sub-Saharan Africans malnourished as of 2012). While Africa has made steady progress on improving labor productivity (above the world average since 2000), agricultural productivity remains low. The majority of noncommercial smallholders produce staple crops for their family and community's subsistence needs, for which formal finance is not available. As a result, non-commercial farmers rely heavily on informal savings and credit mechanisms.

As the world population is predicted to grow to 9 billion by 2050, ensuring proper feeding requires much more than just increasing agricultural production. Food security implies that food is available, accessible and well utilized (properly stored, prepared, including a nutritious and balanced diet to promote health). (Presentation at Reproduction in Pittsburgh, 2009)

In Rwanda, as the share of service sector on national economy grows larger, the government seeks to transform farming into a productive, high value, market oriented sector by modernizing 50% of its agriculture by 2020, and thereby improve livelihoods of rural population, achieve food security and increase exports of agricultural products as reflected in the millennium development goals (MDG) and New Partnership for Africa's Development (NEPAD). The right to food is taken for a principle in the contemporary development and human right discourse (FAO, 2008). However, it is also said to be one of the most frequently violated human rights in recent times. The Millennium development Goal number one, Target 1.C, set by the World Food Summit in 1996 to reduce the number of undernourished people by half by 2015 cannot be met if present trends continue (Delgado et al.,2010) even though the global food production has grown faster than the total population in the world (Ulukan, 2011).

Generally Sub-Saharan Africa is the most endangered region in view of food security. One of the challenges for food security in Sub-Saharan Africa is the underdevelopment of the agricultural sector which is the backbone of economic growth (World Bank, 2008) and the main source of income for the majority of the rural population where poverty is more concentrated (Boussard et al., 2005). The agricultural productivity growth is also necessary as the population continues to grow in Sub- Saharan Africa. The current agricultural productivity in Sub-Saharan Africa is very low compared to the population growth rate and without increasing agricultural productivity, food security improvement and poverty alleviation goals will not be achieved.

In order to improve food security in poor farming settings in Sub-Saharan Africa, governments and other stakeholders have suggested and or implemented a series of agricultural development programs and interventions in order to increase people's capabilities to meet food security needs.

An important aspect of the agricultural development programs is stimulating the adoption of improved agricultural technologies (Doss, 2006). These technologies include the intensive use of fertilizer, improved seeds, irrigation systems and other best agricultural practices. However, the rate of adoption of these technologies has been lower in Sub-Saharan African countries than in Asia and Latin America (World Bank, 2008) and this created opposite outcomes to food security for these three regions where Sub-Saharan Africa is still lagging behind. The socio-economic structures, institutional settings and the characteristics of desirable technologies might be playing a certain role in determining levels of adoption of these disseminated agricultural technologies for improving food security (Doss, 2006).

2.3.1. The Concept of Food Security

The concept of food security has gone through several renovations over the past few decades. The current focal of attention is not only the food security at global, national, and regional levels but also the individual and household food security. This came as a result of Amartya Sen's entitlement approach to poverty and hence to food security whereby he has been credited with initiating a paradigm shift in the early 1980s that brought the issue of access and entitlement to food.

Maxwell and Smith (1992) admit that the food security concept has been widely defined. The authors illustrate for example that by the end of the 80s around 200 definitions of food security had appeared in various writings (Faridi and Wadood, 2010). With this view it is essential to analyze drivers of food security first at household level and any national wide generalization should come later. According to the World Food Summit (1996) food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Despite the increased attention to reducing hunger since the adoption of the Millennium Development Goals, the World still faces large problems of widespread hunger and malnutrition. On the world level, the number of hungry has declined, but remains unacceptably high. FAO estimates that a total number of 925 million people are undernourished in 2010 compared to 1023 billion in 2009 (FAO, 2010). Developing countries account for 98 percent of the world's undernourished people (FAO, 2010). If this situation does not change, the Millennium Development Goal number one (reduce the number of hungry people with 50% by 2015) will not be reached.

The International Food Policy Research Institute (IFPRI) and other cooperating organizations in the '2020 vision for food, agriculture and environment' maintained that this vision entails a world where every person has economic and physical access to sufficient food to sustain a healthy and productive life, where malnutrition is absent, and where food originates from efficient, effective, and low cost

food and agriculture systems that are compatible with sustainable use and management of natural resources (Pinstrup-Andersen and Pandya-Lorch, 1998). The authors highlighted major challenges that brought IFPRI to design the vision to address them. The challenges include inadequate capacity to grow or purchase the needed food, large increases of population in developing countries, gross under-investment in agriculture research, and inadequacies in availability of and access to agriculture inputs, degradation of natural resources, inefficient functioning of markets and inadequate infrastructures and lastly insufficient domestic resource mobilization.

2.3.2. Dimensions of Food Security

Food security has four main dimensions (FAO, 2008): physical availability, food access, food utilization and stability of the availability and access to food. All these dimensions will be further explained in the next sections.

2.3.3. Physical Availability of Food

Food availability refers to the physical availability of food which is a function of both home production and imports, that is, through national food stocks and commercial food import, farming, community gardens and harvesting (own production and reserves), purchasing (the market), hunting wild food and fishing and food handouts (Renzaho and Mellor, 2010).

Increased food production will have to come from more efficient use of land already under cultivation as opposed to significant expansion of cultivated land which is not an economically or environmentally feasible option in most of the world (Pinstrup-Andersen and Pandya-Lorch, 1998). For this, food security on its food supply or availability component implies adoption of best agricultural practices that have potential to increase productivity as a result of efficient and environmentally friendly agricultural practices. Therefore from a food availability perspective, increased food security occurs when the producer price of food rises, conventional factor input prices fall, improved agriculture technology prices fall, user costs of infrastructural services fall, weather conditions improved in food–producing areas, the world market price of food falls, national domestic income rises, international interest rates fall, the volume of food aids increases, and the domestic interest rates fall (Fosu and Nico, 2011).

2.3.4. Food Access

Food access is seen at the household and individual levels. Food access refers to the capability to obtain the needed food, either from own production or purchasing from the market (Bahiigwa, 2002). Access to food depends on the purchasing power of the households but also on what portion of income they spend on food. Within the households, full income is used not only for achieving food security but also for accessing other basic needs such as basic education, health care and housing .This means that in the household, food access is influenced by intrahousehold food distribution decisions.

2.3.5. Food Utilization

There are two forms of food utilization: physical utilization and biological utilization. The physical utilization is the ability of a household to have all the physical means to use food available. This may include cooking utensils, culturally regulated feeding hierarchies, cuisine patterns, adequate housing, caretaker behavior, knowledge, family structure, and workload while the biological utilization is concerned with the ability of the body to effectively use the nutrients once the food is consumed (Renzaho and Mellor, 2010). To this point, food security has been correlated accordingly with the status of malnutrition prevalence, dietary energy balance or supply and prevalence of absolute poverty (Smith et al., 2000). Stability of the availability and access to food

In order to be food secure, adequate supply and access to food on individual, household or population levels must be met at all times. If there is inadequate access to food due to sudden political, economic or climatic chocks like conflict, high food prices or droughts then there is food insecurity. Some temporal man made or natural disasters may affect food security and hence cause transitory food insecurity (Hartwig and Gunter, 2006). Figure 2.5 shows the conceptual framework of food security as a multisectorial and multi-dimensional phenomenon.

2.3.6. Determinants of Household Food Security

Household's potential towards food availability, access and utilization is a function of different variables. In a study conducted in Bangladesh, it was found that household's food security is significantly correlated with some household's characteristics like the level of education of the household's head, electricity connection and land ownership (Faridi and Wadood, 2010).

On their side, Feleke and his co-authors (2005) concluded from a study applied to Southern Ethiopia that the determinants of food security can be found at both supply and demand side. Determinants such as agricultural technology adoption, farming systems, farm size, land quality, per capita aggregate production and access to market were seen as having a deterministic relationship with household's food security (Feleke et al., 2005).

2.4. Role of Agriculture Extension Service on Agriculture Marketing, Trade and Policy

The agricultural sector continues to play a crucial role for development, especially in low-income countries, Rwanda inclusive where the sector is large both in terms of aggregate income and total labor force. DevelopmentReport2008, Agriculture for Development (World Bank, 2007)

2.4.1. Agriculture, Growth, and Poverty Reduction

Developing economies have generally been described as dual economies with a traditional agricultural sector and a modern capitalist sector. Productivity is assumed to be lowering agriculture than in the modern sector. The canonical model was put forward by Lewis (1954) and subsequently extended by Ranis and Fei(1961). Lewis'model rests on the idea of surplus labor in the agricultural sector. With lower productivity in agriculture, wages will be high in the modern sector, which induces labor to move from agriculture to the modern sector, which in turn generates economic growth. Other precursors, such as Schultz (1964), also point out the importance of food supply by the agricultural sector.

Building on the Lewis model, Johnston and Mellor (1961) account explicitly for agriculture as an active sector in the economy. In addition to providing labor and food supply, agriculture plays an active role in economic growth through production and consumption linkages. For instance, agriculture can provide raw materials to nonagricultural production or demand inputs from the modern sector. On the consumption side, higher productivity in agriculture can increase the income of the rural population, thereby creating demand for domestically produced industrial output. Such linkage effects can increase employment opportunities in the rural non-farm sector, thereby indirectly generating rural income. Moreover, agricultural goods can be exported to earn foreign exchange in order to import capital goods.

The fact that there are important linkages between the traditional and modern sectors in developing countries makes agricultural growth an important instrument for decreasing poverty. The contribution to poverty reduction takes place directly, through the effects of agricultural growth on farm employment and profitability, and indirectly because increases in agricultural output induce job creation in upstream and downstream non-farm sectors as a response to higher domestic demand. Potentially lower food prices increase the purchasing power of poor consumers. The magnitude of these effects for poverty reduction depends on the specific circumstances of an economy.

For example, if technological progress in the agricultural sector is labor-saving, farm employment might not necessarily increase (Irz et al., 2001).

Although most of the literature views agriculture as an active and dynamic economic sector, some authors reach quite different conclusions. Gollin (2010) notes that the large share of agriculture in many developing economies does not immediately imply that there is overall growth. Matsuyama (1992) suggests that the relation between agricultural growth and overall economic growth depends on the openness of a country to international trade. Whereas agricultural growth goes hand in hand with economic growth in small, closed economies—where gains in agricultural productivity will lead to the linkage effect described above—the relation might be reversed in the case of an open economy. If the country has a comparative advantage in agriculture, openness to trade will draw resources away from the modern sector into agriculture, which might be less productive than industry. The importance of the degree of openness of a country was pointed out early on by proponents of ''agriculture-first'' approaches to development. For instance, Ranis and Fei (1961) acknowledge that imports could potentially substitute for domestic agricultural products. Adelman (1984) suggests that ADLI would work best for low-income countries that are not yet export- driven; and Foster and Rosenzweig (2003) stress that the tradability of rural non-farm sector goods can have different implications.

In a general equilibrium perspective, productivity gains in the agricultural sector have a negative impact on the tradable non-farm sector. This is because agricultural products as well as rural non-farm non-tradables have a relatively inelastic demand for labor, whereas tradable goods have more elastic labor demand. If wages increase due to greater agricultural productivity, factories producing tradable goods, which are assumed to be operated by external producers, will move to escape the higher wages. There is a vast literature, ranging from critical contributions that do not support ''agriculture- first'' approaches to more recent ''agro-pessimism'' views. The latter are based on the observation that agriculture in developing countries might be the least productive sector in the economy. Dercon (2009) derives this conclusion from a two-sector model elaborated by Eswaran and Kotwal (1993). He explains that, in an open economy, in which both agricultural and modern-sector goods can be traded, linkages between the two sectors become less important for overall growth. As a result, there is less necessity to increase agricultural productivity to induce overall growth and reduce poverty.

2.4.2. Extension Services as a Means to Foster Adoption

Even if new and more productive technologies are available, farmers might lack information about their existence and knowledge about proper implementation techniques. Extension services have been used as a means to diffuse new technology in developing countries since the Second World War. Extension services also include related services, such as health and nutrition services. When they began, extension services mostly included education about new technologies, as well as input and credit provision (Birkhaeuser etal.,1991). However, most field staff lacked the necessary technical training and field experience to effectively deliver the services to farmers.

As described in recent review papers—Anderson and Feder (2007) and Alex et al. (2002)—the decentralization of the system, putting farmer groups or the private sector in charge of service provision, has been the response proposed to overcome these accountability problems. Farmer groups can in fact engage on both sides of the market for extension services. On the demand side, they can increase overall demand for information because they reach more farmers and can negotiate for their demands more successfully. On the supply side of the market, they can deliver services to their members and finance them. In addition to increasing the accountability and quality of service provision, privatizing extension services has reduced the financial burden on the public sector and made services more financially sustainable. Nevertheless, globally only 5 percent of extension services are provided by the private sector. Private extension services could respond better to demands from commercialized farmers but smallholders might be unaware of their own needs, unable to articulate them, and unable to afford services. Therefore, they might demand fewer services than they need. In this

situation, provision only by the private sector to different groups of farmers might not be the best solution. A better approach would be a private-public partnership to provide services as well as a publicly funded but privately managed system.

2.5. Reducing Food Losses in Supply

In this section we examine the economic impacts of (reducing) food losses in a low-dimension partial equilibrium analysis. (Figure 1) below depicts the market for a food commodity, with a standard upward sloping supply curve and a standard downward sloping demand curve. The price mechanism ensures that demand equals supply. The equilibrium is reached at point A, where the price is P^0 and the quantity traded is Q^0.

The depicted situation is best interpreted as capturing the full supply chain from farm to fork, but concealing the various intermediate stages in supply (for example, storage, transport, processing).

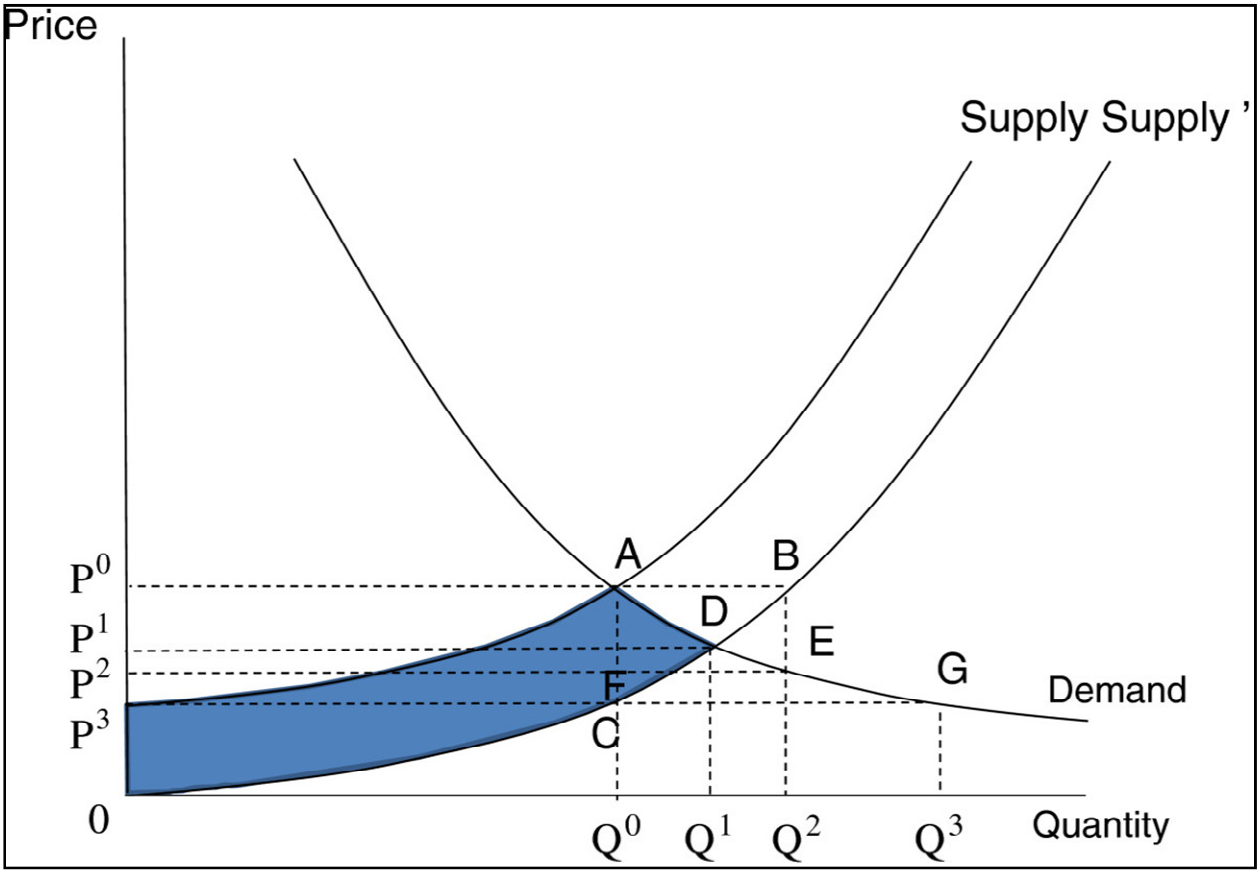

Figure 2: Impacts of reducing food losses in supply. The shaded area: overall welfare gain

Let us assume that there are losses in the production and supply of this food commodity. In such a situation, the socially optimal supply curve, or the supply curve of this food commodity that would not have these losses, lies below the original supply curve, as depicted by Supply' in Figure 1; given the original price, P^0, more can actually be produced and supplied to the market (Q^2 at point *B*), or the original quantity, Q^0, can actually be produced at a much lower cost (P^3 at point *C*) if losses were to be absent. Note that the 'optimal' supply curve does not necessarily have to be parallel to the original supply curve, as the extent of losses may vary with the scale of production (and price). We abstract from this for ease of exposition.

2.5.1. Impacts on Price, Quantity and Welfare

What happens if food losses in supply for the food commodity in question are tackled? Suppliers may, for example, be induced to tackle the losses because of the emergence of a new technology, which makes this possible and worthwhile, or new policies (regulations, taxes and subsidies) that penalise and stimulate reductions in food losses. The action of avoiding the losses, given the original demand curve and given the underlying motivation of doing so, would result in a lower price, P^1, and a higher equilibrium quantity, Q^1, in the market, as given by point *D*. At this new equilibrium consumers can buy more food at a lower price, resulting in a welfare gain to consumers as measured by the change in the consumer's surplus of P^0ADP^1. Similarly, producers can sell more, but at a lower price, resulting in a change in the producer surplus of $P^1D0 - P^0AP^3$, which is also positive. The overall welfare gain equals the sum of the change in the producer and the consumer surplus, which amounts to the area P^3AD0, the blue shaded area between the new and old supply curve and under the demand curve.

These impacts - lower equilibrium price, higher quantity of food produced and consumed, and welfare gains for both producers and consumers - seem to be in line with the qualitative literature on impacts and are encouraging from the perspective of low-income

countries, where food losses on the supply side dominate. From Figure 2. above, it can also be seen that the size of the impacts will depend, amongst others, on how big the losses are relative to the size of the market, which as shown, varies by type of food and country or region. Whatever the extent of the losses, in terms of quantity the size of the impact, Q^0Q^1, however, is much smaller than the original size of the problem, Q^0Q^2, which is due to the change in the price. This is in sharp contrast with how the current literature approaches impacts

2.5.2. Reducing Food Waste in Demand

In this section we examine the economic impacts of (reducing) food waste. Figure 2 depicts the market for a food commodity, again with the supply chain from farm to fork collapsed into a standard upward sloping supply curve and a standard downward sloping demand curve and the equilibrium at point *A*, where the price is P^0 and the quantity traded is Q^0.

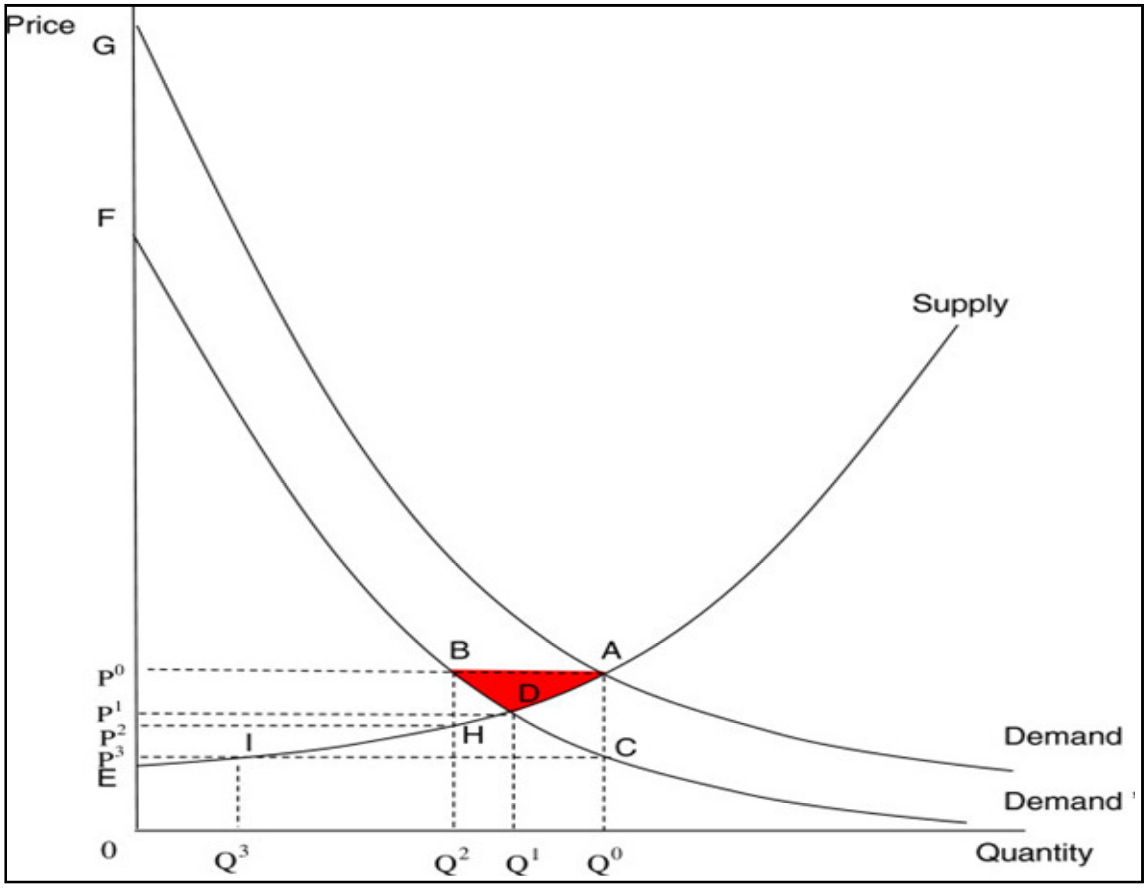

Figure 3: Impacts of reducing food waste in demand. The shaded area: overall welfare loss.

Let us assume that there are losses in the consumption of this food commodity, in that consumers waste part of what they demand. In such a situation, the socially optimal demand curve, or the demand curve that would not have these losses, lies to the left of the original demand curve, as depicted by Demand' in Figure 3; given the original price, P^0, less needs to be consumed (Q^2 at point *B*) so as to reach a certain level of utility if waste was to be absent, or the original quantity, Q^0, represents a much lower value to the consumer (P^3 at point *C*). Equivalent to the analysis on the supply side, the 'optimal' demand curve does not need to lie parallel to the original demand curve as the extent of waste in demand may vary with scale and price. We abstract from this for ease of exposition.

2.6. Summary on Implications for Policy on Food Security

Policy makers ideally should use the outcomes of applied studies on the economy-wide impacts of reducing food losses and food waste as an input to determine what commodity and what element(s) of the food supply chain to focus on. In an international context, policy makers from the various countries in the world can discuss their respective roles in and contributions to reducing food losses and waste. This is in contrast with what is happening now; following the current literature, the focus of policies is being driven by mere assertions of the size of food waste and losses, not societal impacts (benefits and costs) and ignoring the broader policy context. The consequence of this approach is that policy efforts and resources are currently not being put where they will be most cost-effective from a societal perspective.

Making policy using the outcomes of applied studies is by no means easy. It requires taking into account the trade-offs most likely to come out of any research, weighing and ranking the outcomes of the various indicators according to the priorities of policy makers. Naturally, other considerations such as health and environmental aspects play a role, but political and cultural aspects that cannot be

modelled or quantified also play a role. Moreover, other avenues of reaching the aforementioned goals should be considered as well. For example, if the prime concern of policy makers in industrialised countries is to improve resource efficiency and reduce environmental impacts, it may well be crucial to encourage consumers to follow a more healthy diet rather than focusing only on food waste reductions. Similarly, if the interest is also to improve food security in developing countries, trade liberalisation and investment policies may be more effective and should then at least also be considered.

Second, policy makers should move beyond formulating targets for reducing food losses and food waste, such as the European Commission's target of reducing food waste by 50% in 2020 and tackle the underlying causes. Food losses and food waste are nothing new and happen for a reason. Not tackling the root causes is unlikely to yield long-term sustained reductions in food losses and/or waste. With low food prices being cited as a major cause relative to high costs of tackling food losses and waste, this may require increasing the value of and appreciation for food through information campaigns, tax and subsidy policies that reduce incentives to engage in wasteful behaviour, but also financial contributions to improve infrastructure for roads, energy and markets. It may also require setting up institutions and carrying out regulatory reform to facilitate private sector investment in the agricultural sector and food industry.

Finally, policies should take the whole supply chain into consideration. If the focus is only on reducing waste by consumers, which seems to be the approach taken by the European Commission and generally most industrialised countries formulating targets on food waste in demand, the problem may move further up the supply chain to food distributors, processors and farmers, and vice versa, if the focus is on reducing food losses in the early stages of the supply chain, they may move towards the end, such as in retail.

2.6.1. Implications for Practice

The various supply chain actors in the field could benefit from and use the outcomes of applied research by working on innovative solutions and investing in those areas (that is, commodities, stage of the food supply chain and countries) where they will have the greatest beneficial impact. In turn, they could also feed research and policy makers with information on why food losses and waste are occurring, that is, what the bottlenecks are in tackling food losses and waste, and their relative importance.

2.7. Empirical on Land Consolidation Concept and Practice

Land Consolidation is generally considered as putting together small plots with the aim of making them viable and more productive per unit of investment, through economies of scale. These need not change the amount of land controlled by individuals, and is therefore not necessarily an instrument for social justice (Zhou, 1999).

Land consolidation is not a new concept, and has been implemented in different a number of countries. It is believed land consolidation was practiced around 1060 B.C.in China and 300

B.C. during the Roman Empire. Land Consolidation was in practice in Europe since the Middle Ages and the current practices date back to the 19th and 20th centuries (Vitikainen2004). Practices of land consolidation are found today in Germany (Flurbereininigung) the Netherlands (ruilverkaveling) France (remembrement), Belgium, Luxembourg, Austria and Switzerland, as well as Finland (uusjako), Norway, and Sweden (fastighetsreglering). There has been considerable land consolidation in Eastern European countries after the reform from socialist productions systems that had resulted in fragmented property rights. In the whole of Western Europe by early 1990s land consolidation involved a quarter of all cultivated land, which is in excess of 38 million hectares of agricultural land (Vitikainen 2004).

While land consolidation seems to mean the same, objectives and procedures differ from one country to another. It is in the same vein that it is argued in this study that land consolidation in Rwanda has been borne out of concrete conditions and a context forged out of recent policy developments.

While in Europe and other parts it is for multiple purposes in Rwanda it will be pointed out that its scope is limited to specific agrarian outcomes. In Table 1 the diverse objectives of land consolidation in Europe and compares with Rwanda in the last column.

	Finland	**Germany**	**The Netherlands**	**Sweden**	**Rwanda**
Improvement of agricultural land division	Xxx	Xxx	xxx	(x)	Xx
Improvement of forest land division	Xx	(x)	(x)	Xxx	0
Improvement of property division in village centres	X	Xxx	xxx	0	0
Reallotment of leasehold areas	X	Xxx	xxx	X	0
Enlargement of the farm size	Xx	Xxx	xxx	X	Xxx
Land use planning in village centres	X	Xxx	xxx	0	Xxx
Acquisition of land for municipal/state in village centres	0	Xx	xx	0	0
Readjustment of building land	X	Xx	xx	0	0
Improvement of road network in the land consolidated area	Xx	Xxx	xxx	X	0
Improvement of drainage Networks in the land consolidated area	Xxx	Xxx	xxx	X	0
Implementation of Environmental and nature conservation projects etc	X	Xxx	xxx	X	0
Promotion of regional development projects	X	Xxx	xxx	X	0

Table 1: Comparison of objective of land consolidation in Europe and Rwanda

xxx *primary objective* xx *secondary objective (x) minor objective* 0 *not the objective*

Land consolidation can follow different models differing in terms of the process involved, and also the extent of voluntarism or coercion of the affected community. „Comprehensive" land consolidation includes the re-allocation of parcels together with a broad range of other measures to promote rural development (FAO 2003). Examples of such activities include village renewal, support to community-based agro-processing, construction of rural roads, construction and rehabilitation of irrigation and drainage systems, erosion control measures, environmental protection and improvements including the designation of nature reserves, and the creation of social infrastructure including sports grounds and other public facilities.

Other forms of consolidation are voluntary or individual types (FAO 2003). In voluntary consolidation schemes, unlike comprehensive schemes, all participants must agree fully with the proposed project. As a result, voluntary projects tend to be small, and voluntary consolidation tends to be best suited to address localised problems. Voluntary projects usually have fewer than ten participants but in some cases this number may be higher (cited in Musahara 2005).

Individual consolidation involves the spontaneous consolidation of holdings, without the direct involvement of the state. However, the state may provide an enabling environment for consolidation by promoting instruments such as joint land use agreements, leasing and retirement schemes. Experience in a variety of countries has shown that entirely voluntary consolidation tends to be a "slow and unsatisfactory" process (Zhou, 1999). This is due to the difficulties of community collective action, which suggests that progress would be particularly slow in communities where social bonds are weak or strained.

The conceptual clarification above has not captured two issues in our study. First in Rwanda it is clearly pointed out that consolidation is related to the use of land. In many parts of the world different forms of land consolidation from time immemorial has been a method of tapping economies of scale. In Rwanda land use consolidation are related to tapping economies of scale as well but in a different context from say the latifundia programmes in Latin America. In a land scarce society it is not only for economies of scale but also for economic and optimal use of physical space. Secondly, land consolidation in Rwanda is intimately linked to agriculture. Land Use Consolidation is part of the Crop Intensification Programme.

2.7.1. Land Fragmentation as a Problem

Whereas in the previous section it was demonstrated that land consolidation can be designed for multiple objectives it has been pointed out that in Rwanda the proximate cause is found in land fragmentation (Musahara 2004, Musahara and Huggins 2006, GoR 2004, Ntirenganya 2012). It is argued that land consolidation is an answer in societies where there has been significant land fragmentation (World Bank 1992, Okezie et al 2012). Land fragmentation has meant parcels of land that are typically located in different parts of the landscape: in general a household will actively try to access land in different eco-niches (e.g. valley bottoms and at higher altitudes), in order to benefit from differences in rainfall availability and soil retention characteristics (Barasubrimanian and Egli 1986). Land fragmentation is regard as a farm management issue and exists when a household operates a number of owned or rented non contiguous plots at the same time (Okezie et 2012). Land fragmentation is regarded as a feature of less developed agricultural systems (Van Hung *et al.,* 2007; Hristov, 2009). It can be a major obstacle to agricultural development, because it hinders agricultural mechanization, causes inefficiencies in production, and involves large cost to alleviate its effects (Najafi, 2003; Thomas, 2006; Thapa, 2007; Tan *et al*., 2008). Other problems include the fact that fragmentation makes supervision and protection of the land difficult long distances to farms that make labour more costly, loss of working hours, the problem of transporting agricultural implements and products; and results in small and uneconomic size of operational holdings (Bizimana et al 2004).In view of these considerations, numerous land consolidation and land reform policies have been implemented to reduce fragmentation in European countries and Africa such as in Kenya and our case Rwanda and elsewhere (Sabates-Wheeler, 2002; Sundqvist and Anders-son, 2006).

Various factors are responsible for agricultural land fragmentation. Among the main factors that have contributed to subdivision and fragmentation is the traditional system of inheritance of land where a land is divided and bequeathed to sons. In Rwanda coupled with rapid population growth fragmentation has been part and parcel of increasing physical density. Some 40 to 50 years ago density on agricultural land was 121 persons per square kilometer, rose to 166 per square kilometer 30 to 35 years ago, is thought to have been approximately 262 people per square kilometer in 1990, was above 350 in mid 2000s and is above 400 per square kilometer in

2012(GoR 2012). Rwanda is thought to have the highest population density in rural Sub Saharan Africa. Thus as the population increases, not only does the size of holdings fall, but they are increasingly fragmented into small plots, scattered over a wide area (Gebeyehu, 1995). A household in Rwanda can have on average 5 pieces and some cases they go up to 10 pieces (Takeuchi and Marara 2005).

Clay et (1998) summarised the process of physical population density as follows;

- farm holdings have become smaller due to constraints on land availability
- Land holding are more fragmented
- cultivation has pushed into bottom lands and fragile margins on steep slopes previously held in pasture and wood lot
- many households now rent land, particularly households owning little land or those with large families
- fallow periods have become shorter and cultivation periods have grown longer.

While in the 1950s more than 50% of the people worked on more than 2 ha today more than 60% have less than 0.5 ha. Thus the issue is not only land fragmentation but also small sizes of plots for agriculture. This has ramifications to agricultural productivity.

It is however noteworthy that the argument presented in the previous paragraphs is not conclusive and evokes a debate that goes beyond the scope of our study. The first is that there are advantages of fragmented farm holds that should not be ignored. It was argued for example that at the scale of the household, there are often benefits in terms of crop diversification and risk management represented by each plot‟s specific characteristics of fertility, water retention, accessibility, altitude, and form of tenancy (Waller 1996). The negative aspects of fragmentation (such as distance from the homestead) could be offset by these benefits, as well as better spacing of labour throughout the year, due to different labour demands of different crops planted in different microclimates and soils.

2.7.2. Farm Size and Productivity Debate

The inverse relationship (IR) between farm size and productivity was first described as early as 1923. Chayanov found that as the Kulaks acquired more land the productivity or yields of their farms declined. This view was at odds with the Soviet policy of collectivization so he was eventually arrested, tried and shot for his work in 1937.

In 1962, economic philosopher, Amartya Sen, documented the same phenomenon in India. Since then, this inverse relationship has been found in dozens of countries in Africa (Barrett, 1996; Collier, 1983; Kimhi, 2006), Asia (Akram-Lodhi, 2001; Benjamin & Brandt, 2002; Carter, 1984; Heltberg, 1998; Rios & Shively, 2005), Europe (Alvarez & Arias, 2004) and Latin America (Berry & Cline, 1979)[1]. Using data from 1991, Byiringiro and Reardon (1996), found a 300% yield advantage for small farms in Rwanda. The empirical evidence is puzzling because this inverse productivity relationship violates a fundamental tenet of the production function– positive or constant returns to scale.

Dozens of research projects have attempted to explain this puzzle by evaluating the subsistence farm-household as a traditional profit-maximizing business entity producing some detailed analysis of all aspects of these economic entities.

2.7.3. Missing Markets

One line of inquiry points to the lack of markets and effective pricing for the factors of production. These inefficient markets push farm-households to make uneconomic resource allocation decisions. These consequences can be seen in four areas:

Without an effective labor market, farmers have no way to measure their opportunity costs and will continue to work their small plots long after the marginal value of their labor has become unprofitable (Sen 1966). In Rwanda, the inverse productivity relationship rests on the lack of external labor markets and the resultant concentration of labor on small plots (Byiringiro and Reardon 1996). A secondary issue stemming from a thin labor market is the inability to hire and supervise workers needed for expansion. This limits the scale of the farm-household to the family time-endowment to work the land (Eswaran and Kotwal 1986).

In land scarce markets a greater share of farm returns flow to the land production factor (Benjamin and Brandt 1997). These excess returns and the related low returns to labor are fundamental to the inverse relationship. The lack of a land market either for sales or leasing means that more productive farmers will not be able to acquire more land thus preserving the inverse relationship status quo (Byiringiro and Reardon1996).

Most small plot farmers are unable to diversify into cash crops in part because there are no effective markets for their staples or a distribution channels for cash crops. The farm-household production focuses on consumption preferences is also a function of the non-separated household model (Le 2010). Production decisions may depend simply on household composition rather than commodity market factors of supply and demand (Ligon 2011).

Finally, the lack of access to capital markets or credit limits the farmer‟s ability to acquire additional inputs whether it is land, improved seeds and fertilizer or small-scale mechanization (Eswaran and Kotwal 1986).

2.7.4. Measurement Error

Lamb, (2003) considered the potential that the inverse relationship was due simply to measurement error, which is a component of the error term that will be correlated with plot size. The study found a reversal of the inverse relationship when comparing fixed effects against a random effects model, leading to the conclusion that the dependent variable was subject to measurement error. This conclusion was supported by an instrumental variable estimation as well.

2.7.5. Recent Studies on Land Consolidation in Rwanda

Official papers and guidelines on LUC are within the CIP programme in Minagri archives.The most recent paper is that of Onguka (2013) which was cited earlier. It was in from of paper presented to a World Bank conference in April 2013 and provides as yet the most recent account of Land Use Consolidation in Rwanda. It has a detailed narrative that concisely defines land consolidation elsewhere, land administration and position LUC in the discourse. It is the only study so far that mentions settlement reorganization though briefly as being linked to LUC in the law. The paper uses the official MINAGRI statistics and is not based on any prior field work.

There a few more papers on Land Use Consolidation in Rwanda that is scholarly and independent. These represent what is already known and is said about LUC and useful as background for our study. Ntirenganya, J. (2012) wrote a Master‟s Thesis on Land Consolidation in Rwanda. It is a detailed and in depth account of the evolution of land reform and the content of the land policy and law in Rwanda. The thesis records gains in food productivity, includes views of framers in the methodology and mentions infrastructure support. The narrative part is a good record of what is available on land policy and law but as noted earlier it does not make a clear distinction that land consolidation in Rwanda is more focused on use than ownership. The case study and findings are

based on one village of Gisenyi in Bugesera District and data is extracted from 20 households and 8 informants and therefore provides useful information that may have limited generalization to the whole country.

Huggins (2012) has written a critical paper of land use consolidation in Rwanda. The uses a political economy and a neo Marxist approach. The papers has a thorough account of the land reform process in Rwanda and from the start notes the deliberate effort put in the government of Rwanda and its record in transforming the economy in the region. He however argues that land consolidation in Rwanda is consolidation power in hands of a „centralized authoritarian sate" which will make Rwandan peasants „proletarians" (sic) . The paper though with a through understand of the political economy of Rwanda seem to have a political bias that may be motivated by other aims with a frequent reference to coercion by government as a method of implementing LUC. The paper seems to be interested in case studies involving contract farming especially Jatropha and Pyrethrum and criticizes the sustainability of both and finds little faith in cooperative farming. The paper more suitable as can be seen into the discourse on land grabbing in Africa which it admits does not fit the Rwandan case provides no proposed alternative solutions to the land questions of Rwanda which it seems to master.

2.8. Research Gap

The first gap is to know the extent of land consolidation in Rwanda. Information on land that has been placed under LUC is known such as through the most recent national survey and assessment of LUC(Kathiresan 2011,Kathireasn 2012,GoR 2012) and the projections of the land area that will be covered in the next 4 years(GoR 2011). In all the reports there is no where that it is possible to know how many farmers have been involved and where. It is not known which portion of national production is thus affected by the initiative. LUC as part of CIP involves a set of eight crops in different districts and in different agro ecological zones. These are maize, rice, beans, cassava, wheat, Irish potatoes, soybeans and banana. Global changes in input/yield productivities have been reported (MINAGRI 2012, Muhinda 2013). Yet the actual effects to livelihoods in relation to each crop have not been established. It has not been known whether LUC in the valley and marshlands and uphill have been received in the same way and the variation in gains and challenges. How land consolidation has been placed in the legal and institutional framework has been reviewed (Onguka 2013) yet no study has yet provided an in depth analysis of the actual modus at all levels. LUC is part and parcel of CIP and probably the most important. It is however implemented along with other programmes. There have been attempts to look at some related aspects such as post harvest services (USAID 2012). There is still need to look into the extension support condition, the marketing services, and the irrigation and mechanization opportunities.

Socio economic impact is complex and broad. Overall productivity gains have been noted in empirics and reports (Kathireasn 2012). The debate between farm size, fragmentation and productivity has been around for decades and is still current in general and in Rwanda in particular (Hazell et al 1992, Okezie 2012, Ayalew and Deininger 2013, Ansoms 2008). No study has taken a broad perspective of the gains or challenges of LUC in relation to people

While some studies and reports have reported tensions in adopting and participating in LUC, none has shown extensive perception reports other than scattered elite interviews that sometimes look subjective.

A second area that needs more knowledge is the environment. Several studies mention sustainability as a single challenge of LUC. Some tried to include soil conditions in regression studies (Ansoms et 2008) and soil health but no study has provided hard evidence on water quality and quantity and soil conditions. It is apparent there may be no baseline data on water quality assessment before CIP was launched for the whole country. It is however possible to use lab test for select sites especially where LUC has been so long to establish present conditions of water quantity and quality distinguishing between up and down stream. Or valley bottom and up hill for horizontal comparisons or benefits of future studies.

In relation to specific aspects of impact a number of issues gaps that need to be populated with data and information include total factor productivity, access to markets and credit, social capital, transaction costs, ability to withstand risks (market price fluctuations, spoilage, drought, flooding and environment risks and crop and pest attacks), access to roads, irrigation and other farm infrastructure and tenure security (USAID Land Project RFP 2013)

In all it can be seen that there has been limited studies on Land Use Consolidation and Crop Intensification. Although some data and information is available especially from MINAGRI a lot more evidence from the field is required. There is little basis to compare and so get comparable data from elsewhere in the world as land consolidation has differed in objectives from one country to another.

There has been limited use of rigorous econometric methods in analyzing land use consolidation in Rwanda. There is so far no benchmark data on the situation of environment on sites where LUC takes place. Both socio economic, quantitative, qualitative and environmental impact assessment will provide more data and knowledge on LUC-CIP.

The debates on land reform before and after the 2005 Land Law are useful but they are not based on field data that can be obtained after the introduction of land consolidation in Rwanda. Again after Land Use Consolidation there are a few research reports on the programme. Most of these are case studies of some areas in Rwanda mainly carried out for academic purposes.

Data provided by two most recent studies by MINAGRI Assessment and RAB Director General respectively provide a lot of information and useful to understanding the LUC performance. More disaggregate data sets can give a broader picture of events 5 years after the programme.

3. Research Methodology

3.0. Introduction

This chapter contains the methodology that has been used to conduct the study and it presents the research design that has been adopted, study area and population, sampling procedures, data collection methods and instruments, data analysis techniques, the ethical considerations as well as the limitations of the study. Therefore, the chapter presents a detailed explanation of what has been done and why it is deemed appropriate.

3.1. Research Design

This study has used both a qualitative and quantitative study that adopted a cross-sectional design in that data has been collected from a cross section of the population (both CIP and non-CIP beneficiaries) in Muhoza sector at one point in time. This design is preferred because it enables an in-depth analysis of the relationship between the study variables . Therefore, in addition to the quantitative descriptive statistics about the relationship between the study variables, detailed explanations have been obtained from the respondents about how the delivery of agricultural extension services had helped to empower the farmers in Muhoza Sector which has been used as a case study.

3.2. Study Area

The study will be conducted in Muhoza sector which is one of the 15 Governments constituting Musanze District, in the northern province of Rwanda.

The climate pattern of a bimodal rainfall pattern is largely conducive for farming activities, like, cattle rearing and crop farming which are the main occupations of the inhabitants. The average cultivated land area is 1.5 acres. The study area was randomly (rotary method) selected from 14 Sectors in which the CIP programme is being implemented in musanze District.

3.3. Population of the Study

Basically, the study has targeted the CIP beneficiaries but in order to enrich the comparative analysis that has been used to assess the impact, even an equal number of non-CIP beneficiaries have been drawn in the sample. Technical persons like, the sector CIP coordinator, community development officer, agricultural extension staff as well as leaders of key farmer-led institutions who included the chairpersons of the village farmer , community based facilitators and members of the 2 committees of the sector farmer forum, that is, the procurement and executive committees have been involved in the study as key informants. The reason for this is that they are believed to have more detailed and useful information about the study subject.

3.4. Sampling Procedure

3.4.1. Sample Size Determination

For purposes of ensuring representativeness of the sample, sample size was scientifically determined using a formula adopted from Kish (1965) as here below.

n= Z^2 P Q Z is the standard normal deviate at 95% confidence level

d^2 P is the proportion of the survey population with the characteristic of interest

Q is the probabilistic derivative (1-p)

D is the error margin which was fixed at 0.05.

Therefore Z = 1.96 as given by the Z distribution table at 95% confidence level

P= 90% (% of the population benefiting from CIP in Muhoza sector)

q=10% (Population not benefiting from CIP in Muhoza sector)

d= 0.05 (the allowed error margin)

n= 1.96^2 x 0.9 x0.1

0.05^2

From the calculation, 138 is got, but through the Pre-Pilot study, the researcher later realized while in the Pre-pilot study (field) that the sector executive committee members would be left out yet they seem to be having vital information. For this reason, the sample size was raised to 142 as seen in the table below.

Category	Frequency	Percentage
CIP beneficiaries	56	39.4
Non-CIP beneficiaries	56	39.4
Key informants		
Chair persons of village farmer	14	9.9
Community based facilitators	2	1.4
Sector procurement committee members	3	2.1
Sub county executive committee members	4	2.8
Sub county CIP coordinator	1	0.7
Extension workers	5	3.5
Community development officer	1	0.7
Total	**142**	**100**

Table 2: Sample size

Source: Drawn by the Researcher.

3.4.2. Sampling Techniques

A disproportionate stratified random sampling have been used to select the 14 villages (from the 7 sub-sectors that make up Muhoza Sector) that participated in the study. Therefore, from each sub sector, two villages have been picked. The names of the villages have been written on small pieces of papers and at random picking, then villages will be selected. Within each of the selected villages, 4 CIP beneficiary and 4 non-CIP beneficiary households are hoped to be selected also using a disproportionate stratified random sampling. This technique is being preferred because, as Amin (2005) states, it is appropriate in drawing study samples when the survey population is grouped basing on any stratification factor which in this case was benefiting as well as participation in the CIP programme.

From each of the households to be selected, the household head (either husband or wife) have been enrolled in the study upon his/her consent. The sampling process has been facilitated by the information that obtained from the sub-county administration office and Local village chairpersons of the respective villages.

For the key informants, a purposive sampling technique have been used because, this method according to Robson (1993) is appropriate in selecting study elements that are deemed to possess unique information that is hoped to enrich the study.

3.5. Data Collection Methods and Instruments

3.5.1. Interviews

Face-to face in-depth interviews have been conducted using an interview guide (for key informants) and a structured questionnaire (for CIP and non-CIP beneficiaries). This method is said to be appropriate because it allows the collection of both qualitative and quantitative data besides allowing the researcher to concurrently use other methods, like observation. All these helped to ensure a higher internal validity of the study.

3.5.2. Observations

Observations have been made in a naturalistic manner using semi-structured observation checklists primarily to observe and get more objective information regarding farming practices in the farms or holdings of both CIP and non-CIP beneficiaries and any other indicator of empowerment.

4. Presentation, Analysis and Discussion of Findings

4.0. Introduction

This chapter presents the analysis and discussion of the findings in line with the study objectives earlier stated in chapter one. The analysis and presentation of the findings is largely quantitative by the use of statistics, graphs, pie charts and other relevant figures although the presentation is enhanced by narrative statements that were captured directly from the respondents during field work. The analysis and presentation of the findings is followed by the discussion of the findings in light of the literature review presented in chapter two. Basing on the differences and similarities between the primary and secondary data, the researcher states his own views which form the basis of drawing conclusions and recommendations as seen in the next chapter.

4.1. Response Rate

The study registered a 95.1% actual response rate. Although it fell short of the expected, according to Amin (2005) this is adequate to allow the study findings to be largely relied on and generalized to the survey population. Three respondents (one from the beneficiaries' category and two non-beneficiaries) could not be got despite the many callbacks the researcher made and efforts to substitute them were not possible as the study had a completion deadline to meet. The table 3 below shows the categories of the respondents and their response rates in respect to the villagers that participated in the study.

		Categories of respondents									**Total**
		CBs	**NCBs**	**VFC/Ps**	**SNC**	**AEWs**	**CDO**	**SPC**	**CBFs**	**SEC**	
	ruhengeri	8	8	2	0	1	0	1	1	2	**23**
	Cyabarabika	6	6	4	0	1	0	1	1	1	**20**
	Mpenge	8	2	2	0	1	0	0	0	0	**13**
	Kigombe	8	8	3	0	1	0	0	0	0	**20**
	Susa	6	7	3	0	1	0	0	0	0	**17**
	Muhe	7	8	4	0	0	0	1	0	0	**20**
	bushozi	8	7	3	0	1	0	0	0	1	**20**
	Outside the sector	0	0	0	1	0	1	0	0	0	**2**
Total		**53**	**52**	**23**	**1**	**5**	**1**	**3**	**2**	**4**	**135**

Table 3: Response rate of different categories of respondents
Source: Primary data (2015)

- Key:
→ CBs – CIP Beneficiaries
→ NCBs – Non-CIP Beneficiaries
→ VF C/Ps – Village Farmer Chairpersons
→ SCC – Sub-county (SECTOR) CIP Coordinator
→ AEWs – Agricultural Extension Workers
→ CDO – Community Development Officer
→ SPC - Sub-county Procurement Committee
→ CBFs - Community Based Facilitators
→ SEC - Sub-county Executive Committee

Although 142 respondents had been sampled as seen in chapter three, the actual response fell short of the expected as some respondents could not be got, despite the many callbacks the researcher made. Nevertheless, the 95.1% actual response rate that was registered is sufficient to allow the findings of this study to be generalized.

4.2. Demographic Characteristics of the Respondents

The demographic characteristics of the respondents were analyzed because according to Dreier (2006) most demographic characteristics, like education, age, gender, income and marital status have a greater bearing on the level of empowerment. Therefore, these characteristics were analyzed in order to establish their would-be relationship with the respondents' levels of empowerment.

4.2.1. Gender

According to Ahikire (2006) gender influences the empowerment process with differential impacts resting upon men and women. Owing to this, the respondents' gender was analyzed as in the cross tabulation table 4 below.

		Gender		**Total**
		Male	**Female**	
Categories of respondents	CIP beneficiaries	39	14	**53**
	Non-CIP beneficiaries	25	27	**52**
	Chairpersons of village farmer for a	14	0	**14**
	CIP coordinator	1	0	**1**
	SPC	2	1	**3**
	SEC	3	1	**4**
	CBFs	1	1	**2**
	Extension workers	4	1	**5**
	Community development officer	1	0	**1**
Total		**90**	**45**	**135**

Table 4: Gender of different categories of respondents
Source: Field data (2015)

The study was largely dominated by males (66.7%) but this was not surprising owing to the patriarchal system that is well-entrenched in the African setting. In fact, although the researcher only wanted to interview the heads of households, some women declined participating in the study without the clearance of their husbands while a good number of women instead referred the researcher to their husbands.

The descriptive statistics also showed that the women only dominated in the category of Non-CIP beneficiaries (51.9% : 48.1%). However, of the 30 key informants (extension workers, CIP coordinator, chairpersons of village farmer, community development officer, community based facilitators and members of the sub-county procurement and executive committees) only 5 (16.7%) were females. Owing to this, it is apparent that consistent with several previous studies (Keiller, 2001; Moser, 1993) women's presence in influential positions in the community is still very low.

4.2.2. Age

The influence of age on access to resource has consistently featured in literature and because of this it was hypothesized to have a relationship with empowerment which inclined the researcher to analyze it, as seen in table 5 below.

		Age							Total
		Below 18	18-27	28-37	38-47	48-57	58-67	68+	
Categories of respondents	CIP beneficiaries	0	16	5	18	14	0	0	**53**
	Non-CIP beneficiaries	6	0	0	0	18	22	6	**52**
	Chairpersons of village farmer for a	0	0	5	6	2	1	0	**14**
	SPC	0	0	2	0	1	0	0	**3**
	SEC	0	0	1	0	3	0	0	**4**
	CBFs	0		1	0	1	0	0	**2**
	CIP coordinator	0	0	0	0	1	0	0	**1**
	Extension workers	0	0	2	1	2	0	0	**5**
	Community development officer	0	0	1	0	0	0	0	**1**
Total		**6**	**16**	**17**	**25**	**42**	**23**	**6**	**135**

Table 5: Age range of different categories of respondents
Source: Field data (2015)

It was established that all the CIP beneficiaries were above 18 years of age and probably this could have been due to the age limit set by the CIP progrmme. According to the CIP implementation guidelines (2010), all adults of 18 years and above are eligible and will be mobilized by the L.C.1 executive to register in farmer groups in order to participate and access CIP services. Besides this, the majority (49.6%) of the beneficiaries were between 38-57 years of age while a few (24.4%) were between 18 and 37 years. According to 60% of the extension workers the age factor is important in the adoption of new and modern farming practices and this explains why none of the beneficiaries was below 18 years or above 58 years of age. During interviews with non-beneficiary or non-participating farmers in the CIP programme one old respondent had this to say;
"My age cannot allow me to participate in the programme, because even if I attend the trainings, I cannot apply those things because my energy is little. The CIP programme needs those who are young and energetic but not us the old and weak ones"
It is, therefore, apparent that age influences participation in the programme and consequently empowerment and this is also consistent with the findings of other studies, for example, Douglas and Barbara (1996).
The study findings also revealed that the majority (88.6%) of the Non-CIP beneficiaries were above 48 years while the remaining 11.5% were below 18 years of age, as seen in the table above. This further confirmed that age is an important factor that influences people's participation in the programme and consequently the empowerment process.
Of the 14 chairpersons of the village farmer, 57.1% were between 38 and 57 years of age, while the remaining 42.9% were aged between 28 and 37 years. A higher participation level was noted among the middle ages, that is, above 30 but below 50 years, probably because the people in this age bracket are deemed to be still strong and ambitious and are, therefore, capable of applying the modern farming practices being advocated for under the CIP programme.

4.2.3. Educational Levels of the Respondents

As the Canadian International Development Agency (1997) observes, education is an important factor in the empowerment process of the target population. They hypothesized that higher education levels correlate with higher levels of empowerment. This made the analysis of the respondents' levels of education an important issue in this study as seen in the table 6 below.

		Level of education					Total
		Nil	Primary	Secondary	Tertiary	University	
Categories of respondents	CIP beneficiaries	9	12	18	11	3	**53**
	Non-CIP beneficiaries	9	22	18	2	1	**52**
	Chairpersons of farmer for a	0	2	7	5	0	**14**
	CIP coordinator	0	0	0	0	1	**1**
	SPC	0	0	3	0	0	**3**
	SEC	0	0	2	2	0	**4**
	CBFs	0	0	2	0	0	**2**
	Extension workers	0	0	0	4	1	**5**
	Community development officer	0	0	0	1	0	**1**
Total		**18**	**36**	**50**	**25**	**6**	**135**

Table 6: Education level of the respondents
Source: Field data (2015)

From the table above, it is apparent that the majority (33.9%) of the respondents in the CIP beneficiaries' category had secondary education, while 16.9% had no education, 22.6% had primary, 20.8% had tertiary and 5.7% had university education. From the non-CIP beneficiaries, the majority (42.3%) had primary education, while 17.3% had no education, 34.6% had secondary, 3.8% had

tertiary and 1.9% had university education. The majority (50.0%) of the chairpersons of village farmer had secondary education, while the remaining 14.3% and 35.7% had primary and tertiary education, respectively. An equal number (9) of the respondents among the beneficiaries and non-beneficiaries was not educated at all, as seen in the table above.
Of the 5 extension workers, 4 (80%) had tertiary education with a basis in agriculture while the coordinator and the veterinary extension officer were university graduates. It was noted that the majority of the study participants had secondary education and a very small number had university education as illustrated in the table above.

4.2.4. Marital Status
According to Snyder (2000), marital status influences access to resources and this was, therefore, hypothesized to have an impact on the level of farmer empowerment, which called for attention during data analysis. It was established that the majority (86.7%) of the respondents, both males and females in all categories were married, while among all the un-married respondents, the majority (72.2%) were males, as seen in table 7 below. This, probably implied a higher involvement of the male youth in the CIP programme than their female counterparts.

		Gender		**Total**
		Male	**Female**	
Marital status	Married	81	36	**117**
	Un married	13	5	**18**
Total		**94**	**41**	**135**

Table 7: Marital status of the respondents
Source: Field data (2015)

4.2.5. Respondents' Occupation besides Farming
Like other demographic characteristics seen above, one's occupation has a direct and indirect relationship with access to resources and consequently empowerment. Owing to this hypothesis, it was necessary for the study to analyze the respondents' occupation as in table 8 below.

		Categories of Respondents									**Total**
		CBs	NCBs	VFC/Ps	SCC	AEWs	CDO	SPC	SEC	CBFs	
Occupation besides farming	Business	7	17	5	0	0	0	3	3	2	**29**
	Civil service	7	6	0	0	0	0	0	0	0	**13**
	3rd sector	4	6	0	1	5	1	0	0	0	**17**
	Casual labour	10	12	0	0	0	0	0	1	0	**22**
	None	25	11	9	0	0	0	0	0	0	**54**
Total		**53**	**52**	**14**	**1**	**5**	**1**	**3**	**4**	**2**	**135**

Table 8: Occupation besides farming
Source: Field data (2015)

From the above table, of the 53 CIP beneficiaries, the majority (47.2%) were relying only on farming, while 18.9%, 13.3%, 13.2% and 7.5% were casual labourers, civil servants, business people and NGO workers respectively. Among the non-CIP beneficiaries, the majority (78.8%) were having other occupations besides farming. Of the 52 non-CIP beneficiaries, 17 (32.7%) were doing business, 6 (11.5%) civil servants, another 6 (11.5%) were working with NGOs, 12 (23.1%) were casual labourers and 11 (21.1%) were solely relying on farming.
Of the 14 chairpersons of the village farmer that were interviewed, the majority (64.3%) were relying on farming, while only 35.7% were doing some business besides farming. All the five extension workers were at the same time involved in agricultural related projects being implemented by various Non-governmental organizations. This implies that reliance on farming was more pronounced among the CIP beneficiaries than the non-CIP beneficiaries. Several CIP beneficiaries revealed that in order to put into practice all the new ideas that they acquire in the various trainings that they attend, one needs to spend over 80% of his/her time on the farm if they are to achieve success. This explains why most CIP beneficiaries were relying solely on farming.

4.3. The Delivery of the Agricultural Extension Services under the CIP programme
The study findings revealed that there were no major variations in the way agricultural extension services are being delivered from the set guidelines that relate to provision of agricultural advisory services under the CIP programme.
According to the CIP implementation strategy, the farmers through their institutional structures that include the farmer groups form the entry points for provision of extension services. Indeed, this was found to be true, in that through a bottom-up participatory planning process that commences right from the villages through parish to the sub-county level, farmers within their groups with the facilitation of the technical staff who may include subject matter specialists from the district and the Sub-county CIP Coordinator

identify and prioritize the problems they face in the production of their selected farming enterprises. The problems are further analyzed to identify the root causes as well as proposing possible solutions. The process culminates in the formulation of action plans that reflect the farmers' advisory service and technology development needs. A workplan that has been evaluated, considered and eventually approved by the sub-county farmer forum (SFF) is the basis for provision of services to the farmers by the professional service providers.

In the study area, agricultural extension services under the CIP programme are provided by two professional agricultural advisory service providers, a male one for crop and a female for livestock enterprises, both of them were contracted for two years. In order to extend the reach and coverage of the contracted service providers, progressive farmers are identified from among the good performing farmers**,** and these are deployed as Community Based Facilitators (CBFs) to deepen provision of services to farmers. In Muhoza sub-county, there are 2 CBFs , a male and female.

Provision of the required advice, knowledge, skills and information to farmers is done through employment of a number of extension methodologies, for example, carrying out field visits, conducting on-farm demonstrations as well as carrying out trainings through lectures and demonstrations. The delivery of such services is done mainly on routine and at times prompted by the demand expressed by the concerned farmers.

The common issues focused on during execution of extension services include soil and water conservation (i.e. mainly prevention of soil erosion; digging trenches; fertility improvement through compost making; tree planting or agro-forestry); record keeping; post-harvest handling; farming as a business (FAAB); pests and disease control; use of improved seed/breed; good husbandry practices and breeding.

However, it was also noted that despite the many years some CIP beneficiaries had spent in the programme, some though few were not conversant with the implementation strategy of the programme in their respective villages. Of the 13 respondents who could not explain how the agricultural extension services under the CIP programme in their area were being delivered, the majority (61.5%) were women, and as one chairperson of the village farmer forum mentioned during interview that women's participation especially in the planning processes was low could be the major explanation for this. However, data analysis was not so much targeted at understanding the reasons behind women's ignorance of the delivery strategies of extension services under the CIP programme as this was outside the scope of the study spelt out earlier in chapter one.

Further findings of the study about the delivery strategies of extension services under the CIP programme revealed that the majority of the recipients were satisfied with the strategy. This question was asked to all the respondents in different categories and their responses are presented in table 9 below.

Comfortable with delivery methods					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Yes	83	61.5	61.5	**61.5**
	No	16	11.9	11.9	**73.3**
	No response	36	26.7	26.7	**100.0**
	Total	**135**	**100.0**	**100.0**	

Table 9: Respondents' satisfaction levels towards the delivery strategies of extension services
Source: Field data (2015)

Out of the 135 respondents to whom this question was asked, 83 representing 61.5% were comfortable with the delivery strategies, 16 (11.9%) did not like the strategies while the 26.7% did not respond to this question, as seen in the above table. Further analysis revealed that of the 83 respondents who were comfortable with the delivery methods, 45 (54.2%), 11 (13.2%) and 27 (32.5%) were CIP beneficiaries, Non-CIP beneficiaries and the key informants respectively. Of the 16 who were not comfortable with the delivery strategies, 8 (50.0%) were the CIP beneficiaries while 5 (31.3%) and 3 (18.7%) were non-CIP beneficiaries and the key informants, respectively. All the 36 respondents who declined responding to the question were non-CIP beneficiaries as seen in the cross tabulation table below.

		Comfortable with delivery methods			**Total**
		Yes	**No**	**No response**	
Participation in CIP	CIP beneficiary	45	8	0	**53**
	Non-CIP beneficiary	11	5	36	**52**
	Key informants	27	3	0	**30**
Total		**83**	**16**	**36**	**135**

Table 10: Respondents' attitudes towards the CIP delivery strategies
Source: Field data (2015)

It is, therefore, imperative to note that the majority of the beneficiaries as well as the key informants were comfortable with the agricultural extension delivery strategies being used under the CIP program.

Cross tabulation analysis of the respondents' attitude towards the agricultural extension service delivery strategies and the villages from where the respondents were coming showed no major variations, only that in Muhoza sector, the majority of the respondents were not comfortable with the delivery methods while the others refused to respond to the question. This implies that there could be

some peculiar deficiencies in the way extension services are being delivered in this village, which needs to be further studied for a smooth implementation process of the programme in the area. However, although some respondents had some disgruntlements over the way the extension services were being delivered in their respective areas, only one of them revealed that he had ever taken his complaint to the sub-county farmer executive but nothing was done. Pessimism was the overriding factor that was deterring the majority in this category to speak out their disgruntlements as one of them noted;

"Even if you speak, they can't listen to you……..the only thing to do is to keep quiet and do your own things……..if things come and you have a chance to get then well and good" A respondent from Muhoza village mentioned during interview.

However, in order to vividly capture how the delivery of extension services had empowered the people in the study area, it was imperative to analyze how many people were accessing these services in the study sample and even the type of services they were accessing. However, this question was only asked to the CIP beneficiaries and non-CIP beneficiaries because it appeared obvious to the extension workers and the CIP coordinator since they are the providers of the services.

Premised upon this, it was established that all the 53 CIP beneficiaries were accessing extension services unlike the non-CIP beneficiaries where the majority (69.2%) had no access to extension services as seen in the cross tabulation table below.

		Access extension services			Total
		Yes	**No**	**Never asked this question**	
Participation in CIP	CIP beneficiary	53	0	0	**53**
	Non-CIP beneficiary	16	36	0	**52**
	Key informants	23	0	7	**30**
Total		**92**	**36**	**7**	**135**

Table 11: Access to extension services by the respondents
Source: Field data (2015).

The study findings further revealed that a small (30.8%) percentage of non-CIP beneficiaries were accessing extension services. According to the CIP coordinator, even those not currently benefiting from the programme directly are entitled to some of the services like training and advisory, as he emphasized in his words;

"When training is organized for farmer groups in a particular training site, we do not discriminate against anybody, although we as trainers some time do not know the criteria that were used to mobilize the people to come for the training. If some categories of people are deliberately left out, then for us, we can't know"

From the above descriptive statistics, it is apparent that participation in the CIP programme is associated with a higher degree of accessing extension services. The Chi-square value of 7.511 and a corresponding P value of .023, as seen in the table below, further confirm that there is a strong and statistically significant relationship between participating in the CIP programme and accessibility to extension services.

Test Statistics		
	Access to extension services	**Participation in CIP**
Chi-Square	82.978[a]	7.511[a]
Df	2	2
Asymp. Sig.	.000	.023

Table 12: Access to extension services by the respondents
Generated by SPSS Version 17.0

Basing on the cross tabulation analysis, the Chi square and P. values, it is imperative to note that the CIP programme has empowered the beneficiaries to access agricultural extension services, and this is also consistent with the findings of Mugarura et al (2007). Therefore, the more farmers participate in the CIP programme, the more they are likely to access agricultural extension services.

As earlier mentioned, it was imperative also to analyze the various types of extension services that the farmers were accessing, and it was established that the nature of services offered to the clientele by the agricultural service providers basically entailed training in crop and livestock husbandry, improved farming methods, farming as a business and many others; offering advisory services on a number of aspects, like use of good crop varieties/livestock breeds for increased productivity; carrying out farm visits; treatment of sick livestock and inspection of moving animals.

4.4. The Delivery of Extension Services and the Empowerment of Farmers

This was the primary objective of this study and a comparative analysis based on the empowerment levels of both CIP and non-CIP beneficiaries in respect to their abilities to access resources and services that promote improvement in their quality of life was used. Central in this analysis was; farmers' access to extension services as already discussed, modern technologies, improved crop varieties, market information and labour. Attention was also paid to registered improvements in farming methods, crops yields, percentage of harvest marketed, participation in community activities as well as their farm management competences as further seen in detail hereunder.

4.4.1. Access to Modern Farming Technologies

In order to vividly capture the impact of extension service delivery under the CIP programme, the respondents were asked to comment on their accessibility to modern farming technologies before, and after the implementation of the CIP programme in the study area. Therefore, the period under study was stretching from 2007 to date and 2007 to 2001 when the CIP programme was started in Rwanda. The table below shows the responses of the respondents to question 301c in the research tool (that is, Accessibility of modern technologies in farming).

Participation in CIP * Access to modern farming technologies Cross tabulation					
		Access to modern farming technologies			**Total**
		Improved	**No change**	**Reduced**	
Participation in CIP	CIP beneficiaries	43	10	0	**53**
	Non-CIP beneficiaries	22	24	6	**52**
	Key informants	30	0	0	**30**
Total		95	34	6	**135**

Table 13: Access to extension services by the respondents
Source: Field data (2015).

The findings revealed that of the 53 CIP beneficiaries, the majority (81.1%) mentioned that their access to modern farming technologies had improved while 18.9% had registered no changes in their accessibility to modern farming technologies. All the key informants revealed that their accessibility to modern farming technologies had improved since 2007 when the CIP programme was introduced in the area.
Of the 52 non-CIP beneficiaries, the majority had registered no changes in their level of accessibility to modern farming technologies while 42.3% and 11.5% had registered an improvement and a decline in their accessibility levels to modern farming technologies, as seen in the table above. From all the above, improved access to modern farming technologies were more noted among the beneficiaries than the non-beneficiaries, and to this extent it is worth concluding that to some extent the agricultural extension service delivery has been instrumental in empowering the people to access modern farming technologies. The study findings in respect to this variable are consistent with those of Mugarura et al (2007).

4.4.2 Access to Improved Crop Varieties

In terms of access to improved crop varieties, it was established that of the 53 CIP beneficiaries, the majority (67.9%) had registered an improvement in their accessibility to improved crop varieties while 32.1% had not registered any change to that effect. The majority (59.6%) of the non-CIP beneficiaries had not registered any change in their accessibility to improved crop varieties while 12 (23.1%) and 9 (17.3%) had registered an improvement and a decline, respectively. Of the 30 key informants, the majority (76.7%) compared to 23.3% had registered no and negative changes in their accessibility to improved crop varieties as seen in table 14 below.

Participation in CIP * Access to improved crop varieties Cross tabulation					
		Access to improved crop varieties			**Total**
		Better	**No change**	**Worse**	
Participation in CIP	CIP beneficiaries	36	17	0	**53**
	Non-CIP beneficiaries	12	31	9	**52**
	Key informants	23	7	0	**30**
Total		**71**	**55**	**9**	**135**

Table 14: Access to improved crop varieties by the respondents
Source: Field data (2015)

From the table above, it is apparent that all the respondents that were participating in the CIP programme had either registered positive or no changes in their accessibility levels to improved crop varieties, but unlike the non-CIP beneficiaries, none had registered negative changes. However, owing to the operational definition of the concept 'empowerment' as used in this study, access to improved crop variety can only be a means but not an end. Upon this realization it was imperative for the researcher to cross tabulate access to improved crop varieties and increase in crop yields as seen in the table below.

Access to improved crop varieties * Crop yields Cross tabulation					
		Crop yields			**Total**
		Increased	**No change**	**Reduced**	
Access to improved crop varieties	Better	46	17	8	**71**
	No change	24	23	8	**55**
	Worse	0	9	0	**9**
Total		**70**	**49**	**16**	**135**

Table 15: Access to improved crop varieties in relation to crop yields
Source: Field data (2015)

According to the table above, of the 71 respondents whose access to improved crop varieties had increased, the majority (64.8%) mentioned that it was accompanied with the subsequent increase in yields while to (23.9%) their increased access to improved crop

varieties did not bring about any changes in the level of crop yields. A small percentage (11.3%) of the respondents registered a decline in crop yields despite their increased access to improved crop varieties.

Of the 55 respondents who had not experienced any changes in respect to their accessibility to improved crop varieties, a slightly bigger percentage (43.6%) registered an increment in crop yields while 41.8% registered no change in crop yields and 14.5% registered a decline in crop yield.

The study also established that 9 respondents had had their access to improved crop varieties worsened, but according to the descriptive statistics in the table above it has not been accompanied by a decline in their crop yields. It is apparent from all the above that to a larger extent, increased access to improved crop varieties is normally accompanied by increase in crop yields. Therefore, the fact that the delivery of agricultural extension services under the CIP programme has increased farmers' access to improved crop varieties, it worth stating here that really the programme has empowered the farmers in this aspect.

Furthermore, a cross tabulation analysis of the farmers' accessibility to improved crop yields and level of empowerment revealed that the majority of the respondents who revealed that they were significantly empowered had had their access to improved crop varieties improved as further illustrated in the table below.

Access to improved crop varieties * Level of empowerment Cross tabulation						
		Level of empowerment				**Total**
		Significantly empowered	**Modestly empowered**	**No change**	**Modestly disempowered**	
Access to improved crop varieties	Better	26	22	23	0	**71**
	No change	7	12	21	15	**55**
	Worse	0	9	0	0	**9**
Total		**33**	**43**	**44**	**15**	**135**

Table 16: Access to improved crop varieties in relation to level of empowerment
Source: Field data (2015)

Of the 135 total respondents that took part in this study, the majority (56.3%) revealed that they had been empowered since 2007, although 43.3% and 56.6% revealed that they had been significantly and modestly empowered respectively. It was further established that of those who had been significantly empowered, 78.8% revealed to have had their access to improved crop varieties improved and so did the 52.4% of those who had been modestly empowered. A small percentage of the respondents whose accessibility to improved crop yields had increased revealed that they had not registered any changes in their levels of empowerment since 2007.

Further findings show that all the 15 respondents who revealed to have been empowered had also registered no changes in their access to improved crop varieties. However, what was not captured as it was outside the scope of the study was whether the limited access to improved crop varieties was the one causing disempowerment or visa versa.

4.4.3. Access to Improved Livestock Breeds

Another aspect of farmer empowerment which was analyzed was access to improved livestock breeds. This was because, livestock in African culture serves as a symbol of wealth and prestige which all have a bearing on the socio-economic power. Descriptive statistics show that the majority (52.8%) of the CIP beneficiaries revealed that their access to improved livestock breeds had improved while 37.7% and 9.4% revealed that their access to improved livestock breeds did not change or reduced despite their participation in the CIP programme.

From the non-CIP beneficiaries' category, out of 52 respondents, 24 (46.1%) had improved access to improved livestock breeds, 14 (26.9%) had had no change in their accessibility to improved livestock breeds while the access of 3 (5.8%) of the respondents in this category had reduced. 11 (21.1%) did not have any livestock. It was also noted that all the CIP beneficiaries and the key informants had livestock (cows, goats, poultry and pigs).

From the key informants' category, the majority (56.7%) had not registered any changes in their access to improved livestock breeds despite the presence of the CIP programme. On the other hand 36.7% had registered some improvement in their access to improved livestock since the implementation of the CIP programme in the area. 6.7% of the respondents revealed that their access to improved livestock breeds had reduced as further illustrated in the table below.

Improved livestock breeds * Participation in CIP Cross tabulation					
		Participation in CIP			**Total**
		CIP beneficiaries	Non-CIP beneficiaries	Key informants	
Improved livestock breeds	Improved	28	24	11	**63**
	No change	20	14	17	**51**
	Reduced	5	3	2	**10**
	No livestock	0	11	0	**11**
Total		**53**	**52**	**30**	**135**

Table 17: Access to improved livestock breeds by respondents
Source: Field data (2015)

From the table above, 63 out of 135 respondents who participated in this study had had improved access to improved livestock breeds from the time the CIP programme was introduced in the area. Of these, 28 (44.4%) were CIP beneficiaries, 24 (38.1%) and 11 (17.5%) were non-CIP beneficiaries and the key informants respectively.
Those who had not registered any change in their access to improved livestock breeds despite the presence of CIP were 51 (37.8%) of the 135 respondents. Of the 51, 20 (39.2%) were CIP beneficiaries, 14 (27.4%) and 17 (33.3%) were non-CIP beneficiaries and key informants respectively. The findings further revealed that 10 (7.4%) had had their access to improved livestock breeds reduced from the time the CIP programme was introduced. Half of these were CIP beneficiaries while 3 (30.0%) and 2 (20.0%) were non-CIP beneficiaries and key informants respectively. Only 11 (8.1%) all of whom were non-CIP beneficiaries did not have livestock.

Improved livestock breeds * Level of empowerment Cross tabulation						
		Level of empowerment				**Total**
		Significantly empowered	**Modestly empowered**	**No change**	**Modestly disempowered**	
Improved livestock breeds	Improved	13	32	12	6	**63**
	No change	13	11	21	6	**51**
	Reduced	7	0	0	3	**10**
	No livestock	0	0	11	0	**11**
Total		**33**	**43**	**44**	**15**	**135**

Table 18: Showing access to improved livestock breeds in relation to empowerment levels
Source: Field data (2015).

From the table above, 76 (56.3%) felt more empowered today than before the introduction of the CIP programme in the area. On the other hand, 44 (32.6%) did not have any change in their empowerment level while 15 (11.1%) were significantly disempowered with the introduction of CIP. The majority (71.4%) of those whose access to improved livestock breeds had improved since the inception of CIP in the study area felt significantly or modestly empowered. From the above descriptive statistics, it is apparent that access to improved livestock has a significant relationship with the empowerment levels of farmers. Therefore, since according to the study findings, the CIP programme has through various ways improved farmers' access to improved livestock breeds, it is worth noting that the programme has really empowered the farmers. Basing on the Chi-square values in the table below, access to improved livestock breeds is strongly related to farmers' empowerment and even the relationship is statistically significant at .001.

Test Statistics		
	Improved livestock breeds	**Level of empowerment**
Chi-Square	66.215[a]	16.081[a]
Df	3	3
Asymp. Sig.	.000	.001

Table 19: Chi-square values of the relationship between access to improved livestock breeds and empowerment levels

4.4.4. Farmers' Access to the Market

The impact of CIP on the empowerment of farmers was also measured in respect to farmers' access to markets after and before the introduction of the programme. This was because according to Gerdien et al (2007) access to the markets is one of the indicators of empowerment. Therefore, farmers' participation status in the CIP programme was first cross tabulated with access to the market in order to establish whether there was variations in market accessibility between the CIP beneficiaries and non-CIP beneficiaries which was used as a yard stick to measure the impact of the programme in this respect.
According to descriptive statistics, out of 135 respondents, 50 (37.0%) revealed that their access to the market had improved since the inception of the CIP programme in their area while the market accessibility of 61 (45.2%) and 24 (17.8%) of the respondents had not changed and reduced respectively as seen in the cross tabulation table below.

Participation in CIP * Access to Market Cross tabulation					
		Access to Market			**Total**
		Improved	**No change**	**Worsened**	
Participation in CIP	CIP beneficiaries	16	30	7	**53**
	Non-CIP beneficiaries	10	25	17	**52**
	Key informants	24	6	0	**30**
Total		**50**	**61**	**24**	**135**

Table 20: Farmers' access to the market.
Source: Field data (2015)

According to the table above, of the 50 respondents whose access to the market had improved, it was further established that the majority (80.0%) were participating in the CIP programme as compared to a smaller (20.0%) of the non-CIP beneficiaries. Of the 61 respondents whose access to the market had not changed despite the implementation of the CIP programme, the majority (49.2%) were the CIP beneficiaries while 41.0% and 9.8% were non-CIP beneficiaries and the key informants respectively. Of the 24 respondents whose access to the market had worsened, 7 (29.2%) were CIP beneficiaries while 70.8% non-CIP beneficiaries .
It was also observable that access to the market was more improved among the CIP beneficiaries than non-CIP beneficiaries which implies that the CIP programme has made a contribution something towards the empowerment of farmers in this respect.
In order to vividly capture the relationship between access to the market and empowerment, a cross tabulation analysis was done as in table below.

Level of empowerment * Access to Market Cross tabulation					
		Access to Market			**Total**
		Improved	**No change**	**Worsened**	
Level of empowerment	Significantly empowered	14	12	7	**33**
	Modestly empowered	15	28	0	**43**
	No change	21	18	5	**44**
	Disempowered	0	3	12	**15**
Total		**50**	**61**	**24**	**135**

Table 21: Farmers' access to the market and their perceived level of empowerment
Source: Field data (2015)

From the table above, it is observable that market accessibility is associated with higher levels of farmer empowerment as those who had access to the market constituted the majority who were either significantly or modestly empowered. Basing on this, the fact that those who were participating in the CIP programme were found to also have higher market accessibility rate than their counterparts, it is worth stating that the CIP programme has had a positive impact on the empowerment of farmers in this aspect.

4.4.5. Farmers' Bargaining Power

The power of the farmers to bargain for better prices and working conditions was sought to be an important indicator of empowerment and the extent to which the CIP programme has helped farmers to boost their bargaining power was used to capture the impact of the programme on the farmer's empowerment. According to descriptive statistics, 63 (46.7%) of the 135 respondents revealed that their bargaining power was now stronger than before the introduction of the CIP programme in their area. Also of the 135, 54 (40.0%) had registered no change in their bargaining power while 18 (13.3%) had had their bargaining power weakened as seen in table below.

Participation in CIP * Bargaining power Cross tabulation					
		Bargaining power			**Total**
		Stronger	**No change**	**Weaker**	
Participation in CIP	CIP beneficiaries	38	9	6	**53**
	Non-CIP beneficiaries	10	30	12	**52**
	Key informants	15	15	0	**30**
Total		**63**	**54**	**18**	**135**

Table 22: Changes in farmers' bargaining power
Source: Field data (2015)

From the table above, of the 63 respondents whose bargaining power was stronger, 38 (60.3%) were CIP beneficiaries, 15.9% and 23.8% non-CIP beneficiaries and key informants respectively. Of the 54 who had not registered any change in their bargaining power, the majority (55.6%) were non-CIP beneficiaries, while 16.7% and 27.8% beneficiaries and key informants respectively. Of the 18 whose bargaining power had weakened, the majority (66.7%) were non-beneficiaries of CIP while 33.3% beneficiaries. From all the above, stronger bargaining power was noted among the CIP beneficiaries than non-CIP beneficiaries. Improvement in the quality of produce, information and a change in production orientation were the frequently mentioned factors behind the registered improvements in the farmers bargaining power. One CIP beneficiary noted thus;
"When you are confident of what you are selling in terms of quality, you feel stronger when bargaining its price".
In respect to improvement in information flow, the majority of the key informants revealed that through several trainings and media, farmers are now more informed about the prices in other parts of the country and this helps to strengthen the bargaining powers of the farmers. Although it was not explicitly established how the CIP programme had helped to improve the farmers' bargaining power, its

influence on farmers' access to information and quality produce were vital in shedding light about this relationship. Therefore, the CIP programme has indirectly improved the farmers' bargaining power and consequently their empowerment.

4.4.6. The Percentage of Marketed Harvest

The percentage of produce that is marketed has a lot to speak about the household income levels and so does the farmer empowerment. It was premised upon this that the study had to analyze the relationship between these variables. The descriptive statistics revealed that 65 (48.1%) of the 135 respondents had registered an increment in the percentage of the marketed farm produce while 43 (31.8%) registered no change and 27 (20.0%) registered a decline as seen in table 23 below.

Participation in CIP * % of marketed harvest Cross tabulation					
		% of marketed harvest			**Total**
		Increased	**No change**	**Decreased**	
Participation in CIP	CIP beneficiaries	29	10	14	**53**
	Non-CIP beneficiaries	15	27	10	**52**
	Key informants	21	6	3	**30**
Total		**65**	**43**	**27**	**135**

Table 23: Relationship between participation in CIP and marketing of produce
Source: Field data (2015)

From the above table, it is observable that of the 65 who had registered an increment in the percentage of the marketed farm produce, 50 (76.9%) were participating in the CIP programme while the remaining 23.1% non-participants. Of the 43 who had registered a zero change, the majority (62.8%) were not participating in the CIP programme compared to smaller percentage (37.2%) that was participating in the programme. Of the 27 who had registered a decline in the marketed farm produce since the inception of the CIP programme, the majority (62.9%) were the CIP beneficiaries while only 37.1% were non-beneficiaries of CIP.

Although to a larger extent as seen in the table above, participation in the CIP programme was associated with increment in the percentage of marketed farm produce, it was noted that some farmers had registered a decline in the percentage of marketed farm produce irrespective of their participation in the CIP programme.

However, in order to clearly capture the relationship between the percentage changes in the marketed farm produce and the farmers' levels of empowerment, a cross tabulation analysis was also done as in table below.

Level of empowerment * % of marketed harvest Cross tabulation					
		% of marketed harvest			**Total**
		Increased	**No change**	**Decreased**	
Level of empowerment	Significantly empowered	13	6	14	**33**
	Modestly empowered	23	10	10	**43**
	No change	29	15	0	**44**
	Disempowered	0	12	3	**15**
Total		**65**	**43**	**27**	**135**

Table 24: Relationship between marketing of produce between and empowerment levels
Source: Field data (2015)

From the table above, 33 of the 135 respondents had been significantly empowered although the majority (42.4%) had registered a decline in the percentage of the marketed farm produce. Of the 43 who had been modestly empowered, the majority (53.5%) had registered an increment in the percentage of marketed farm produce while the same percentage (23.2%) registered a no and negative change in their percentage of marketed farm produce. All this imply that the percentage changes in the marketed farm produce had little relationship with the farmers' empowerment level. This does not, however, negate the indisputable contribution the CIP programme has made towards the empowerment of the farmers as seen in this chapter.

A number of reasons explaining the percentage changes in the marketed farm produce were captured during interview with farmers and the majority of those who had registered an increment attributed it to the commercialization of agriculture as well as increased yields as a result of better farming practices, improved crop yields and increased sizes of farm plots. On the other hand the majority of those who registered no or negative change in the percentage of marketed farm produce attributed it to high dependency ratios and poor yields due to seasonal factors and reduced sizes of farm plots due to inadequate inputs.

4.4.7. Farmers' Income and Empowerment

According to Jacques, et al (2002) the level of income is strongly related to empowerment and, therefore, people with higher incomes are more empowered than their counterparts. Owing to this, the researcher analyzed the changes in the household income levels before and after the implementation of the CIP programme in the study area as in the cross tabulation table below.

Participation in CIP * Income from the farm Cross tabulation						
		Changes in Income from the farm				Total
		Increased	No change	Decreased	No response	
Participation in CIP	CIP beneficiaries	27	16	8	2	**53**
	Non-CIP beneficiaries	11	24	13	4	**52**
	Key informants	11	9	10	0	**30**
Total		49	49	31	6	**135**

Table 25: Relationship between participation in CIP and changes in farm income
Source: Field data (2015)

As in the table above, 49 (36.3%) of the study respondents had registered an increment in their incomes accruing from the farm while the farm incomes of another 36.3% and 23.1% had not changed and reduced respectively. 6 respondents did not answer this question. Statistics further show that of the 49 who registered an increment in their incomes accruing from the farm, the majority (75.5%) were CIP beneficiaries while the remaining 24.5% non-CIP beneficiaries. Of the other 49 whose incomes had not changed, the majority (51.1%) were participating in the CIP programme while the remaining 48.9% non-participants. Of the 31 whose incomes had reduced, the majority (58.1%) were CIP beneficiaries compared to the 41.9% non-CIP beneficiaries.
From the statistics above, no major variations in respect to incomes accruing from the farm were noted between CIP beneficiaries and non-CIP beneficiaries implying there is little quantitative relationship between participation in the CIP programme and changes in farmers' income levels. While this was important in throwing some light about the impact the CIP programme has made in respect to farmer empowerment, it was also deemed necessary to analyze changes in income levels as a result of participation in the CIP programme on one hand and their levels of empowerment on the other as seen in the cross tabulation table below.

Level of empowerment * Income from the farm Cross tabulation						
		Income from the farm				Total
		Increased	No change	Decreased	No response	
Level of empowerment	Significantly empowered	16	5	6	6	**33**
	Modestly empowered	29	11	3	0	**43**
	No change	3	19	22	0	**44**
	Disempowered	1	14	0	0	**15**
Total		**49**	**49**	**31**	**6**	**135**

Table 26: Relationship between changes in farm income and farmer empowerment levels
Source: Field data (2015)

Of the 76 respondents who felt more empowered since their participation in the CIP programme, the majority (59.2%) had at the same time registered an increment in their incomes accruing from the farm while 21.0% and 11.8% had registered a zero and negative change in their farm incomes respectively. Of the 44 whose levels of empowerment had not changed even with the implementation of the CIP programme, the majority had registered a negative change in the farm incomes, 43.2% registered a zero change and 6.8% had registered an increment in their farm incomes. Of the 15 who had been disempowered since the implementation of the CIP programme, the majority (93.3%) had registered a zero change while 6.7% an increment in their farm incomes.
From the statistics above, increment in income levels was found to be more associated with higher empowerment levels and since increased incomes were noted among the CIP beneficiaries than non-beneficiaries, it is worth noting that the programme has significantly contributed towards the empowerment of the farmers.

4.4.8. Farmers Participation in Community Activities

According to Nikkhah (2009), participation is both a means and an end in the empowerment process. Owing to this, the level of farmers' participation in community activities was used as a yardstick to measure their levels of empowerment. According to the descriptive statistics generated by SPSS, 77 (57.0%) revealed that their participation in community activities had improved since the inception of the CIP programme while the participation of the 28.1% and 14.8% had not changed and reduced respectively. In order to establish the community participation levels of different categories of respondents, cross tabulation analysis was done as in the table below.

Participation in CIP * Community participation Cross tabulation					
		Community participation			Total
		Improved	No change	Reduced	
Participation in CIP	CIP beneficiaries	39	14	0	**53**
	Non-CIP beneficiaries	20	12	20	**52**
	Key informants	18	12	0	**30**
Total		**77**	**38**	**20**	**135**

Table 27: Respondents' participation in community activities
Source: Field data (2015)

Of the 77 respondents whose participation in community activities had improved, the majority (72.7%) were the CIP beneficiaries and the remaining 27.3% non-beneficiaries. Of the 38 whose community participation had remained static, 68.4% were CIP beneficiaries as compared to31.6% non-beneficiaries. It was noted that none of the CIP beneficiaries had had reduced community participation level. It is thus imperative to note that participation in CIP was accompanied by higher levels of community participation and owing to this, it is worth stating that the CIP programme has empowered the farmers as it is reflected in their increased participation in community activities unlike those not participating in the programme.
In order to get the full scope of farmers' community participation, the various communities in which the respondents participate were analyzed as in the table below.

Participation in CIP * Type of community activity participated in Cross tabulation							
		Type of community activity participated in					Total
		Leadership	Mobilization	Resource mobilization	Training	No activity	
Participation in CIP	CIP beneficiaries	13	6	17	14	3	**53**
	Non-CIP beneficiaries	4	14	6	9	19	**52**
	Key informants	0	23	0	7	0	**30**
Total		**17**	**43**	**23**	**30**	**22**	**135**

Table 28: Respondents' participation in community activities
Source: Field data (2015)

It was established that 17 (12.6%) were participating in community leadership and of these, the majority (76.5%) were CIP beneficiaries and 23.5% non-beneficiaries. Those participating in community mobilization were 43 and of these, the majority were the key informants who were also dominated by the CIP participants. It was also established that even non-CIP beneficiaries (32.6%) were participating in community mobilization as compared to 13.9% of the beneficiaries that participate in this activity. The CIP beneficiaries were also dominating in community activities such as; resource mobilization and training with very few of them (13.6%) compared to 86.4% of the non-beneficiaries having no activity they participate in the community.
It is, therefore, apparent that the CIP beneficiaries are the most dominant in most community activities and since participation is an indicator of empowerment, it is rightful to note that the CIP programme has empowered the farmers to participate in various community activities.

4.4.9. Access to Information

As Hirokawa (undated) observes, access to information is both a means and indicator of empowerment and, owing to this, it was imperative for the study to analyze how they access information as well as its bearing on their empowerment levels. Basing on the cross tabulation analysis, it was established that 117 (86.7%) respondents were having better access to information than before the CIP programme was started in the area. On the other hand 18 (13.3%) had not got any change in their access to information as seen in the table.

Participation in CIP * Access to information Cross tabulation				
		Access to information		Total
		Better	No change	
Participation in CIP	CIP beneficiaries	53	0	**53**
	Non-CIP beneficiaries	34	18	**52**
	Key informants	30	0	**30**
Total		**117**	**18**	**135**

Table 29: Respondents' access to information
Source: Field data (2015)

From the table, it is observable that all the CIP beneficiaries had better access to information than before the programme was introduced in the area. From the non-CIP beneficiaries' category, 65.4% had better access to information compared to 34.6% whose access to information had not changed even with the introduction of CIP in the area. Basing on these statistics, it is apparent that the CIP programme has helped to improve people's access to information. However, this remained unclear how it has been transformed into empowerment and to clear this fog, respondents' access to information had to be cross tabulated with their empowerment levels as seen in the table below.

Level of empowerment * Access to information Cross tabulation				
		Access to information		Total
		Better	No change	
Level of empowerment	Significantly empowered	33	0	**33**
	Modestly empowered	42	1	**43**
	No change	36	8	**44**
	Disempowered	6	9	**15**
Total		117	18	**135**

Table 30: Relationship between access to information and empowerment levels
Source: Field data (2015)

Descriptive statistics show that of the 117 whose access to information had improved since the inception of the CIP programme in the area, the study findings further showed that the majority (64.1%) felt empowered either significantly or modestly while 30.8% and 5.1% felt no change and disempowered respectively.
Of the 18 whose access to information had not changed despite the implementation of CIP, only 1 (5.6%) felt modestly empowered while 44.4% and 50% felt no change and disempowered respectively. From these statistics, it is apparent that access to information is strongly correlated with empowerment and, since the majority of those whose access to information were CIP beneficiaries, it is worth stating that the programme deserves to be credited in as far as farmers' empowerment is concerned. According to the CIP coordinator, access to information is so important and by itself it is able to bring about farmers' empowerment as he was quoted thus;
"Access to information is so important and once you ensure that farmers get the information which they need, they will be able to take charge of their own situations, and even their bargaining power will improve and that is what I understand to be empowerment"

4.4.10. Food Security and Nutrition

Food is the primary basic need and peoples' access to this most important need, therefore, throws some light on their levels of empowerment. It was established that ensuring household food security is one of the primary objectives of the CIP programme, according to the CIP coordinator and extension workers. Therefore, it was necessary to analyze food security situations of both CIP and non-beneficiaries as seen in the cross tabulation table below.

Participation in CIP * Food & nutrition security Cross tabulation					
		Food & nutrition security			Total
		Significantly improved	Modestly improved	No change	
Participation in CIP	CIP beneficiaries	27	13	13	**53**
	Non-CIP beneficiaries	12	12	28	**52**
	Key informants	16	11	3	**30**
Total		**55**	**36**	**44**	**135**

Table 31: Relationship between participation in CIP and food and nutrition security
Source: Field data (2015)

From the table above, of the 135 respondents 55 (40.7%) had registered significant improvements in their food security situations. Of these, the majority (78.2%) were those participating in the CIP programme while 21.8% were non-participants. Those whose food and nutrition security situation had modestly improved were 36 (26.7%) and of these, the majority were still the CIP participants while 33.3% were non-CIP participants. 44 (32.6%) revealed to have not realized any change in their food and nutrition security, despite the presence of the CIP programme, and of these, the majority (63.6%) as compared to 36.4% were non and CIP beneficiaries respectively. From all these statistics, a strong relationship is seen between participation in the CIP programme and improved food and nutrition security. This inclined the researcher to conclude that the programme has significantly empowered the farmers in this aspect.
While it was established that the CIP programme has largely improved farmers' food security situation, it was also imperative to analyze the relationship between food security situation and farmers empowerment levels as seen in the table below.

Level of empowerment * Food & nutrition security Cross tabulation					
		Food & nutrition security			Total
		Significantly improved	Modestly improved	No change	
Level of empowerment	Significantly empowered	23	5	5	**33**
	Modestly empowered	11	11	21	**43**
	No change	21	20	3	**44**
	Disempowered	0	0	15	**15**
Total		55	36	44	**135**

Table 32: Relationship between food and nutrition security and empowerment levels
Source: Field data (2015)

According to the table, of the 55 respondents whose food and nutrition security situation had significantly improved, the majority (41.8%) felt significantly empowered while 20% and 38.2% had been modestly empowered and no change respectively. The findings further revealed that of the 36 respondents whose food and nutrition security situation had been modestly improved, 44.4% felt empowered either significantly or modestly while the remaining 55.6% felt no change in their empowerment level. Also of the 44 respondents whose food and nutrition security situation had not changed, the majority (59.1%) felt empowered, 6.8% felt no change and 34.1% revealed that they had been empowered.

It was further established that there were variations in the empowerment levels attributed to gender in that the majority of the men were the ones who were more empowered as compared to the women. In fact 93.3% of those who felt disempowered were women as seen in the table below.

Level of empowerment * Gender Cross tabulation				
		Gender		**Total**
		Male	**Female**	
Level of empowerment	Significantly empowered	19	14	**33**
	Modestly empowered	43	0	**43**
	No change	31	13	**44**
	Disempowerment	1	14	**15**
Total		**94**	**41**	**135**

Table 33: Relationship between gender and empowerment levels
Source: Field data (2015)

Therefore, according to the table above, besides the fact that the men were dominant in the whole study (67.4%:32.6%), empowerment was higher among men than women. During interview with extension workers, it was revealed that the commercialization of agriculture as a result of the CIP programme has pushed men into farming which has eroded away the powers women used to enjoy over subsistence farm produce. Therefore, it is worth mentioning that although the CIP programme has contributed all towards the empowerment of the farmers, it has on other hand disempowered women. One woman during the interview noted thus;

"My husband is the one who controls everything, even he is the one who allocates me plots of land where I grow crops for home consumption .some times he sells almost all the produce leaving little for home consumption and argues that it is what they are taught in the CIP training".

Basing on such revelations it was not surprising that of the 41 women who participated in the study, the majority felt disempowered or no change in their empowerment levels, despite the CIP implementation in their area.

4.4.11. Preparation of Farm Records

Like the information seen earlier, farmers' knowledge is also a useful indicator of their empowerment. Record taking and keeping is one of the most important principles of modern farming practices, that is geared towards better farm management. In a study done by Magarura et al (2007), the majority of farmers were poor at taking and keeping farm records and, therefore, in this study, the researcher wanted to establish whether there has been some noticeable changes in the status quo since the inception of the CIP programme. To establish this, cross tabulation analysis was done as seen in the table below.

Participation in CIP * Preparation of farm records Cross tabulation					
		Preparation of farm records			**Total**
		Improved	**No change**	**Worse**	
Participation in CIP	CIP beneficiaries	42	10	1	**53**
	Non-CIP beneficiaries	7	26	19	**52**
	Key informants	17	13	0	**30**
Total		**66**	**49**	**20**	**135**

Table 34: Relationship between participation in the CIP and preparation of records
Source: Field data (2015)

From the table above, it is observable that 66 (48.9%) had registered improvement in farm record preparation and of these, the majority (89.4%) were CIP beneficiaries compared to 10.6% of the non-beneficiaries. Furthermore, 49 (36.3%) had seen no change in their farm records preparation and of these the majority (53.1%) were non-CIP beneficiaries as compared to 46.9% of the beneficiaries. Those who revealed a decline in their farm record preparation practices were 20 (14.8%) and of these, the majority (95.0) as compared to 5.0% were non-CIP and beneficiaries respectively.

It is observable that farm record preparation was more among the CIP beneficiaries than their counterparts a factor which the farmers during interview attributed to the commercialization of farming business and the too much training the farmers receive in this aspect. In this regard, several farmers who were participating in the CIP programme noted that since farming had become a business, they had to properly take and keep records in order to calculate the costs and profits at the end of the season. Basing on the cross tabulation analysis in the table below, the link between farm record preparation and empowerment was established. It was noted that the majority

(84.8%) of those whose farm record preparation practices had improved also felt much empowered with a very small percentage (15.2%) showing that their empowerment level had not changed. Those whose farm recording preparation had not changed were 49 (36.3%) and the majority of these had also experienced no changes in their empowerment levels, while the same percentage (30.6%) had experienced modest empowerment and disempowerment as seen in the table below.

Level of empowerment * Preparation of farm records Cross tabulation					
		Preparation of farm records			Total
		Improved	No change	Worse	
Level of empowerment	Significantly empowered	33	0	0	**33**
	Modestly empowered	23	15	5	**43**
	No change	10	19	15	**44**
	Disempowered	0	15	0	**15**
Total		**66**	**49**	**20**	**135**

Table 35: Relationship between farm record preparation and empowerment
Source: Field data (2015)

As noted from the afore running data presentation and analysis, the CIP beneficiaries have been empowered in various ways compared to their counterparts, but as Zimmerman and Rappaport (1988) note, the empowerment process is said to be successful when people become confident to manage their affairs with little or no reliance on outside parties. Owing to this, farmers were asked how confident they were in managing their farms without any support from extension workers.
Therefore, much as the CIP programme has done much in the farmers' empowerment process, it is worth noting that the process is still incomplete as the confidence of the farmers to manage their farms without the hand of extension workers was still low among the majority of the farmers both CIP and non-CIP beneficiaries. Nevertheless, the majority (65.5%) of the farmers had positive, 22.2% negative and 8.1% neutral attitudes towards the programme in as far as farmer empowerment was concerned, while 3.7% did not respond to the question as seen in the pie chart below.

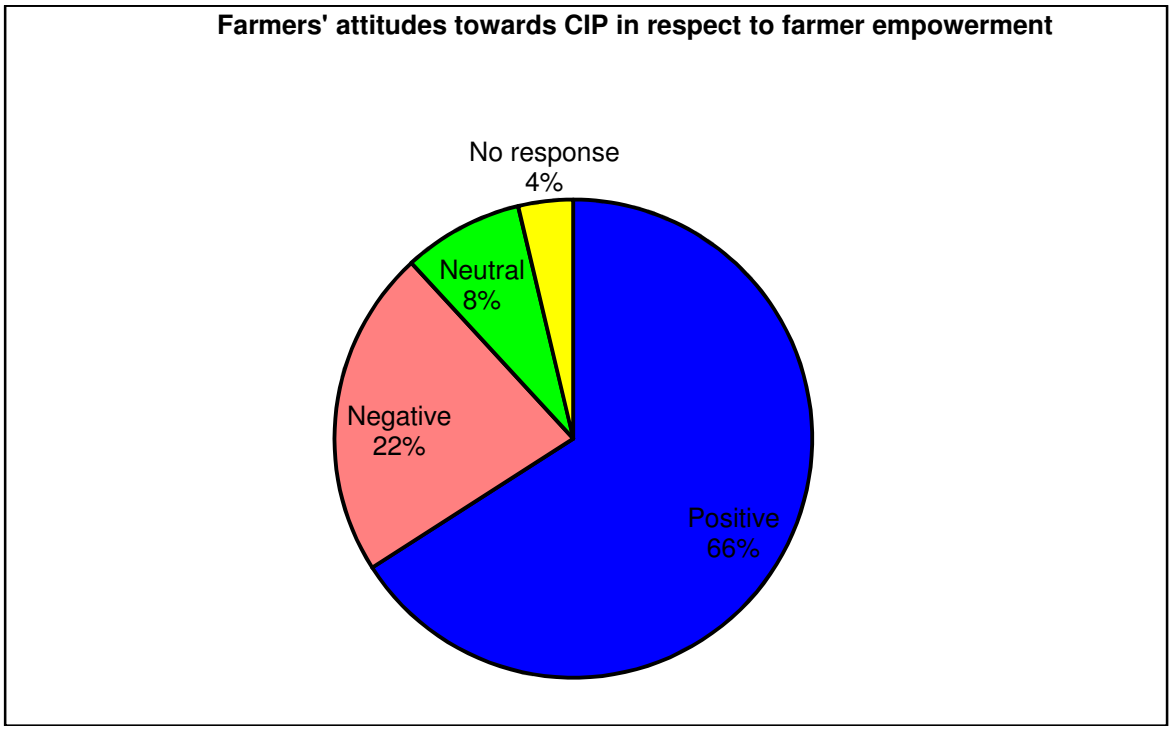

Figure 4: farmers' attitudes towards CIP with respect to empowerment

Further analysis showed that of those with positive attitudes towards the CIP programme, the majority were the beneficiaries while the non-beneficiaries were dominant among those with negative attitudes.

4.5. Other Empowerment Programmes in the Area
It was necessary for the study to establish other empowerment programmes in the study area in order to avoid possible confounders. It was noted that a number of empowerment programmes in the fields of education, finance, health and governance were being implemented although apart from micro-credit programmes others did not have a direct linkage with farmers' empowerment as much as the extension services. Descriptive statistics show that 69 (51.1%) were aware of other empowerment programmes, besides CIP

extension services while 21 (15.6%) denied the presence of such programmes and 45 (33.3%) frankly revealed that they were not aware of any as seen in the pie chart below.

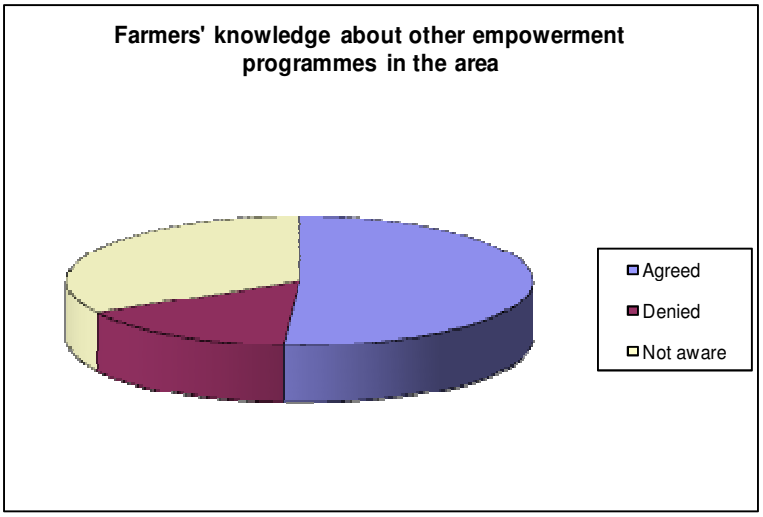

Figure 5:. Farmers' knowledge with respect to other empowerment programmes in the study area Source: Field data (2015)

Of the 69 respondents who revealed that there were other empowerment programmes in the area, the majority (86.9% : 13.1%) were the CIP participants, while those who denied, the majority (76.2% : 23.2%) were non-CIP participants. Of the 45 who were ignorant about the presence of other empowerment programmes, the majority (60% : 40%) were non-participants. This implies that those who were participating in the CIP programme were more informed than their counterparts which is also an indicator of a higher level of empowerment. However, the mere presence of the programmes in the area was not enough to throw more light on the farmers' empowerment, and it was necessary to analyze their content and the farmers' levels of participation in the programmes, as seen here-under.

In terms of content, it was established that the majority of the programmes mentioned involved training of people in areas like public leadership, public health, income generation, household gender relations, and participatory development planning and civic rights among others. However, it was established that the farmers' participation in these other programmes was less frequent as in the CIP programme. Basing on this state of affairs, it is worth concluding that although a number of empowerment programmes had ever been implemented in the study area, extension service delivery under the CIP programme was paramount in as far as farmer empowerment was concerned.

4.6. Influence of Types of Markets on Women's Management of Income

The type of market that a product is sold to has been shown to influence the income share going to women (Njuki *et al*. 2011). There is evidence that women are more likely to sell to informal, often near-to-home markets, and that income derived from these markets will be managed by women. There were several markets that livestock and livestock products were sold to: farm gate to other farmers, farm gate to traders, village markets, and delivery to shops/traders/butchers and other market actors.

Generally, women are expected to manage a larger income share when products are sold in informal markets, often at farm gate, compared to when they are sold in distant markets, or when delivered under contract or other arrangements to formal establishments such as shops and butcheries. At farm gate level, it was expected that women would sell more and therefore manage more income if products were sold to other farmers than when sold to traders, often due to their lower negotiation skills and social capital from interactions with other farmers.

In Muhoza sector, when chickens were delivered to traders and shops away from home, women lost up to 35 per cent of the income share that they would have managed if they sold chickens at farm gate to other farmers .When chickens were sold at farm gate to other farmers, women received a 70 per cent share of the income. This share, however, fell to 45 per cent when chickens were sold at farm gate to other traders, and further to 28 per cent when the chickens were delivered to traders, shops or hotels. Similar trends were observed for other products. For milk, when sold at farm gate to other farmers, women's income share was 74 per cent. This fell by more than 50 per cent to 32 per cent when the milk was delivered to traders, shops or hotels. At farm gate, selling eggs to traders instead of to other farmers, reduced women's income share by 24 per cent. This trend was not observed, however, for the sale of cattle, sheep and goats, which did not seem to be greatly influenced by the type of market.

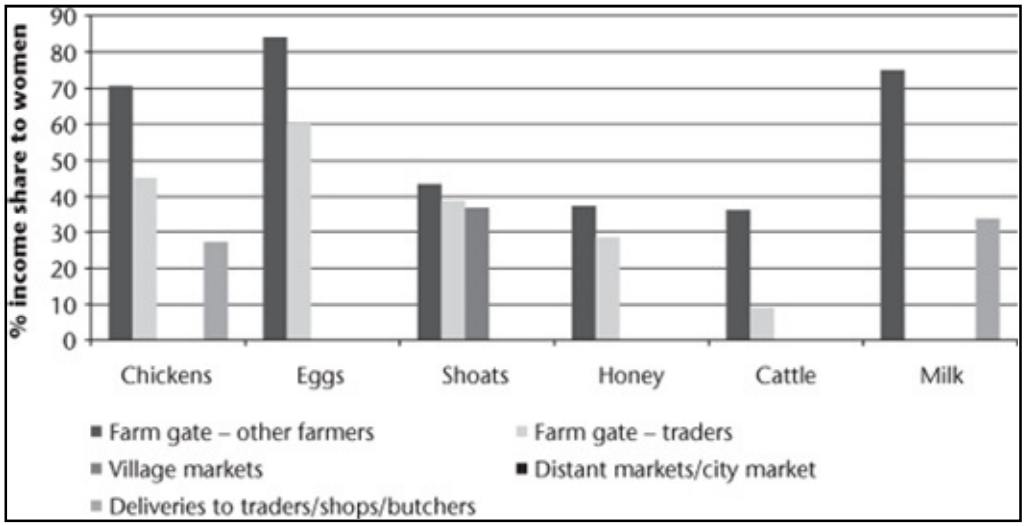

Figure 6: Percentage income share to women based on where livestock was sold in Muhoza sector

Similar to Urban areas, in rural Musanze areas, women managed the highest proportion of income from chickens and eggs when these products were sold at farm gate to other farmers. Selling eggs at farm gate to traders and not other farmers also reduced the income share going to women by close to 20 per cent. Unlike in urban areas, however, the proportion of chicken income managed by women was much higher when chickens were sold to village markets than when sold at farm gate to other traders.

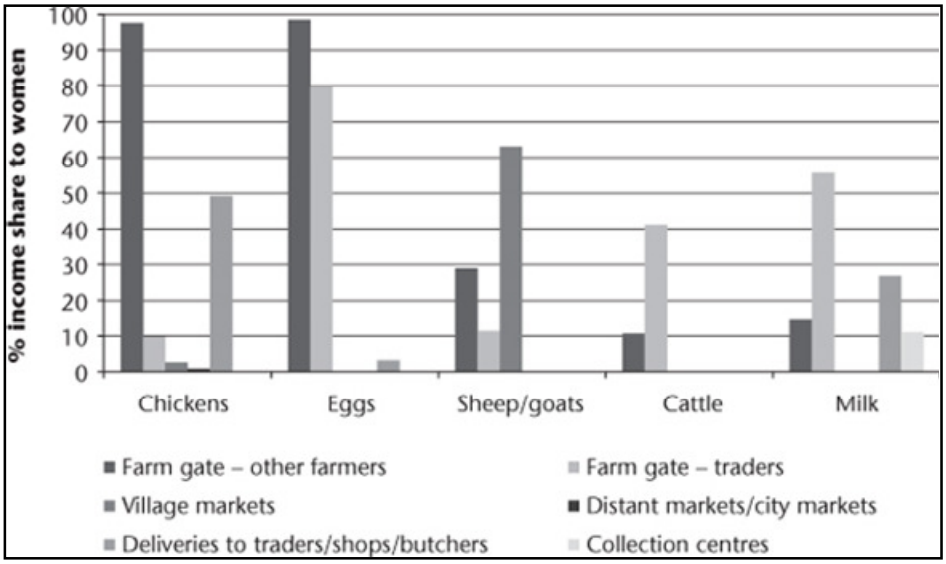

Figure 7: Percentage income share to women based on where livestock was sold in rural areas of Muhoza

Income management patterns were less clear for the sale of cattle, sheep, goats and milk. Women managed the largest income share from the sale of sheep and goats when these were sold in the village market and from the sale of cattle if cattle were sold at farm gate to other traders. This could be due to lower sales of these species among farmers. In Muhoza sector, most common sales were of chickens, cattle, sheep and goats.

4.7. Influence of Women's Participation in Markets on Their Income Management

Women's participation in market transactions can influence the extent to which they manage income. Often, development programs focus on increasing access to markets by women to enhance their benefits and management of income from these market linkages. In Muhoza sector, this was true across all the species and products. For chickens and milk, women managed close to 100 per cent of the income when they sold the, irish potatoes, chickens and milk themselves, compared to only 26 per cent and 17 per cent for food stuffs, chickens and milk respectively when these products were sold by men. Even in the case of sheep and goats, women managed 60 per cent of the income when they made the actual sale, compared to 35 per cent when men made the actual sale as shown in the below figure.

These results show the value of linking women farmers to markets so that they are able to do the negotiations and carry out the transactions themselves. Women often face different constraints in participating in markets, including issues of mobility, balancing household reproductive and care work with market participation, access to information and infrastructural facilities in markets, low

literacy and negotiation skills. While development programs aiming to increase benefits to women through markets have focused on addressing these constraints, these results show that if addressing these constraints can facilitate women's direct participation in markets they will also influence intra-household income management and resource allocation in favor of women. Such programs, however, need to work with men as what little income women control may substitute for former male household member contributions if men retain more of their income for their own individual use.

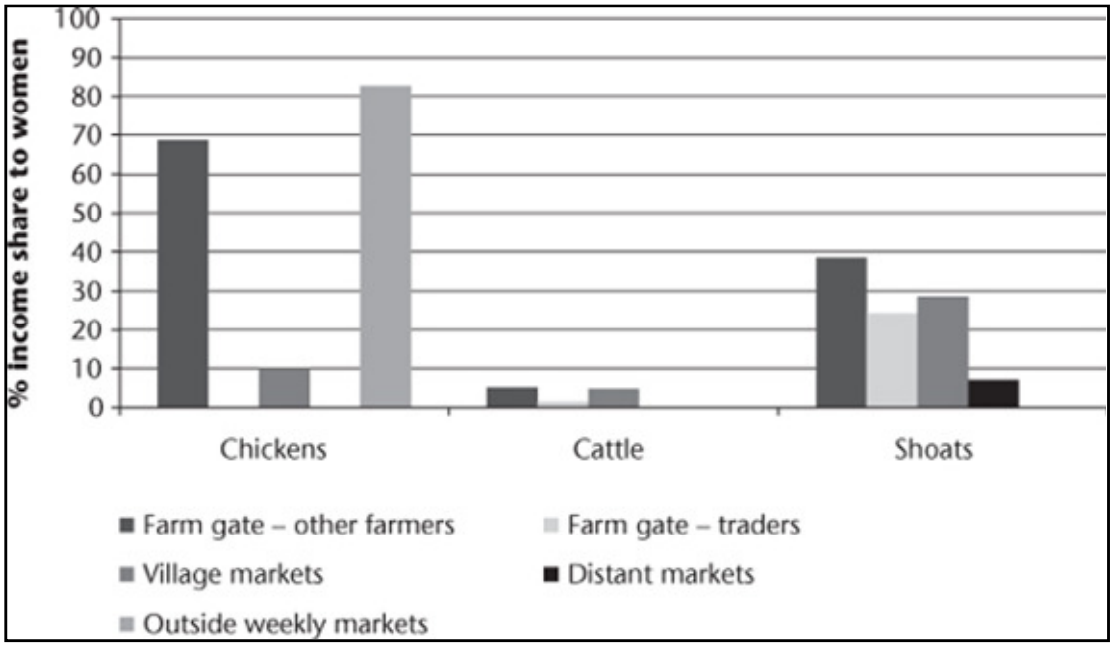

Figure 8: Percentage income share to women based on where livestock was sold in Muhoza sector

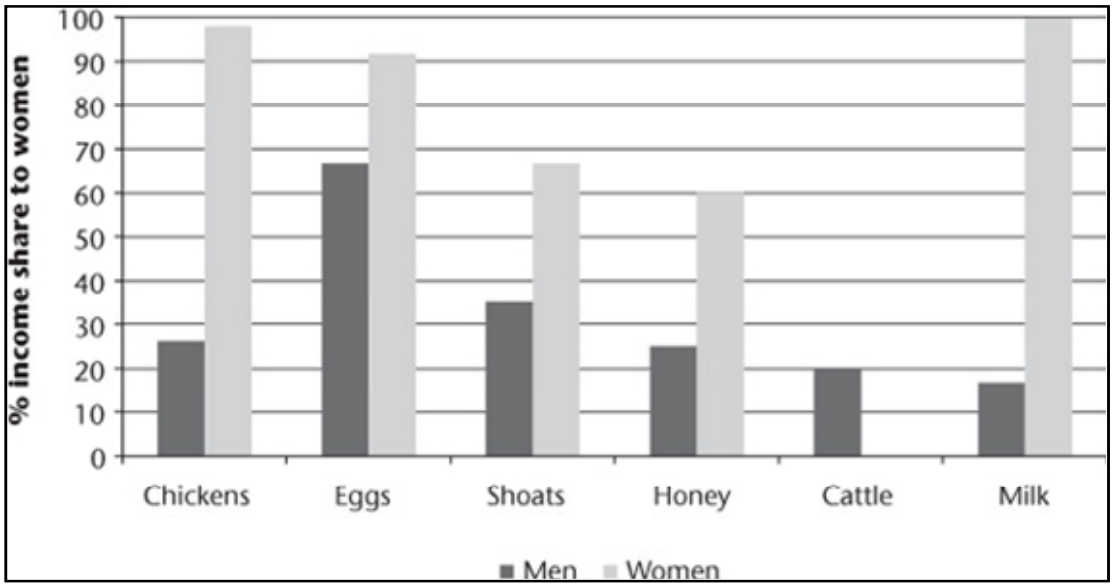

Figure 9: Percentage income share to women depending on who sold livestock in rural muhoza

4.8. Influence of Total Incomes on the Income Share to Women

There is both anecdotal and documented evidence on changes in control of products or enterprises once they become more commercialized or successful, or once the total income from these products becomes large (Njuki *et al*. 2011).

Although the study did not collect time series data on change in income management over time, This research study used different species and correlate the total amounts received from each and the income share that goes to women. In Muhoza, milk and irish potatoes which was the livestock enterprise through one cow per family, (that paid the most) had the lowest share of income managed by women, while sheep, goats and eggs had the lowest amounts of income and a higher proportion of the income from these was managed by women.

In deep rural areas of Muhoza sector, although there was no linear relationship between the total amount of money made from different livestock and livestock products and the income share managed by women, products or livestock that had high incomes (with the exception of milk) also had the lowest share of income managed by women (products on the left side of such as eggs and cattle).

Livestock and livestock products with lower amounts of total income (i.e. sheep and goats, honey and chickens), had higher income shares managed by women.

4.9. Regression Results

The crop intensification program has the main goal of increasing the production. With regression analysis some factors has been more meaningful on the role of crop intensification program in poverty reduction

	Coeff.	Standard error	z-score	p-value
Household size	0.004712	0.010467	0.44	0.578
Member of coop.	0.012917	0.040677	0.17	0.784
Female headed HH	0.049397	0.039133	1.11	0.127
HH head age	-0.00147	0.001378	-1.05	0.277
HH head has some schooling	-0.07151	0.028437	-2.76	0.005
HH head finished primary school	-0.14828	0.053281	-2.24	0.018
Log of non-agricultural income	0.001149	0.002612	0.49	0.542
Land size (ha.)	-0.00372	0.004322	-0.79	0.275
Years in LUC program	0.003929	0.01585	0.19	0.670
Access to fertilizer subsidy	0.149072	0.038079	4.06	0.000
Monthly visits by extension agent	0.216613	0.061867	3.41	0.000
Seasonal visits by extension agent	0.113728	0.041075	2.77	0.006
Log of value of agricultural production	0.114809	0.020024	5.73	0.000

Table 36: Probit regressions results and increase in yield

Most of the production variables are statistically significant. For example fertilizer subsidies (significant at 1%) and positively affect yield, monthly extension services (1%) and positively affect yield, and seasonal extension services (5%) and positively affect yield.

	Log of agricultural output				Log of agricultural productivity			
	Coeff.	Standard error	z-score	p-value	Coeff.	Standard error	z-score	p-value
Land size (ha.)	0.116757*	0.06080	1.83	0.055	-0.13239*	0.07058	-1.76	0.080
No. of years in LUC program	0.145749*	0.05677	2.6	0.012	0.16128*	0.04542	2.78	0.007
Access to fertilizer subsidy	0.03944	0.12736	0.29	0.604	-0.0123	0.13582	-0.15	0.774
Monthly visits from extension agent	0.255995	0.17359	1.88	0.048	0.134021	0.16664	0.72	0.323
Seasonal visits from extension agent	0.153083	0.11804	1.27	0.173	-0.01381	0.10747	-0.13	0.792
HH size	0.082139	0.02453	3.64	0.001	0.021963	0.01896	1.5	0.112
Member of coop	0.181009	0.13805	1.19	0.208	0.211196	0.12525	1.59	0.103
Female headed HH	-0.16121	0.12067	-1.22	0.200	-0.05166	0.15258	-0.2	0.663
Age of HH head	-0.00481*	0.00179	-1.66	0.082	-0.01067**	0.00199	-3.8	0.001
HH head has some schooling	0.312438**	0.10010	3.13	0.005	0.240851*	0.09108	2.64	0.014
HH head finished primary school	0.549422*	0.14674	3.74	0.001	0.281692*	0.13252	2.13	0.044
Log of non-agricultural income	-0.06859***	0.01343	-5.11	0.000	-0.06143**	0.01335	-4.6	0.000

Table 37: OLS Regression Results, Agricultural Output and Productivity
significant at 10%, **significant at 5* and ***significant at 1

It should be noted that these variables are among the services provided by the program and the fact that they affect positively the production signifies the importance the program has on the crop yield.
However, other variables like membership to cooperative, household size, age of household head, female headed household are not statistically significant.
The analysis further shows that households yield vary depending on location. For example households in near training center. This may suggest that though the participants receive same level of services, there is variation in yield between locations and agro-ecological factors may be one of the factors influencing the variation (though this need further analysis). It is also evident that the number of years the participants spend in the program does not affect largely the level of yield.
Table 36 explores factors affecting production and productivity of the households surveyed. The factors considered also household characteristics and other factors related to activities of the CIP. On the level of production; the land size (10%), number of years in CIP (10%), the age of household head 5%), if household has schooling (10%) and if head of household had finished primary school (10%) the education level are statistically significant. However, looking on the coefficients the results suggest several things. As expected the number of years in CIP, access to extension services, membership to cooperatives and the level of education affected positively the production. The finding seems to suggest also that the inverse relationship of land- size and productivity seem to be clear here as the sign on land size is negative. This can be used to say that CIP is not favorable to a small holder with a small plot. However as noted earlier the CIP in Rwanda is based on tapping economies of scale and use efficiently the provision and administration of inputs resulting in higher yield per unit of input. It would be certainly be inefficient to offer these services to small farmers scattered around different locations with small plots of different crops.
The non-agricultural income affected equally both production and productivity at 1% of significant. This result suggests that off-farm income contributes to large extent the level of agricultural production. Indeed, apart from ordinary small trade that rural people might be involved in and some remittances; the government has set a numerous rural financing schemes which also constitute non-agricultural income. The level of significance of non-agricultural income may also a good indication that farmers are keenly investing in agriculture especially for the services which are not covered by CIP program. These may include paying for the labor, purchase of inputs such improved seeds and fertilizer where these are not fully provided. Additionally, though age of household head was significant (10% for production and 5% for productivity), it is negatively related to both.

5. Summary, Conclusions and Recommendations

5.0. Introduction

This chapter presents the summary of the findings with respect to the study objectives seen in the introductory chapter, and this also guides the drawing of conclusions and recommendations which are all contained in this chapter.

5.1. Summary of the Findings

Some farmers were not aware of the implementation strategy of the CIP programme in their respective areas, and the majority of these were women. Nevertheless, the majority were comfortable with the delivery methods of extension services used in the programme.
While the implementation strategy of the CIP programme was expected to be uniform in the whole district, personal weaknesses of the concerned persons were detrimental and, therefore, creating negative attitudes in the recipients towards the programme.
All the CIP beneficiaries were accessing extension services unlike the non-CIP beneficiaries of whom the majority were not accessing the services. Basing on the Chi-square values, it was established that participating in the CIP programme and accessibility to extension services had a strong and statistically significant relationship.
The programme has empowered farmers to access modern farming technologies which they have mostly acquired through trainings. Therefore, the number of farmers accessing these technologies were noted to be participating in the CIP programme.
The CIP beneficiaries had also registered greater improvement in their access to improved crop varieties compared to their counterparts. The number of farmers participating in the CIP programme whose access to improved crop varieties had improved was three times higher than that of non-CIP participants. Therefore, the programme has greatly empowered the farmers to access improved crop varieties.
It was also established that the majority whose access to improved crop varieties had improved had also registered an increment in crop yields although others, despite their improved access to improved crop varieties, their crop production levels had remained the same and in other instances declined. However, basing on the statistics, improved access to improved crop yields is potentially important in bringing about improvements in the farmers' production levels. Therefore, from this, it is apparent that the CIP programme has not only empowered the farmers to access improved crop varieties but also improve their production levels.
The study findings reveal that the majority of the farmers whose access to improved crop varieties had improved also dominated in the category who felt more empowered than before. This further confirms the positive impact the CIP programme has had onto farmers in respect to empowerment.
It was established that all CIP participants owned livestock and the majority revealed that their access to improved livestock breeds had improved unlike before. Through the arrangement of sharing the improved breeds of male animals as well as young ones, participating farmers in the CIP programme were in a better position to acquire improved breeds of animals than their counterparts. However, no big variance was noted between the participating farmers in the CIP programme whose access to improved livestock breed had improved and their non-participating counterparts.

In respect to farmers' access to improved livestock breeds and their levels of empowerment, no sharp variations between the empowerment levels of those whose access to improved livestock had improved and those whose access had remained constant or even reduced. This implies that access to improved livestock was not as significant as other variables in as far as influencing farmers' empowerment levels was concerned.

The study findings further revealed that no major improvements in farmers' access to the markets had been realized since the inception of the CIP programme as the number of farmers whose access to the markets had been improved was very small. However, the little improvement in farmer's access to markets was noted more among the CIP beneficiaries than none. To this extent, it is apparent that the CIP programme has empowered the participating farmers to access the markets. The statistics also show that the majority of the farmers who felt more empowered had not registered any improvements in their market accessibility.

The study findings reveal that a considerable number of farmers had realized an improvement in their bargaining power and the majority of these were from the CIP beneficiary category which they attributed to better information flow about market prices as well as improved quality of the produce. With respect to farmer empowerment, it was established that the majority of those whose bargaining power was stronger than before the introduction of the CIP programme felt more empowered.

It was further established that the CIP programme has helped to empower the participating farmers to increase their percentage of produce that is marketed through improved levels of production and changes in the farmers' production orientations. The commercialization of agriculture which has been the primary objective of the CIP programme has changed farmers' production objectives from consumption-based to market-based, a factor according to the study findings has empowered the farmers to increase the share of the produce that is marketed.

The study findings reveal that the level of income highly correlates with empowerment and the majority of the farmers whose income levels had increased were participating in the CIP programme. It was further established that the majority of those whose incomes improved or remained constant felt more empowered than those whose income declined, and the majority were non-CIP participants. From this, it is apparent that through improving farmers' incomes, the CIP programme has contributed to their empowerment.

In respect to community participation which was established to be an indicator of empowerment, the study established that the participation of the majority of the respondents in community activities had improved, although this improvement was noted more among the CIP beneficiaries than the none. To this extent, the study findings were consistent with Mugarura et al that the CIP programme has surely empowered the beneficiaries not only to participate in its activities but also those of the community at large.

Access to information was also established to be an indicator of farmer empowerment and basing on this, it was noted that all the participating farmers in the CIP programme had registered an improvement in their access to information in comparison to the non-participating farmers. To this extent, it is therefore, apparent that the programme has largely empowered the farmers in this respect.

Another area in which the CIP programme had empowered the beneficiaries was improved food and nutrition security situation. The study findings revealed that the majority of the respondents whose food security had improved were those participating in the CIP programme which clearly indicated the contribution the programme has made towards farmer empowerment. A statistically significant relationship was noted between farmers' improvement in food and nutrition security and farmer empowerment. Infact, those whose food and nutrition security had improved also felt more empowered than their counterparts.

Despite the decimal representation of women in the study sample, the study findings revealed that the men dominated in the category of those who have been empowered. This further confirms the findings from previous studies that highlight gender inequality in household production and empowerment.

The majority of the respondents had registered improvements in the way they prepared and kept their farm records, but this category was also dominated by those who were participating in the CIP programme. Besides, the majority of the respondents whose farm record preparation practices had improved also indicated that they had been significantly or modestly improved.

The study findings further reveal that the majority of the respondents were not yet confident in their farm management practices, implying that extension services are still needed. This according to Zimmerman and Rappaport implies that the empowerment process is still incomplete. Despite this, however, the majority of the respondents had positive attitudes towards the CIP programme in respect to farmer empowerment.

There are a number of other empowerment programmes in Muhoza sector and they are spread in education, health, political and economic spheres. It was noted that policies like universal education both at primary and secondary levels, decentralization, access to micro-credit and civic education especially during elections are all aimed at empowering the people. However, apart from access to micro-credit other empowerment programmes were said to be ineffective in the study area.

5.2. Conclusions

The implementation of the CIP programme in Muhoza sector conforms to the implementation guidelines set by the line ministry, although in some villages especially Muhoza, the implementation of the programme has met numerous challenges which have created negative attitudes among the farmers both beneficiaries and non-beneficiaries towards the programme.

5.2.1. Implications for Practice

The various supply chain actors in the field could benefit from and use the outcomes of applied research by working on innovative solutions and investing in those areas (that is, commodities, stage of the food supply chain and countries) where they will have the greatest beneficial impact. In turn, they could also feed research and policy makers with information on why food losses and waste are occurring, that is, what the bottlenecks are in tackling food losses and waste, and their relative importance.

This study, if anything, has shown that the link from reducing food losses and/or waste to food security and welfare for producers and consumers is not as straightforward as the literature seems to suggest using standard economic theory. Many factors are shown to play a role, which should be taken on board by further applied research to investigate broader societal impacts. This would greatly improve the information base for policy making, which is currently being driven by mere considerations of the size of food losses and waste, not their impacts on society, and in turn focuses too much on addressing the size of the problem, thereby often ignoring the underlying causes. It would allow for better targeted policies and resources being devoted to areas where impacts are shown to be most beneficial.
Farmers have largely been empowered in several areas like access to better farming technologies, improved crop varieties and livestock breeds, market but according to the findings, CIP beneficiaries have been more empowered than their counterparts in these areas. Therefore, the CIP programme has greatly contributed towards farmer empowerment.
Although access to extension services by farmers had generally increased, those participating in the CIP programme were accessing these services more than their counterparts, implying that participating in the CIP programme is strongly related to improved access to extension services.
Much as the CIP programme has empowered the farmers in the study area, women still lag behind in the whole empowerment process. The number of women who felt empowered ever since the programme was introduced in the area was sharply lower than that of men.
The majority of the respondents were comfortable with the delivery strategies of extension services under the CIP programme despite the fact that some pockets of ignorance about the strategies were noted among some farmers.

5.3. Recommendations

There is need for the sub-county CIP team to conduct periodic reviews of the programme in the area in order to document the successes registered, lessons learnt and challenges met in the implementation of the programme. This would help to improve the design and implementation of the programme.
The implementation team should pay much attention to gender issues at all stages of programme design and implementation. This will help to harness the contribution of both genders in the design and implementation processes of the programme which highly contributes to its success.

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