THE IMPACT OF THE GIRINKA ONE COW PER POOR FAMILY PROGRAM ON HOUSEHOLD INCOME IN GATSIBO DISTRICT, RWANDA

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University. No part of this work should be reproduced without the prior permission of the author and / or Kenyatta University

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DEDICATION

Dedicated to my loving father, and my deep good memories to my irreplaceable late mother.

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ABREVIATIONS AND ACRONYMS

GDP: Gross Domestic Product

PSTA: Plan Strategique pour la Transformation de l'Agriculture

MINECOFIN: Ministry of Finance and Economic Planning

EDPPRS: Economic Development and Poverty Reduction

RSSP: Rural Sector Support Project

ADRA: Adventist Development and Relief Agency

UCRIDP: Umutara Community Resources and Infrastructure Development

DDP: District Development Plan

MDG: Millennium Development Goals

MINAGRI: Ministry of Agriculture

ATT: Average Treatment on the Treated

ABSTRACT

Low agriculture productivity and arable land distribution is a major challenge in Rwanda. The obvious consequences is that a substantial number of rural families who subsist on agriculture have less than 1ha, and where there is no use of fertilizers and most of that land is not arable which will cause land degradation, poverty and low household income. In the vision 2020, Rwanda intends to move from a low level income country to a middle level economy by 2020. The Girinka program is one of the strategies towards these objectives. Its aim is to give to every poor family one cow that will help the poor families to increase their crop production by using manure, increase their income and their nutrition at the household level and country wide as well. It is against this background that the study evaluates the impact of one cow per poor family or Girinka program on household income in Gatsibo district in Rwanda. The study was an attempt to fill the gap of empirical understanding of the impact of Girinka program that was introduced in 2006 in Rwanda. The study objectives were to analyse the impact of the program on household income, on crop production at the household level and to evaluate the constraints facing the implementation of the program. The study has employed the propensity score matching (PSM) approach to analyze the impact of Girinka program on household income in Gatsibo district, using a cross sectional data of households participating and non-participant in the program, collected using a semi structured questionnaire in the region. The findings have shown that the program has a positive impact on household income and crop production at the household level. The logistic regression of the factors that influence the participation in Girinka program, four factors came out significant which are gender, household size, land size and crop input. The study also showed that according to the response of the participant; that corruption was not a main constrain during the implementation of the program, that follow up of local leaders was a constraint, that lack of information was not constrain, that training of beneficiaries was a constraint. The study also recommended the implementation of the program in other areas out of Rwanda as one of the policies basis for improving poor household livelihood, and this study recommended as well for further research of the impact of the program on milk production in the country.

CHAPTER ONE

1. INTRODUCTION

Rwanda's economy is based on agriculture like most of the countries in Africa, with more than 90% of the population engaged in subsistence agriculture. The agricultural sector contributes 43% of the GDP and 90% of the export earnings. Other agriculture products account for 8% while food crop and livestock contribute 23% and 12% respectively to the GDP (MINAGRI, 2009). Apart from contributing to the country's GDP, livestock plays an important role in the social economic well being of the population (MINAGRI, 2009).

Livestock is a source of food especially for milk and meat to the population. They can provide these all year round which are important in ensuring food security. As a business, the productivity or income from livestock is an inflation-proof investment. As such, they are important assets which can be crucial for household financial survival in times of crises. In addition, they can also be sold to contribute to the income of the farmer (MINAGRI, 2009).

Livestock are central to the smallholder farming systems. The poor use them as a source of cheap manure and of substitutes for synthetic fertilizers which are expensive. The use of manure is an efficient and sustainable method for maintaining soil quality and water retention. In addition, livestock integrated with crop farming can stabilize and improve farming if pasture is planted on terraces to stop soil erosion thereby improving crop yields and at the same time providing animal

feeds. This would be important for Rwanda, a country facing severe soil erosion because of the extensive hilly topography.

Livestock provide a range of other benefits including hides and skins, fuel for cooking and appropriate transport for carrying water, goods and people. It therefore plays a significant role in the culture of the Rwandan people. In addition, animals provide traction that is important in agricultural production. In Rwanda cow dung was traditionally used in the process of making bee hives and decorating houses.

After 1994 genocide, Rwanda needed to have a vision of its future. The Rwanda vision 2020 was a result of a national consultative process that took place in Rugwiro village in 1998-99. The vision 2020 has six pillars which are;

1- Good governance and capable state.
2- Human resource development and a knowledge based economy.
3- A private sector led economy.
4- Infrastructure development.
5- Productive and market oriented agriculture.
6- Regional and international economic integration.

In the framework of implementation of the 2020 vision and the Poverty Reduction Strategic Plan, the government of Rwanda has chosen to make rural development and agricultural transformation, to spearhead a new era of quick and sustainable development. It is predicted that the sector will grow of 5% to 8% so as to reach its expected objectives (PSTA, 2004).

To achieve the 2020 vision gaols, the government of Rwanda in August 2006 instituted the "one cow per poor family program" or the Girinka program. It aims at giving the poorest household in the country support to raise milk for home consumption. This program was set up and was implemented in November 2006 with the objectives to bring down poverty levels of rural households, as well as reduce the malnutrition rates among children less than five years old.

1.1 BACKGROUND

The poverty in rural areas

The poverty profile of the population shows that 67% of poor people are in the rural areas. On the other hand, poverty and living standards depend on land and livestock holdings. In Rwanda, the combination of cattle and land holdings has led to six categories of poverty indicators according to Ubudehe classification:

i) Destitute with no land, do not keep animals and must beg for food (Umutindi nyakujya)

ii) Very poor, may have little land but can work but do not keep animals (Umutindi)

iii) Poor, has land to produce food but no savings (Umukene)

iv) Poor, has a bit more land keeps some animals, besides subsistence has more income to satisfy other needs (Umukene wifashije)

v) Rich in terms of food security has land, keeps animals and may access paid employment (Umukungu)

vi) Rich, has land, animals paid employment to maintain a good living standard (Umukire)

What is very clear from the classification is that lack of livestock is associated with a higher level of the poverty and an individual who owns livestock moves a step upwards away from poverty. The entry point of this initiative will therefore be to assist the people who own land and can have enough feed for their animals so that they move away from the poverty line. In

Rwanda, agriculture will be the major household income earner but livestock will be an integral part of the bio-physical and economic importance of cropping providing inputs in terms of manure and consuming outputs mainly milk.

Gatsibo and Girinka program

Gatsibo is one of the districts that form what used to be the Akagera National Park before 1994. After the liberation war in Rwanda in 1994, that part of the national part was re-demarcated to accommodate human settlement, making the former national park slightly smaller. Most of the Rwandans who came to settle in this area were predominantly pastoralists who kept cattle as their major economic activity.

With decentralization and national agricultural reform, the district adopted new methods of cattle keeping with an aim of increasing productivity and citizens' welfare. This was done by introducing artificial insemination and cross breeding of the traditional long horned cattle. As a result, milk yields have grown tremendously so has been meat production. Today Gatsibo district is one of the major suppliers of milk and high quality meat to Rwanda's population.

However, results showed that households whose main source of income came from agriculture wage labour, income at the district level was very low, and for such households 91% lived below the poverty line in 2005/2006 (MINECOFIN, 2008). Gatsibo district now has 28.1% of households living in the bottom two categories of extreme poverty according to UBUDEHE classification (EDPRS, 2011). The partners of rural development and human development in Gatsibo District are Rural Sector Support Project (RSSP), CARE international, Adventist Development and Relief Agency (ADRA) Rwanda, Umutara Community Resources and Infrastructure Development (PEDERCIU/UCRIDP) and World vision.

The Economic Development Poverty Reduction Strategy (EDPRS) has reduced poverty to some extent through improved methods of farming that has enhanced food security, cash crops sales. The one cow per poor family is one of the programs that have contributed in reducing poverty in Gatsibo District by increasing income of the poor households (EDPRS, 2011).

In 2006, the government of Rwanda implemented the Girinka program in order to increase household income. The strategy was to give one cow to a poor family, and then the calf is given to a neighbour who in turn keeps it and gives the second calf to the next neighbour and so on. The household, that received the cow, gives the first calf to the neighbour as a refund to the government, and then subsequent calves will belong to the household. Households in Gatsibo district, like other districts in Rwanda have participated in Girinka program. It is now the testimonies of the residents of Gatsibo district who were pleased to receive these cows. The program has boosted their income and now they can earn a daily income from milk sold and milk production as well as crop production as a whole in the district.

The participation of a poor household in Girinka program will generate its income by selling the milk from the cow given, and then contribute in milk production through famer's organisation at the district level, as well as enhance crop production to meet household food needs. In November 2006, when the program was implemented, and has several challenges like; lack of training on the program, lack of communication and the misunderstandings of the program made at implementation as well as poor monitoring. Therefore, it has conducted to a certain level of corruption, the cow were given to the rich not to the poor family or the cow were being sold by the owner then bought a cheap one (Ombudsman report, 2008).

1.2 STATEMENT OF THE PROBLEM

The Girinka program was implemented in Gatsibo district among other districts in Rwanda, to improve the livelihood of poor households. In Gatsibo, this program started in 2006 and still continues. However, there is no information evaluating the impact of the program.

The government of Rwanda had come up with the "Girinka program" which has been locally scored as the biggest economic development conscious project at the household level in the country. The government spent a lot of money on several programs to improve health, nutrition, education and other social sectors. However, very few programs benefit from studies that could determine whether or not they actually made a difference in terms of income. This includes the "Girinka program". It is very crucial to know the impact of the Girinka program in order to understand if it has a positive or negative impact on the welfare of the poor households, so that the policy makers and donors would know whether it has meet its objectives, or weither it can be replicated elsewhere.

This study intends to close this existing information gap which is to evaluate the impact of one cow per poor family program on household income in Gatsibo district.

1.3 OBJECTIVES

The overall objective of this study was to analyze the impact of one cow per poor family program in Gatsibo district.

The specific objectives of this study were to:

1. Assess the impact of the program on household income in Gatsibo district.
2. Assess the impact of the program on crop production at the household level in Gatsibo district.
3. Assess the constraints facing the implementation of the program.

1.4 HYPOTHESES

The hypotheses to be tested in this study are that:

1. Participation in the program has no effect on household income in Gatsibo district.
2. Participation in the program has no effect on crop production at the household level in Gatsibo district.

1. Participation in the program has effect on household income in Gatsibo district.
2. Participation in the program has effect on crop production at the household level in Gatsibo district.

1.5 JUSTIFICATION OF THE STUDY

This study has provided information to policy makers regarding the vital role of the Girinka program and its contribution on the income of the poor families that have participated in the program as well as in crop production as a whole at the household level in Gatsibo district.

In the District, Economic Development and Poverty Reduction Strategy (EDPRS), District development plan (DDP), and Millennium development goals (MDGs) provides a medium-term framework for achieving the country's long term development aspirations as found in the Rwanda's Vision 2020 and this study will help to formulate appropriate recommendation for the development of the program. Donors, NGO's and other intermediary organizations can easily identify the weaknesses of the program and intervene in an efficient and effective way to develop it.

In 2004, the first phase of strategic plan for agricultural transformation was initiated followed by a wide range of government initiatives and policies aimed at transforming agriculture were implemented in an effort to meet the population growth. The government initiatives include the crop intensification program and one cow per poor family program which is locally known as Girinka as a well as a performance contract (Imihigo) and exemplary site (agasozi ndatwa) (MINAGRI, 2009).

As a way to achieve Vision 2020 and the Millenniums goals to eradicate poverty, Rwanda has improved the agricultural sector by sensitizing its citizens about farming techniques to increase productivity. This will help do wipe out poverty and improve the standards of living for everyone. The achievement of one of the objectives of vision 2020 in Rwanda; is to create a productive middle class and fostering entrepreneurship. It is envisaged that with these reforms,

Rwanda will transform from subsistence agriculture to a knowledge-based society, with a vibrant class of entrepreneurs.

One of the greatest challenge the agricultural sector faces is soil degradation, and Girinka program will provide to the households a portion of manure that will contribute in soil quality and water retention. This study therefore seeks to provide some crucial information on the impact of one cow per poor family (Girinka program) on poor household income in Gatsibo district, Rwanda.

1.7 THEORITICAL FRAMEWORK

1.7.1 The fundamental theory of impact evaluation

Impact evaluation of programs and events such as adoption of technology or participation in projects are intended to provide policy makers and other stakeholders with feedback information regarding the net effects of such interventions on the target group or institutions (Baker, 2000). The resultant 'impacted' outcome is argued to be a function of various endogenous and exogenous 'impacting' factors. Nevertheless, the daunting task lies in identifying part of the change in the 'impacted' outcome of the target population due to the change in the selected 'impacting' factor (treatment).This is mainly due to the unobserved or missing counterfactual outcome which makes the problem of impact evaluation one of missing data (Bryson *et al*., 2002).To effectively establish the impact of a program, the counterfactual outcome (outcome that would result without the program and vice versa) must therefore be considered.

Similarly, Baker (2000) argues that determining the counterfactual outcome is the core of impact evaluation and it must be estimated to ensure methodological rigor. The determination of the counterfactual outcome can be accomplished by methodologies broadly falling into two categories namely; experimental (randomized) and quasi-experimental (non-randomized) designs. The author argues further that, it is however, a daunting task to net out the impact of a program from the counterfactual conditions which are likely to be affected by history, selection bias and contamination.

Khandker *et al.,* (2010) also note that impact evaluation is basically a problem of missing data, since one cannot observe the simultaneous outcomes of program participants, i.e. outcome with participation (factual outcome) and outcome without participation (counterfactual outcome). It is noteworthy that, for nonparticipants, the factual outcome is the outcome without treatment whereas the counterfactual outcome would be the outcome had they received treatment. The authors argue that due to the lack of information on the counterfactual, the next best alternative is to compare the outcomes of treated households with those of a comparison group that has not received treatment. By doing so, one attempts to pick a comparison group that has similar characteristics to the treated group, such that the treated group would have had similar outcomes to those in the comparison group in absence of treatment. A successful impact evaluation therefore depends on finding a good comparison group.

The fundamental approach to consider in evaluating the impact of participating in one cow per poor family would be to include a dummy variable equal to one in the outcome equation if the household had been in one cow per poor family and zero otherwise, and then, apply Ordinary Least Squares (OLS).

That basic relationship is a linear function of vector explanatory variables (X_i) and an adoption or use dummy variable (D_i) specified as follows;

$$Y_i = \alpha \boldsymbol{X}_i + \beta D_i + \mu_i \quad (1)$$

Where;

Y_i is mean outcome (output) of the household

D_i is a dummy variable, $D_i = 1$ for participating in Girinka program and $D_i = 0$ otherwise.

μ_i is a normal stochastic term reflecting unobserved characteristics that also affect *Y*.

$\boldsymbol{X}_i$ is a vector representing household and farm level and household characteristics. Equation 1 reflects an approach commonly used in impact evaluations, which is to measure the direct effect of the program *D* on outcomes *Y*. This approach, however, is likely to generate biased estimates because it assumes that to be in Girinka program is exogenously determined whereas it is potentially endogenous. The treatment assignment is not often random due to either: (a) purposive program placement or (b) self-selection into the program. That is, programs are placed according to the need of the communities or individuals, who in turn self-select based on program design and placement. Self-selection could be based on observed characteristics, unobserved factors, or both.

The choice of being selected to participate or not to participate in Girinka program is dependent on the household characteristics; hence the decision of being in Girinka program depends on the characteristics of the household rather than random assignment.

Assuming a risk neutral farmer, the index function to be in Girinka program can be expressed;

$$G_i = \gamma X_i + e_i \quad (2)$$

Where;

G_i is a latent variable denoting the difference between utility from participating in Girinka program (U_{iA}) and the utility from not participating in Girinka program (U_{iN}). The household will participate in Girinka program if $G_i = U_{iA} - U_{iN} > 0$. The term γX_i provides an estimate of the difference in utility from participating in Girinka program ($U_{iA} - U_{iN}$) by employing the household and farm-level characteristics, X_i as explanatory variables, whereas e_i is an error term.

In the estimation of equations (1) and (2), it should be noted that the relationship between participating in Girinka program and the outcome such as income could be interdependent. Therefore, while participating in Girinka program could increase output such as household income; richer households may have an advantage toward the Girinka program. Thus, the assignment of treatment is not random, with the group of poor families or households being systematically different. This is likely to cause selection bias. Selection bias specifically occurs if unobservable factors influence both the error terms of the outcome equation (1) μ_i, and participating in Girinka program choice equation (2) e_i, resulting in correlation of the error terms of the outcome and technology choice specifications. In other words, the correlation between the two stochastic terms is greater than zero; in this case, ordinary least squares (OLS) will lead to biased estimates, including the estimates of the program effect (Ali and Abdulai, 2009; Becerril and Abdulai, 2010).

1.7.2 Girinka program as an input in production

As noted in Abdoulai and Ali (2010), assuming that participation in Girinka program is a dichotomous choice, the net benefit of participating in Girinka program overweight those who are not participating in the program. A further assumption is that the project participation is expected to affect the demand for inputs, yields and incomes. To link the adoption or project participation decision with these potential outcomes, we consider a risk-neutral farmer that minimizes the total cost of production which comprises both conventional and transaction costs, subject to conventional constraints. Algebraically this can be expressed as,

Min C (**WX**) (1)

Subject to a production function specified as:

$Y(\mathbf{X}) = Y(\mathbf{W}, \mathbf{X})$ (2)

Where;

W is a vector of input prices.

X is vector of all production inputs.

Y is the output produced and sold.

The farmer's optimization problem is therefore to choose **X** which minimizes the total cost of production subject to a given quantity of output Y_o as expressed below. Stated differently, the farmer will decide to participate in a project if such a move will minimize the total cost of production subject to a target output. (For computational ease, two inputs are used, and the production function is assumed to take the functional form

$Y = f(W, X) = Y_o = WX)$

$$\text{Min } C = W_1X_1 + W_2X_2 \quad (3)$$

Subject to:

$$f(W, X) \geq Y_o \quad (4)$$

We write out the lagrangian function for this problem as follows;

$$\ell = W_1X_1 + W_2X_1 + \lambda(Y_o - f(X_1, X_2) \quad (5)$$

First order conditions (F.O.C) for optimization yields;

$$\frac{\partial \ell}{\partial X_1} = W_1 - \lambda \frac{\partial f(X_1, X_2)}{\partial X_1} = 0 \quad (6)$$

$$\frac{\partial \ell}{\partial IX_2} = W_2 - \lambda \frac{\partial f(X_1, X_2)}{\partial X_2} = 0 \quad (7)$$

$$\frac{\partial \ell}{\partial \lambda} = Y_o - f(X_1, X_2) = 0 \quad (8)$$

By dividing equation (6) by equation (7) to allow for input substitution and then substituting the result into equation (8) we are able to obtain the conditional factor demands.

Equation (6) divided by equation (7) yields;

$$\frac{W_1}{W_2} = \frac{X_2}{X_1} = \text{input price ratio} = \text{Marginal Rate of Technical Substitution (MRTS)} \quad (9)$$

We make X_1 in equation (9) the subject of the formula and obtain;

$$X_1 = X_2 \frac{W_2}{W_1} \quad (10)$$

Then substitute equation (10) into equation (8) to obtain;

$$Y_o = X_2 \frac{W_2}{W_1} * X_2 , \quad (11)$$

Assuming the output function is $Y = f(X_1, X_2) = Y_o = X_1 X_2$ as indicated earlier.

We finally make X_2 in equation (11) the subject of the formula as follows;

$$X_2 = \sqrt{\frac{Y_o * W_1}{W_2}} \qquad (12)$$

And obtain the conditional factor demand for the vector of all production input.

The solution of the lagrangian function associated with the cost minimization problem yields, among other, X which is conditional input demand equation as functions of output **Y**, input prices **W.**

$$Y(X) = (X, W). \qquad (13)$$

1.8 CONCEPTUAL FRAMEWORK

Lack of livestock and low crop production has led to low household income and a high level of malnutrition, which is an indicator of poverty in rural areas. It is from this back ground that the government of Rwanda has introduced the Girinka program in order to increase household income and crop production. This study brought the information on impact of the Girinka program on household income in Gatsibo district and provides information for policy makers.

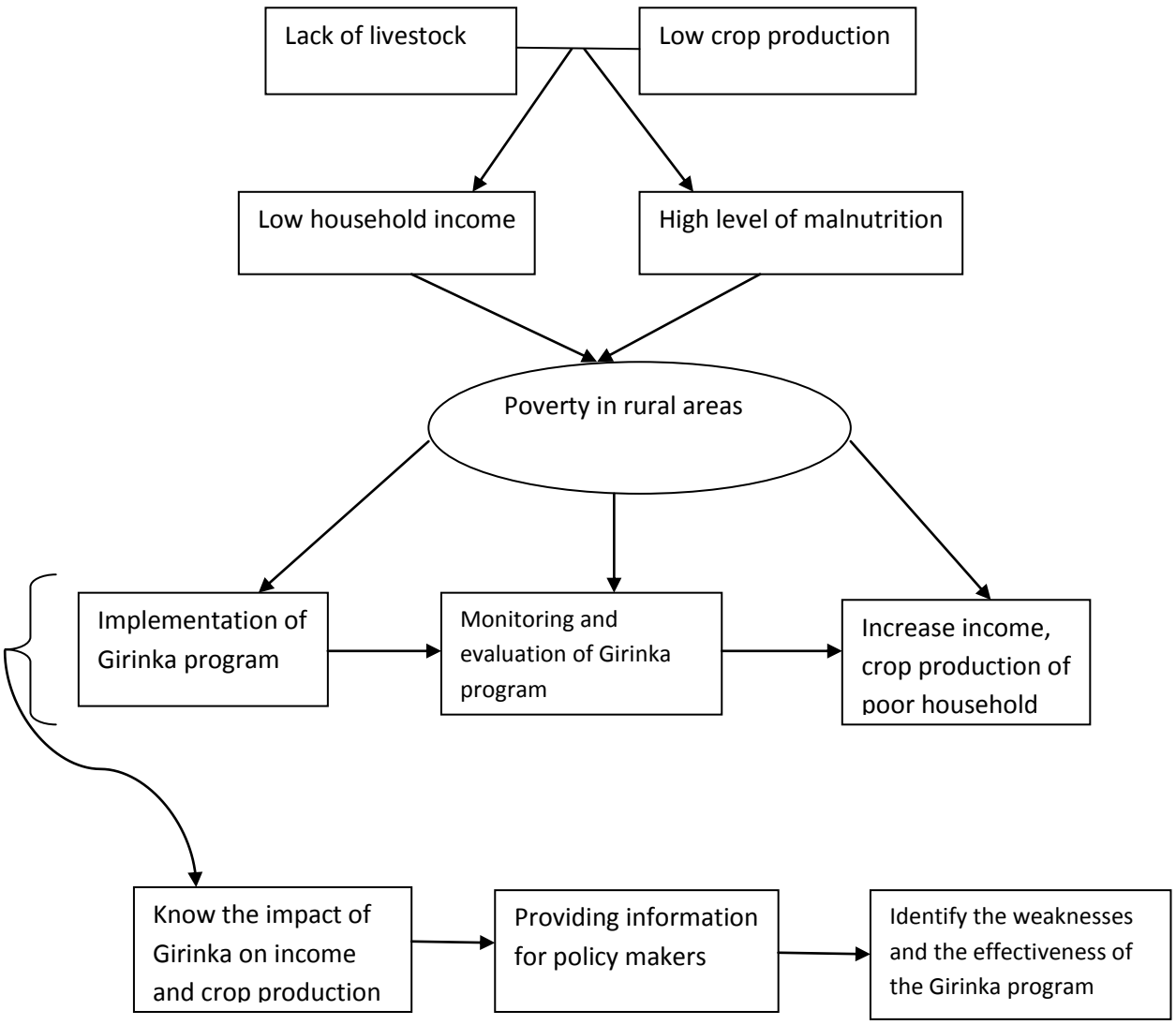

Figure 1: Conceptual framework

Source: Own conception

CHAPTER TWO

2. LITERATURE REVIEW

2.1 The empirical review

There is no existing literature on the impact of Girinka or one cow per poor family program in Rwanda; most of such studies have been conducted in other countries like Uganda. This sub-section provides a review of few of the studies that have been done using the propensity score matching on impact evaluation.

Kabumbuli and Phelan (2003), based on a survey of benefiting and non-benefiting farm households in Uganda's Mpigi district, analyses the Heifer-in-Trust scheme. Although the scheme is intended to alleviate the nutrition and income deficiencies of the poorest rural farmers through dairy production, the actual beneficiaries tend to be the less poor because of the expenses involved. Such is the fate of many development initiatives in which the benefits often do not reach their intended recipients, with the risk of widen-ing the inequality gap. On the other hand, those who did benefit from the scheme, though better off from the start, were found to be very active and enthusiastic, and it was obvious that the scheme had made a significant contribution to dairy improvement. The challenge, then, remains to devise the means by which the poorest farmers can be reached.

Ali and Abdoulai (2009) employed a propensity score-matching approach to examine the direct effects of adoption of Bacillus thuringiensis (Bt) cotton on yields, pesticide demand, household income and poverty, using cross-sectional data from a survey of farmers in the Punjab province of Pakistan. Their findings reveal that adoption of the new technology exerts a positive and

significant impact on cotton yields, household income and poverty reduction, and a negative effect on the use of pesticides. The positive and significant impact of the technology on yields and household income is consistent with the potential role of new agricultural technology in directly reducing rural poverty through increased farm household income.

Bentch, Kluve and Peters (2010), investigated the impacts of electrification on the household's lighting usage, home studying, energy expenditures and income. They used household data that they collected in rural Rwanda in villages with and without access to mini-grids. To account for self-selection processes in the connection decision they used households from the electrified villages to estimate the probability to connect for all households – including those in the non-electrified villages. Based on these propensity scores they identified counterfactual households to determine the impacts of electrification on the outcome indicators. Their findings indicated positive effects on home studying and income, but particularly on lighting usage.

The Banking Development and research unit (2012) conducted a study which the objective was to identify how remittances impact various socio-economic dimensions of remittance-recipient households. This study conducts an impact evaluation based on propensity score matching (PSM) approach by surveying both remittance-recipient households (treatment households) and non-recipient households (control households) in Dhanusha district, one of the largest migrant-sending districts in Nepal, and analyzed the impact gain resulting from remittance flows in the study area. The findings showed that receiving remittances has a positive impact on agriculture income, women empowerment, educational expenses, and also in communication means.

Robbie et al, 2012 investigated if international students face unique interpersonal, intrapersonal, and structural constraints to participation in intramural sports. Surveys were collected from 292 participants, with proportionate representation of international and noninternational students when compared with the broader university population using likert scale. Results demonstrated that international students who have participated in intramural sports experience significantly higher interpersonal and intrapersonal constraints when compared with noninternational students who also have participated in intramural sports. There were no significant differences in the three types of constraints between international vs. noninternational students who have not participated in intramural sports. It was concluded that campus recreation and international student service departments at universities need to collaborate to foster awareness, promote the benefits of participation, and assist international students in overcoming these constraints to participating in intramural sports.

2.2 The missing counterfactual and correction for selection bias

There are various methods that have been employed in impact evaluation theory to address the fundamental problem of the missing counterfactual. Each of these methods carries its own assumptions about the nature of potential endogeneity or selection bias in program targeting and participation, and the assumptions are crucial to developing the appropriate model to determine program impacts. Among the methods comprise:

a) Randomized Evaluations

Randomized evaluations are designed to address the problem of the missing counterfactual and selection bias by randomly generating an experimental group of individuals who would be

willing to participate in the program, but are excluded from the treatment. By so doing, we record success at using the randomly selected, but excluded group to be our control group and obtain their responses as the desired counterfactual. Randomized experiments have the advantage of avoiding selection bias at the level of randomization, hence providing a clear causal link between treatment and outcome. However, Randomized evaluations are limited to experimental studies, are costly and often encounter ethical challenges through the denial of the benefits of a program to otherwise eligible members of a population (Baker, (2000) and Khandker *et al.*, 2010).

b) Quasi-experimental (non-random) methods

Baker (2000) posits that quasi-experimental (non-random) methods can be employed in an impact evaluation when it is not possible to construct treatment and comparison groups via experimental design. Non-random techniques generate comparison groups that resemble the treatment group, at least in observed characteristics, through econometric methodologies, which comprise: double difference methods, matching methods, instrumental variables (IV) methods, and regression discontinuity method etc.

i) Double difference or difference-in-difference (DD) methods

These techniques compare the change in outcomes in the treatment group before and after the intervention to the change in outcomes in the control group. The difference in the outcomes of the treatment and control group gives the average treatment effect on the treatment. By comparing changes, we control for observed and unobserved time-invariant household characteristics that might be correlated with the participation decision as well as with productivity (outcome). The change in the control group is an estimate of the true counterfactual,

i.e. what would have happened to the treatment group if there was no intervention. Stated differently, the change in outcomes in treatment areas controls for fixed characteristics and the change in outcomes in the control areas controls for time varying factors that are common to both control and treatment areas (Galiani *et al.,* 2003)

DD methods are advantageous in the sense that they relax the assumption of conditional exogeneity or self selection on observed characteristics. Moreover, they provide an appealing and intuitive way to account for selection based on unobserved characteristics. The main shortcoming, however, rests precisely with this assumption: the concept of time-invariant selection bias is unlikely for many target programs in developing countries (Khandker *et al.,* 2010).

ii) Instrumental variables or statistical control methods

This approach identifies the exogenous variation in outcomes attributable to the program, recognizing that its placement is not random but purposive. The "instrumental variables" are first used to predict program participation; then an observation is made on how the outcome indicator varies with the predicted values. In this technique, selection bias on unobserved characteristics is corrected by finding a variable (instrument) that is correlated with participation but not correlated with unobserved characteristics affecting the outcome; this instrument is then used to predict participation (Baker, 2000). The IV method comprises the estimation of a two-stage regression model. The method employs the use of the extra variable, referred to the 'instrument', in the second stage of the regression which introduces an element of randomness into the assignment. This technique yields unbiased and consistent estimates in the presence of hidden bias.

The main drawback of the IV method, however, is that it will often be difficult to find at least one variable in the selection model to serve as a suitable 'instrument'. The instrument should influence the probability of treatment, without itself being determined by any confounding factors affecting outcome, i.e., without being correlated to the error term (Wooldridge, 2002; Kirui *et al*., 2011). Since this last condition is difficult to test, the choice of a valid instrument largely depends on intuition and economic reasoning. In addition, the IV approach typically reduces the precision of the causal estimates and introduces new uncertainty besides the difficult to test assumptions (DiPrete and Gangl, 2004; Kiiza et al., 2011).

iii) Regression Discontinuity (RD) method

This approach is an extension of IV method. It is implemented using program eligibility rules that aid in determining program participation and nonparticipation. A certain eligibility threshold may be established such that individuals above this distinct cut-off are placed in the treatment group, whereas those falling below are placed in the control group. This technique controls for both observed and unobserved heterogeneity. Although, the cut-off can be non-parametrically defined, it has in practice been conventionally defined via an "instrument". The limitations of the RD method include: the likelihood that the eligibility rules will not be adhered to consistently, besides the possibility of potential eligibility rules changing overtime (Khandker *et al.,* 2010).

iv) Heckman Selection Estimators

The Heckman two–step method has been widely employed in empirical research to control for hidden bias or selection on unobserved variables. This method has the advantage of modeling for the differences in both the observed as well as the unobserved attributes of both the treated and

control groups by the inclusion of the inversion of mills ratio as an extra regressor in the outcome model. The drawback to this method is that, the selection estimators are dependent on the strong assumption that the hidden variables are normally distributed resulting to the questioning of the robustness of their results in literature employing both actual and simulated data (Ali and Abdulai, 2009; Kiiza et al., 2011).

v) Propensity Score Matching (PSM)

Finally, the non-parametric propensity score matching (PSM) technique due to Rosenbaum and Rubin (1983) has also been used in addressing the problem of selection bias. The method does not depend on functional form and distribution assumptions and is intuitively attractive since it compares the observed outcomes of adopters and non-adopters of technology (Heckman, et al., 1998; Asfaw, 2010). The matching technique has heavy data requirement, however, in the absence of such data, experimental treatment effect results can still be obtained. PSM consists of matching treatment with control units (i.e., Girinka program users versus non-users) that are similar in their observable characteristics, according to the predicted propensity of adopting a superior technology (Rosebaum and Rubin 1983; Heckman *et al*., 1998; Smith and Todd, 2005; Wooldridge, 2005; Asfaw, 2010). In this study we will use this model to evaluate the impact of Girinka program on household income in Gatsibo district.

There are different matching techniques in estimating the matching scores. These include the nearest neighbour, calliper and radius, kernel and local linear matching and stratification and interval method Kernel matching, which will be used for this analysis, is where all the treated individuals are matched with a weighted average of all controls using weights that are inversely

proportional to the distance between the propensity scores of the treated and controls and covariance and nearest-neighbourhood matching, where each treated individual is matched with controls with the closest propensity score, i.e. nearest neighbour, while accounting for the difference in the mean values of the covariates between the treated and controls. Nearest neighbour methods will yield better results with large samples and therefore many neighbours. In this study PSM was used to evaluate the impact of Girinka program on household income. The treatment will be participating in the program therefore PSM will be applied to match the participant and the non participant households.

This study opted to use PSM not other methods that evaluate an impact assessment for a certain reason. Since Girinka is a program that has more than five years, this difference in difference or before and after was a suitable method for this study. When the Girinka program started, a base line survey was not done, which made the before and after method not applicable. The propensity score matching was then chosen in other to match the participant and the non participant in order to evaluate the impact of the program.

CHAPTER THREE

3 METHODOLOGY

3.1 Empirical Model

The propensity score matching

Khandker *et al.*, (2010) notes that, to calculate the program treatment effect, one must first calculate the propensity score $P(X)$ on the basis of all observed covariates X that jointly affects participation and the outcome of interest. The aim of matching is to find the closest comparison group from a sample of nonparticipants to the sample of program participants, in order to control for potential differences between participation and non-participants**.** In this case, the decision to participate or not to participate is a dichotomous or a binary choice. Classical linear methods are considered inappropriate for estimating probability response in binary decisions since they lead to heteroscedastic variances (Herath and Takeya, 2003). Wooldridge (2004) also argues that, although a linear probability model is easy to estimate, it has two key limitations: the resulting probabilities can be less than zero or greater than one and the partial effect of any explanatory variable are constant. Consequently, linear models are not often used in practice since logit and probit models are found more appealing.

Borrowing from Herath and Takeya (2003), suppose an individual farmers utility after participating in Girinka program given a vector of economic, social and physical factors X is denoted by $U_{iA}\ (X)$, and the utility without participation $U_{iN}\ (X)$. Then the preference for participation and non-participation can be defined as a linear relationship:

$$U_{iA}\ (X) = X\beta_{iA}\ + \varepsilon_{iA} \quad (1)$$

$$U_{iN}\ (X) = X\beta_{iN}\ + \varepsilon_{iN} \quad (2)$$

In this caseβ_{iA} , β_{iN} , ε_{iA} , ε_{iN} are response coefficients and stochastic terms associated with participation and non-participation in Girinka program, respectively. Assuming that the qualitative variable *D* represents participation decision, and takes the value of one if the household participated in Girinka progam, and zero otherwise. The probability that a given household will participate in Girinka program can be expressed as a function X observed covariates as follows:

$$
\begin{aligned}
P(D=1) &= P(U_{iA} > U\varepsilon_{iN}) \\
&= P(X\beta_{iA} + \varepsilon_{iA} > X\beta_{iN} + \varepsilon_{iN}) \\
&= P\{X(\beta_{iA} - \beta_{iN}) > \varepsilon_{iN} - \varepsilon_{iA}\} \\
&= P(X\beta > \xi) = F(X\beta) \qquad (3)
\end{aligned}
$$

Where P is a probability function, $\xi = \varepsilon_{iN} - \varepsilon_{iA}$ is a stochastic disturbance term, $\beta = (\beta_{iA} - \beta_{iN})$ a vector of unknown parameters which can be interpreted as the influence of the vector of independent variables on participation in Girinka program, and $F(X\beta)$ is the cumulative distribution function for ξ evaluated at $X\beta$.

The exact distribution of F depends on the distribution of the stochastic term. The Probit model assumes a normal distribution of the random term while the Logit model is founded on the assumption of a logistic distribution of the error term. Maddala (1992) notes that, since the cumulative normal distribution of the Probit and the logistic distribution of the Logit are very close to each other except at the tails, we are unlikely to obtain very different results, unless the samples are too large such that we have enough observations at the tails. Similarly, Cameron *et al.*, (2005) observe that in empirical studies either a Logit or a Probit model can be used since there is often little difference between the predicted probabilities of the two models. The differences are noted to be greatest at the tails where the probabilities are close to one or zero.

Herath and Takeya, (2003) argue that under the standard assumptions about the error term, there is no apriori reason to prefer Probit to Logit, since in practice they don't have much difference. Following this reason, a Logit model will be estimated to obtain the observable covariates that determine project participation.

According to the Logit model, the probability of a household participating in Girinka program$(iA|X) = P_i$, given the economic, social and physical characteristics can be specified as:

$$P(iA|X) = P_i = \frac{\exp\,(X\beta + \xi)}{1 + \exp\,(X\beta + \xi)} \tag{4}$$

The probability of not participating in Girinka program $P(iN|X) = 1 - P_i$ is therefore:

$$P(iN|X) = 1 - P_i$$

$$= 1 - \left[\frac{\exp\,(X\beta + \xi)}{1 + \exp\,(X\beta + \xi)}\right]$$

$$= \frac{1}{1 + \exp\,(X\beta + \xi)} \tag{5}$$

The relative odds of participating versus not participating in a Girinka program are given by:

$$\frac{P(iA|X)}{P(iN|X)} = \frac{P_i}{1 - P_i} = \frac{[\exp\,(X\beta + \xi)][1 + \exp\,(X\beta + \xi)]}{1 + \exp\,(X\beta + \xi)}$$

$$= \exp(X\beta + \xi) \tag{6}$$

By taking the natural logarithms, we obtain the Logit model:

$$\text{In}\left[\frac{P(iA|X)}{P(iN|X)}\right] = \text{In}\left[\frac{P_i}{1 - P_i}\right] = X\beta + \xi \tag{7}$$

The maximum likelihood approach can be employed to estimate the above equation.

The observable covariates hypothesized to influence participation are based on innovation diffusion theory and previous studies, notably Kirui *et al.*, (2011).

The propensity score is bounded away from 1 and 0, excluding the tails of the distribution of p(X). This assumption ensures that persons with the same *X* values have a positive probability of being both participants and no-participants (Heckman et al. 1997). If there are regions where the support of *X* does not overlap for the different groups, matching is only justified when performed over the common support region. Individuals that fall outside of the region of common support have to be disregarded and the treatment effect cannot be estimated (Bryson et al. 2002).

The probability of participating in Girinka program can be given as follow:

$p(X) \circ P(D = 1| X) = E(D | X)$

Where $D = \{0,1\}$ is the indicator of exposure to treatment and *X* is the multidimensional vector of pre-treatment characteristics.

Given the propensity score, which can be estimated by any standard probability model, the average treatment of the treated (ATT) can be estimated under conditional independence assumption (CIA) as follows (Becker and Ichino 2002):

$$\tau_{ATT} = E\{Y_{1i} - Y_{0i} \ / D_i = 1\} = E\{E\{Y_{1i} - Y_{0i} \ /D_i = 1, p(X_i)\}\}$$

$$= E\{E\{Y_{1i} \ /D_i = 1, p(X_i)\} - E\{Y_{0i} /D_i = 0, p(X_i)\} /D_i = 1\}$$

Where:

ATT= Average treatment on the treated or the impact

D_i = Is a dummy variable for participation (=1) and non participation (=0)

X_i = Determines the vector of control variables

Y_{0i} = Determines the income or crop production of the non participant

Y_{1i} = Determines the income or crop production of the participant

The expected treatment effect of participating in Girinka program is the difference between the actual income of the households participating in Girinka program, and the income of the

households who did not participate in Girinka program and this was used also on effect on crop production.

The following table gives a description of the variables specified in the model:

Table 1: Description of variables

Variable	**Nature of the variable**	**Expected sign**
Dependent Variable PICTNOT (whether a household participated in project or not)	Dummy (Participated=1, did not participate=0)	
Explanatory Variables Age of the HH head	Age in years	-
Education level of the HH head	Years of formal education	+
Gender of the HH head	Dummy (Male=1, Female=0)	+
Household Size	Number of household members	+/-
Group Membership	Dummy (member=1, non-member=0)	+
Value of the assets	Value of assets in Rwandan francs	+
Distance to the Nearest input market	Measured in Kilometres (Kms)	-
Land size	Land size (Acres)	+
Crop input	Crop input (Kg)	+

The rationale of the explanatory variables included in the model as aforementioned is based on the past studies and innovation diffusion literature.

Independent Variables

Age of the of the household head

Although age is a crucial factor in determining project participation, its influence cannot be determined apriori. As a measure of experience (Age squared), older people may participate in projects due to previous losses as result of failure to participate in projects early. On the contrary older farmers may be more risk averse and consequently be more reluctant to participate in projects (Ngugi *et al.*, 2002). However, previous adoption studies predict a negative correlation between age and technology adoption. For instance Walton *et el.,* (2010), argues that younger people are less risk averse and are more willing to make adjustments in their farming by adopting new technologies, unlike the older people. Given the nature of the project, it is hypothesized that a negative correlation will exist between age and project participation.

Education level of the household

Education is conceived to better enable farmers to visualize the benefits of participation in projects. Findings in technology adoption studies (e.g. Walton *et el.,* (2010), indicates that education improves the analytical ability of the decision makers, hence positively influencing adoption. It is noteworthy that, although the determinants of participation in projects and technology adoption may be different, there may be enough similarities to draw from the later. It is hypothesized that education has a positive influence on project participation.

Gender of the household head

Odendo *et al.,* (2010) argues that since previous research has documented evidence of inequalities in ownership and control of crucial resources between men and women, gender *per se* does not influence adoption patterns, but resource inequalities. It is perceived that male headed households are more likely to participate in projects relative to the female headed households.

Household size

The influence of household size on participation cannot be determined apriori (Herath and Takeya, (2003). Project participation may depend on whether the household has a higher ratio of members who contribute to farm work (implying more labour, hence more time for participation) or the household has a higher consumer-worker ratio (raising the need for more labour for production, hence reducing time available for participation), Odendo *et al.,* (2010).The influence of household size is thus indeterminate.

Value of farm assets

This is a proxy for the household's wealth. Ngugi *et al.,* (2002), observes that although the determination of the influence of the value of assets may be ambiguous apriori, ownership of such assets as ploughs and oxen reduce the demand for human labour, hence promote participation. In this study, a positive correlation between the value of assets and project participation is hypothesized.

Group membership

Being a member of group whether of famers, health or welfare will have an impact on the income due to the contribution that the make weekly or monthly for example for welfare groups. If you are in a farmer group, you are likely to get trainings and acquire new technologies that can have an impact on your crop production.

3.2 Likert scale

Likert scale is a technique for measurement of attitudes. The goal is to measure psychological attitudes in a scientific way. A psychometric response scale primarily used in questionnaires to obtain participant's preferences or degree of agreement with a statement or set of statements. Likert scales are a non-comparative scaling technique and are one-dimensional (only measure a single trait) in nature. Respondents are asked to indicate their level of agreement with a given statement by way of an ordinal scale.

Most commonly seen as a 5-point scale ranging from "Strongly Disagree" on one end to "Strongly Agree" on the other with "Neither Agree nor Disagree" in the middle; however, some practitioners advocate the use of 7 and 9-point scales which add additional granularity. Sometimes a 4-point (or other even-numbered) scale is used to produce an ipsative (forced choice) measure where no indifferent option is available. Each level on the scale is assigned a numeric value or coding, usually starting at 1 and incremented by one for each level. For example:

Strongly agree	**Agree**	**Neither**	**Disagree**	**strongly disagree**
1	2	3	4	5

In this study, we used five point scales to measure the third objective of the study. After the questionnaire is completed, each question was analyzed and then it was ranked.

Dependent Variables

1. Dummy (participated=1, did not participate=0).
2. Constraints score or rank.

3.3 Study area and data

3.3.1The study area

The Relief

The relief of the District of Gatsibo is characterized to the East by scarcely weak hills separated by valleys dry during a big period of the year. To the West, Gatsibo has an injured relief. The region of Gatsibo is located in a granite depression of which the average altitude is of 1550 Meters. The District of Gatsibo spreads itself on the plateau and the savannah of the East of the country. The topography of the zone is not largely mountainous and constitutes a potentiality for the introduction of the agricultural mechanization. The agricultural development of the District on the part will necessitate well heard fitting installations for the protection of the grounds. This relief offers to Gatsibo a vocation agro pastoral and tourist.

Climate

The District of Gatsibo is characterized by two principal seasons: a long dry season of which the annual average temperature varies between {PN20.3° CPN} and 21.7° C. The rain season is short and influences negatively hydraulic availability for the activities agro-sylvo one-

pastoral. The center forecast of Kiramuruzi a trump of followed by the microphone climate of the region.

Hydrographic

The District of Gatsibo is known for its weak rains and high temperatures. Those limit the availability of water. In fact, to party the river Umuvumba and Akagera as well as the lake Muhazi, there is not any other river exploitable by the inhabitants of Gatsibo. Gatsibo disposes also rivers swamps and intermittent between them. They are Kanyonyomba, Rwangingo, Kabahanga, Kagina, Kagende, Rwagitima and Ntende. This hydrographic network combined with the mentioned relief offers timeliness of irrigation. The maps of the study area are found in **Appendix** 3 and **Appendix 4**.

3.3.2 Research design

The study has employed quantitative research design to achieve the stated objectives. This involved the analysis of cross sectional data which was collected from the households using a semi-structured questionnaire.

3.3.3 Data needs

Qualitative and quantitative data was required to accomplish the set objectives. Data was required and was comprise; household specific, household specific and asset endowment of the households. A fairly large sample was required for treatment and control of study.

The survey was conducted by local enumerators who were well trained to the exercise, which was taken in June 2013.

3.3.4 Data collection and sampling procedure

This study used primary data collected in Gatsibo district. The data collections employed cluster sampling. The sampling procedure was conducted in two stages. First, for Gatsibo district, a list of all farmers who had participated in the Girinka program for at least three years will be drawn with the help of Girinka program and the district leaders. A second list of households that did not participate in the Girinka program (who are on the waiting list of Girinka program) was also obtained with the help of local administration (village elders and area agricultural extension officers) and will be verified by the Girinka program and the district leaders as non-project members. Second, the respondents were sampled from the two lists using probability proportionate to size sampling method. That is, more households were sampled from the lists using the Glenn (1992) sampling method which uses the following formula:

$$n = \frac{N}{1 + N(e^2)}$$

where:

n: sample size

N: size of the population

e: precision level chosen (for confidence interval of 95%, equal to 5% significance level)

Therefore the sample size is calculated as follow:

$$n = \frac{9167}{1 + 9167(0.09068^2)} = 120.01994$$

3.4.5 The data analysis technique

The specified empirical model (PSM Model) was estimated using STATA version 11. Data analysis has also employed likert scale to evaluate the third objective, using statistical package for statistics for sciences (SPSS).

CHAPTER FOUR

4 RESEARCH RESULTS

In this chapter is showing the results of my research.

4.1 Descriptive statistics

The results presented in table 2, show a summary of statistics of demographic and social characteristics of famers in Gatsibo district that are non participant in the Girinka program.

Table 2: Non participation in the Girinka program

Variable	Obs	Mean	Std. Dev	Min	Max
Distance from the market	60	1.935	1.612197	0.05	8
Age	60	45.66667	15.76379	22	97
Household size	60	4.95	2.118722	1	11
Education	60	1.95	0.5344092	1	3
Group member	60	0.8666667	0.3428033	0	1
Land size	60	6.51925	5.872616	0.19	30
Crop input	60	32.08333	63.0798	0	300

Source: own research

In terms of age, the average age of the non participant is 45.7 while the minimum is 22 and the maximum is 97. The mean of the household size was of 5 which explain the demographic problem we have in the country. The minimum of the household size was of one where you could find that this household is of a widow or young genocide survivor that lives alone. According to education we can say that with the average of 1.95 which is slightly near to the value of 2 that most of the respondents have at least joined primary. It occurs also that no one of

the non participant in the Girinka program has reached the level of University where the maximum of education is 3 which stands for secondary.

The results presented in table 3, show a summary of statistics of demographic and social characteristics of famers in Gatsibo district that are participant in the Girinka program for at least three years.

Table 3: Participation in Girinka program

Variable	Obs	Mean	Std. Dev.	Min	Max
Distance from the market	60	2.202	1.796593	0.01	8
Age	60	46.51667	9.941339	28	67
Household size	60	5.3	2.109703	1	12
Education	60	1.966667	0.4859611	1	3
Group member	60	0.7333333	0.4459485	0	1
Land size	60	8.5958	7.442203	0	41.5
Crop input	60	411.8833	534.943	0	3000

Source: own research

In terms of the age, the average of the participant is 46.5, the minimum of 28 and the maximum of 67. The maximum of the age of the non participant is higher than participant because of one case of an old couple that was given cow. The household size is likely the same as for the non participant except for the maximum, where for the participant is 12 and this give the households a good labor support. Ashenafi (2007) found availability of household labor positively affecting adoption of agriculture technology in Ethiopia. On education, it is slightly the same as on the non participant and also there was no one found that had gone to University. The land size is different from the non participant; the average on the participant is 8.6 acres where for non participant it was 6.5 acres. This is due to purchases of land done by the participant in the program who after giving the first calf, the other were theirs, so they can sell it and buys a piece of land. The

minimum of land size is zero, because there was one of the participant in the Girinka was given a cow and then her land was taken by a family member so she ended up with no land. On the side of the crop input, it is obvious the participant will have a lot of input comparing to the non participant because they can use the manure of the cows given.

4.2 Results from the logistic regression

These results are shown in the **Table 4**; and it show the factors that influence in the households that participate in Girinka program on crop production as well as in income. Furthermore validation test has been computed which of heteroscedasticity and multicollinearity that are shown in respectively in **appendices 1** and **appendices 2**. The validation tests have shown that there is homoscedasticity and that there is no multicollinearity.

Table 4: Logistic regression on factors influencing the participation in Girinka program

LR chi2(9) = 70.58

Prob > chi2 = 0.0000

Log likelihood = -47.886041 Pseudo R2 = 0.4243

partprog	Coef.	Std. Err.	z	P>z
distmnmkt	-0.15	0.17	-0.88	0.378
Gender	-2.40	1.30	-1.84	0.066*
Age	0.01	0.02	0.5	0.619
housestatus	2.13	1.35	1.57	0.116
Hhsize	0.02	0.01	2.24	0.056**
education	0.17	0.53	0.34	0.737
memgrp	-0.46	0.69	-0.68	0.498
landsize	0.05	0.02	1.74	0.071*
cropinput	0.01	0.002	4.57	0.000***
_cons	-1.85	1.62	-1.14	0.254

Source: own research

Note: *significant at 10% ** significant at 5%***significant at 1%

From the results that are shown in **Table 4**, the factors that are influencing participation in Girinka program, four out of nine factors showed significance at 1% and 10%. The factor gender is significant at 10%, the factor household size is significant at 5%, the factor land size is significant at 10% and finally the factor crop input is significant at 1%.

The log likelihoods for the factors influencing the participation in Girinka program and the overall model was different from zero while the chi-square value was strongly significant at 1% which implied that the explanatory variables used in the models were collectively able to explain the variations in participation in Girinka program.

4.3 Impact of Girinka Program (treatment effect)

From the **figure 2** below , all the treated and the untreated individuals were within the region of common support indicating that all treated individuals have corresponding untreated individuals This shows that the assumption of common support was attained.

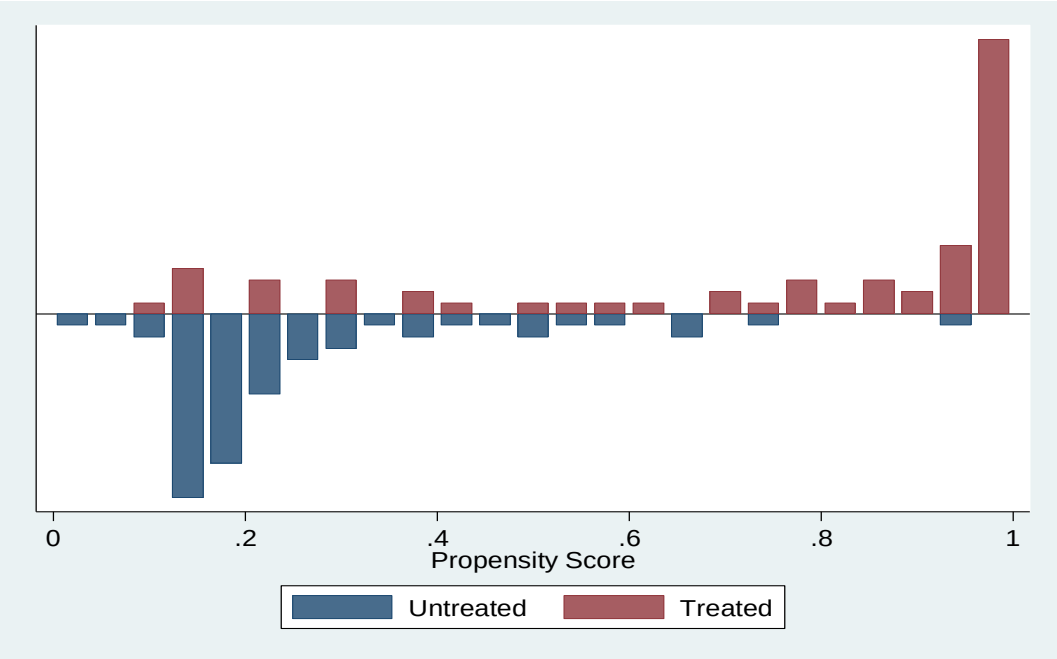

Figure 2: The propensity score

On the basis of the first and second objectives of this study which are; to assess the impact of the Girinka program on the household income and to assess to impact of the Girinka program on crop production, the propensity score matching was used to determine that.

Table 5: Impact of Girinka program

		Sample	Treated	Controls	Difference	S.E.	T-stat
neighbour	cropprod	ATT	934.08333	390.7961	543.287222	288.8811	1.88*
	income	ATT	159225.43	43900.27	115325.161	30440.11	3.79***
Kernel	cropprod	ATT	955.77586	322.2053	633.570527	301.2246	2.1**
	income	ATT	159244.41	47354.44	111889.974	35016.36	3.2***
radius calliper	cropprod	ATT	955.77586	386.6736	569.102251	292.6214	1.94*
	income	ATT	159244.41	44499.91	114744.507	32874.83	3.49***

Source: Own research

Note: *significant at 10% ** significant at 5% *** significant at 1% ATT: Average Treatment of the Treated

From the results in **Table 5**, on the nearest neighbor matching method the ATT on crop production is significant at 10% and the ATT on household income is significant at 1%. On the other hand using the kernel matching method the ATT on crop production is significant at 5% and on household income it is significant at 1%. The radius caliper matching method shows that the ATT on crop production is significant at 10% and on household income it is significant at 1%.

4.4 Constrains of Girinka implementation

According to my third objective which is to look on the constraints that had affected the implementation of the Girinka program; four questions were asked to the participant in the program.

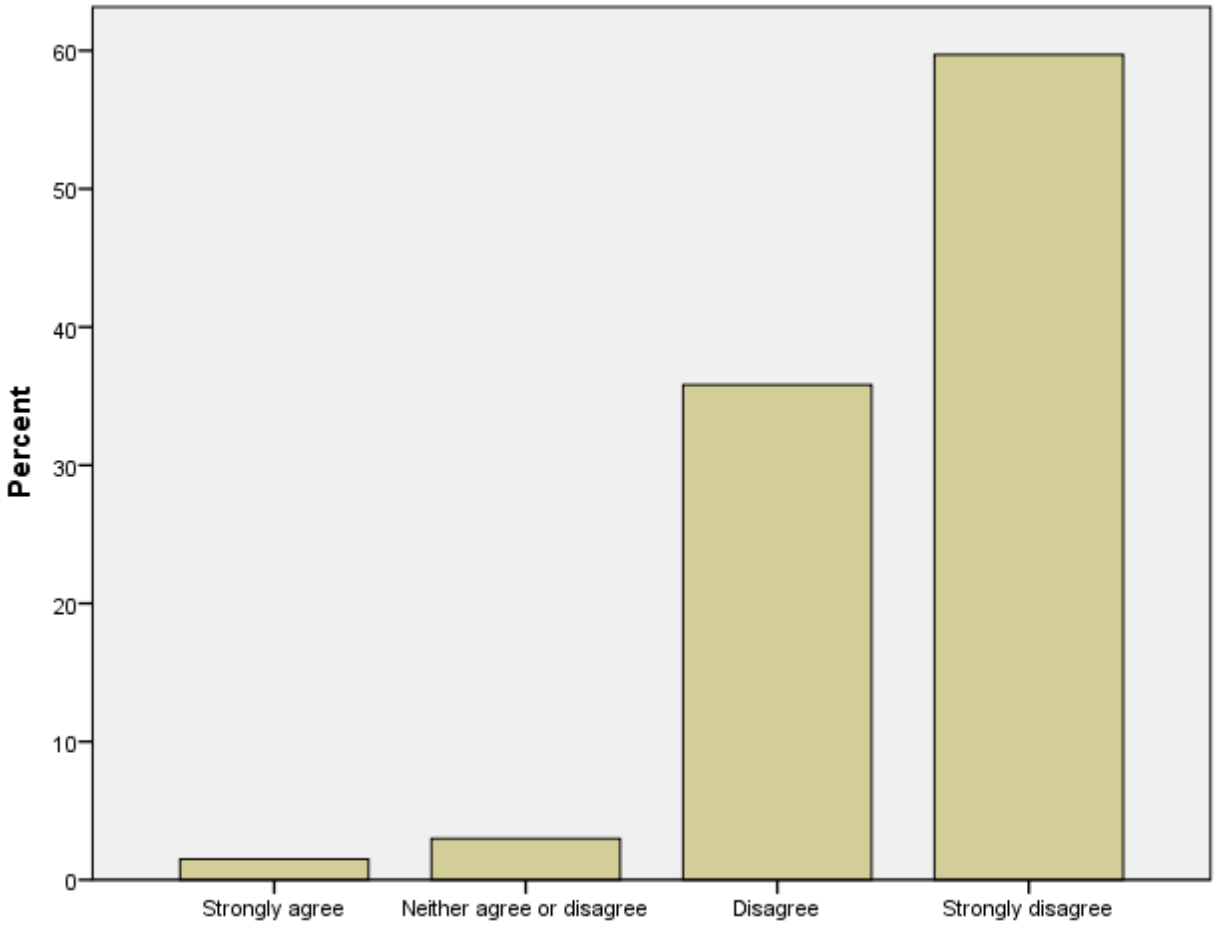

Figure 3: Level of corruption during implementation

a. The first question was to ask if there were any corruption involved during the implementation. There were different perceptions according to the respondent; the highest rank was 59.7% who strongly disagreed followed by 34.3% who disagreed on the matter, as you can see in the **Figure 3**. Indeed, this lead us to say that there were no corruption involved during the implementation of the program due to this majority. The respondents were notifying that in order to get a cow, the whole village would gather together and approve that this particular person is really in the specified category to get a cow, and then

they agree on that together. However, 1.5% of the respondent strongly agreed that there were corruption during the implementation and 4.5% neither agreed nor disagreed. The 1.5% argued the cows were given to the local leaders and their family member or friends, but this was denied by the majority who disapproved saying that the cows were taken back from them later.

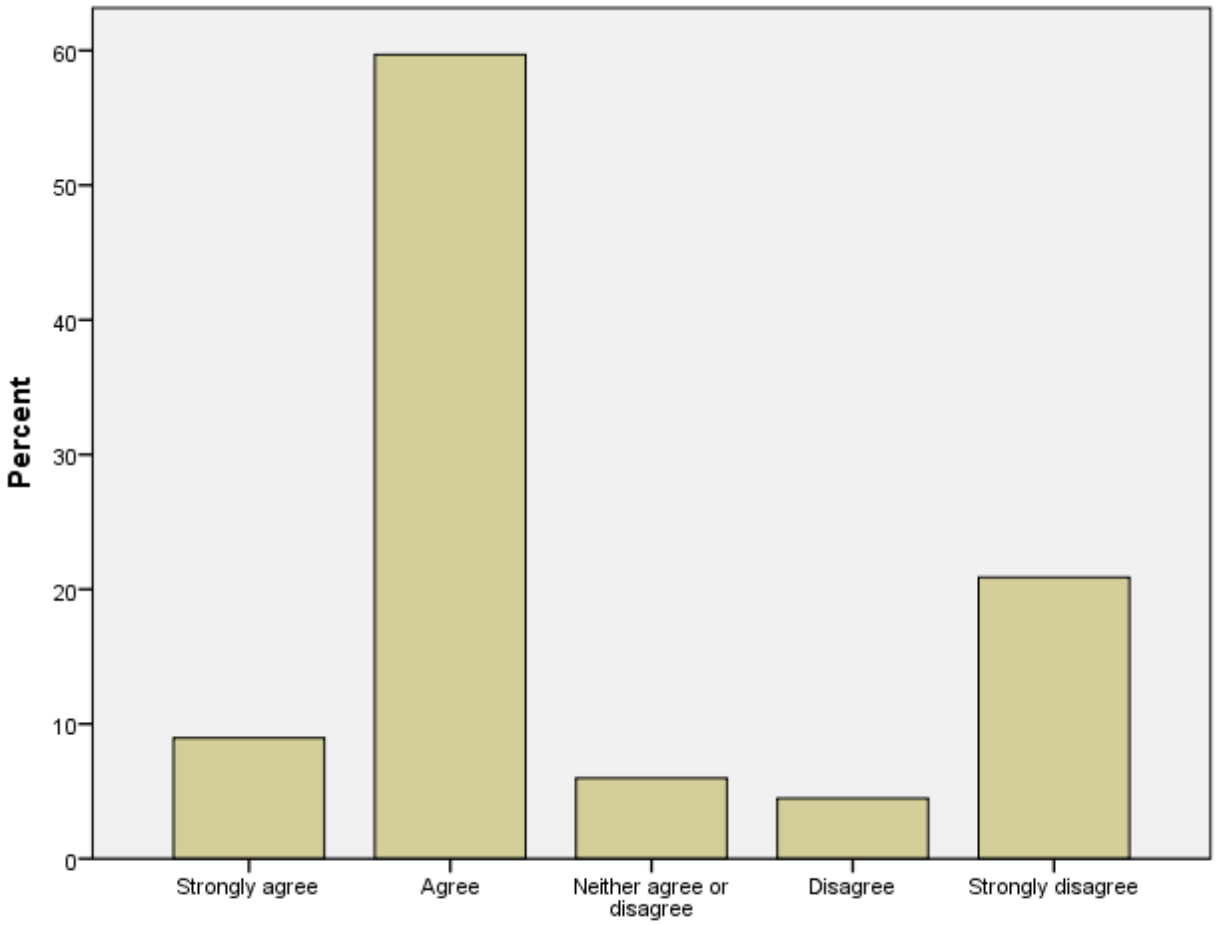

Figure 4: Follow up of local leaders

b. The second question was to ask if during the implementation of the program, there was an adequate follow up of the local leaders. The participant had different perceptions, where the highest rank was of 59.7% who agreed that this was a constraint during the implementation

of the program and also 9% strongly agreed as you can see in the **Figure 4**. The argument was that when you are given a cow, the cell or village veterinary would be there for the first time you are given the cow, and then you won't see him for a long time after. However, the participant on the rank of 20.9% strongly disagreed and 4.5% agreed on this matter, arguing that there was an adequate follow up of the local leaders on the cows that have been given. There was also another rank of 6% who had no position on that matter. According to the outcome of these perceptions on this question, we could say that the majority agreed that this was a constraint, but this also depend on the leadership of the cell or village, because there are some participants who disagreed and said that there was a clear follow up on the cows that were given.

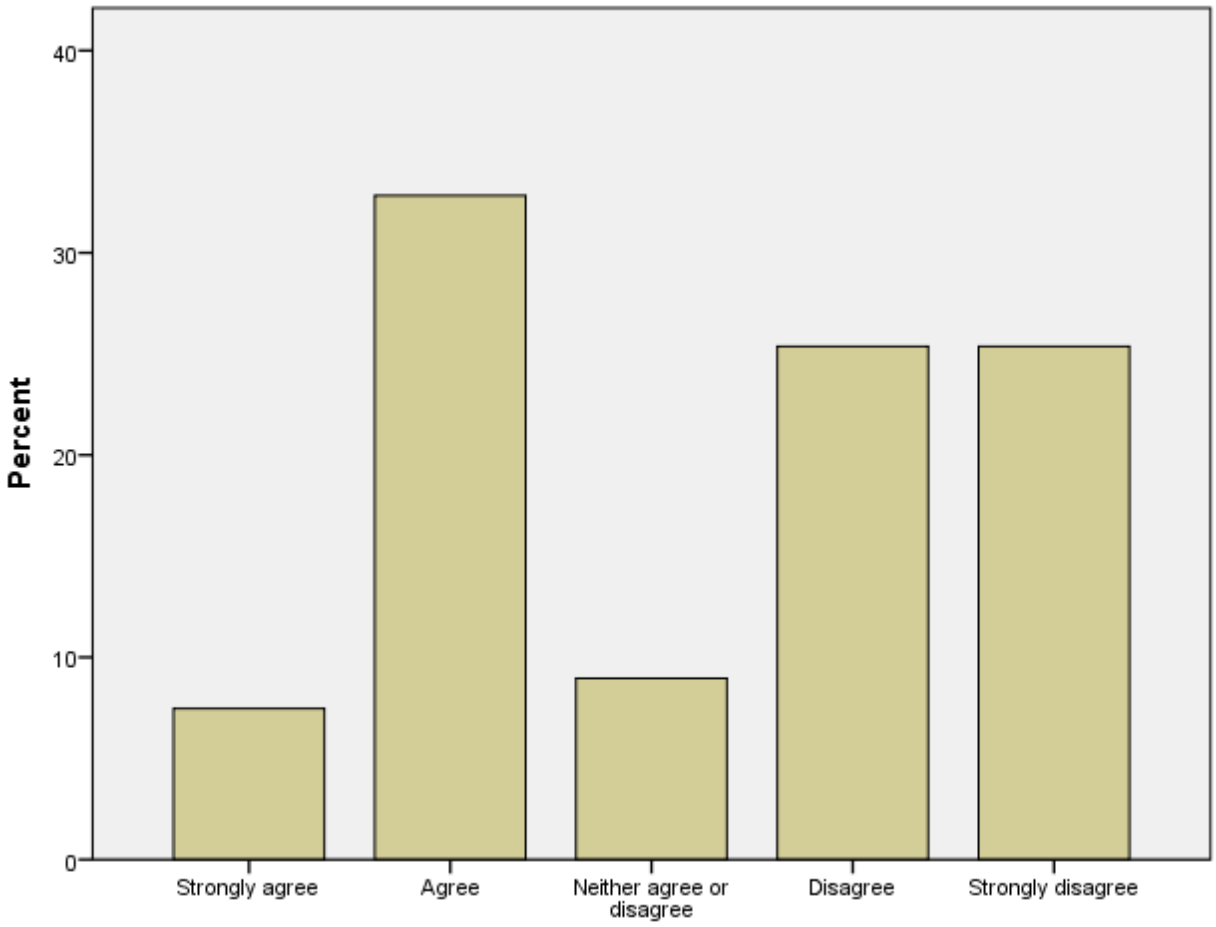

Figure 5: Lack of information as constraint

c. The third question was to ask if during the implementation of the program, the lack of information of the beneficiaries was a constraint. In their response, the participant highest rank was 32% which agreed, and also on this positive side 9% strongly agreed on this matter as you can see on the **Figure 5**. However, there was an equal perception rank on the negative side, which was of 25.4% who disagreed and 25.4% who strongly disagreed on this matter, and also a rank of 9% of those who had no position. Due to the outcome of the different perceptions ranks on this question, we can say that the majority of the participant answered this question by denying this matter, if we look at the total of the negative rank which is of

50.8% and where the total of the positive rank is of 40.3%. On the positive side they would argue that for most of them, it was their first time to have a cow, and yet they had never experienced the techniques of taking care of a cow, and this made it difficult for them in the beginning. According to the respondents, it was difficult for them to purchase livestock maintenance products and these products were not found easily on the market.

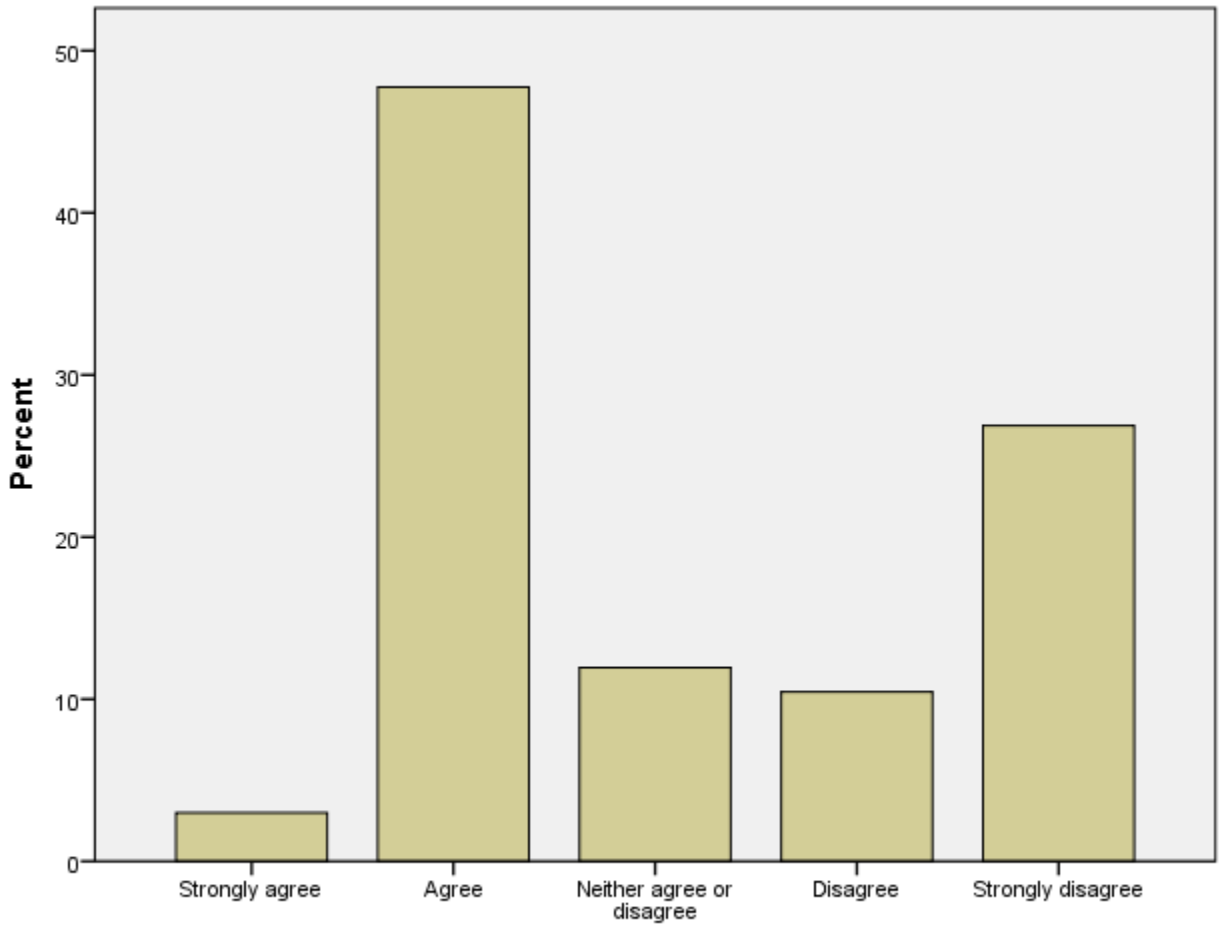

Figure 6: Training of beneficiaries as a constraint

d. The fourth question was to ask if during the implementation of the program, the lack of training of the beneficiaries was a constraint. On this question, a high rank perception was of

47.8% who agreed on the matter and also on this positive side 3% strongly agreed on this matter as you can see in the **Figure 6**. On the negative side, a high rank of 25.4% strongly disagreed and 10.4% disagreed on the same question, and also 13.4% who had no position. According to the outcome of those perceptions, we could say that the majority of the participants think that the beneficiaries should have had trainings on farming so that they can do better on the cow that they had received.

CHAPTER FIVE

5 DISCUSSIONS

5.1 Introduction

This chapter covers the interpretation of the results of the study. The results of the study are discussed from individual household and in general. The chapter also looks at the findings in view of what has been reported in literature with the aim of trying to assess the underlying factors that possibly explain the observed trends and outcomes. In the chapter existing gaps are identified and sets a basis for recommending the necessary policies to address the identified gaps.

5.2 The factors influencing the participation in the program

The results on the factors that influence the participation in Girinka program are shown in **Table 4**. It shows that four out of nine factors are significant, which are gender, household size, land size and crop input.

Odendo *et al.*, (2010) argues that since previous research has documented evidence of inequalities in ownership and control of crucial resources between men and women, gender *per se* does not influence adoption patterns, but resource inequalities. It is perceived that male headed households are more likely to participate in projects relative to the female headed households. In this research, the variable gender shows that it significant at 10%.

The household size had shown also a positive influence on the participation in Girinka program at 10% of significance. Herath Takeya, (2003) on their founding, said that the influence of household size cannot be determined, where Odendo et al, (2010) were arguing that project participation may depend on whether the household has a higher ration of members who contribute to farm work. Marvis and Oduro, (2013) were saying that the nature of family living, and the size of families, in communities in Ghana may affect the utilization of conditional cash transfer and it is important to be aware of these factors when determining the implementation of cash transfer programs. It can be inferred that; that is why in our research household size showed an influence on Girinka participant.

The size of the land of the household has a positive effect on the income and crop production of the participant in the Girinka program at 10% significant level. Households with more land are likely to be able to grow diverse crops that can help the household on food security and on the income. (Prince et al, 2013) argued that households with more land are likely to participate in agriculture projects in order to access for more inputs.

The independent variable crop input showed a positive influence on the participant of Girinka program on the crop production and income at 1% of significant level. The households of participant tend to have a portion of manure from the cow that was given to them which can boost their crop production as well as income (manure on crop production). Raw dairy manure stimulated the highest overall maize yields of 7.395 kg (Hepperly et al, 2009). This is one example that can confirm the influence that we found on crop input.

5.3 The impact of Girinka program

The results of the impact of the Girinka program on household income and also on crop production are shown in the **Table 5**. A sample of 60 households participating in the program (treatment) was matched with 60 households that are on the waiting list (control). Three matching method has been use; the nearest neighbor, kernel and the radius caliper. Both results on the three matching methods were significant.

On the nearest neighbor, the results showed that on crop production between the treated and the control, the treatment effect was of 543.29 kg which is the difference between the participant and the non participant from their crop production. These results reject the second hypothesis. On the other hand, on the household income the treatment effect was of 115325.16 Rwf which is equivalent to 174.73USD which reject the first hypothesis. This shows that the Girinka program has the potential to contribute to crop production and household income.

On the kernel matching method, the result showed that on crop production, the difference between the treated and the control is of 633.57 kg, while on the household income the difference was of 111889.97 Rwf which is equivalent to 169.53USD and this rejects the first and second hypothesis. As for the nearest neighbor, also on the kernel method the Girinka program has a great contribution on crop production and on household income.

On the radius caliper matching method, the average treatment of the treated (ATT) on the crop production was of 569.10 kg, and on household income the average treatment of the treated was

of 114744.50 Rwf which equivalent to 173.85USD and this rejects the first and the second hypothesis. The three matching methods (the nearest neighbor, the kernel and the radius caliper) have shown that Girinka program has a great contribution on crop production and household income.

According to the article by C.R Wiyereka (2013) in Nyamagabe District, Mukandoli Dancille who has been in Girinka since 2008, her cows has calved a healthy bull and three others calves and she was able to pass on one calve to neighbor. Her cow milks 15 liters per day and sells 10 liters to keep 5 liters for her family. She recently has opened a business that helps her to pay fees for her children and buy necessary medicines for her cow. From the same article this woman said that she is the legal representative of two widow cooperatives and make 480,000 RWF per month from my 1 hectare farm of soya and maize. Although this research did not evaluate the impact on milk production, but selling the 10 liters per day for this woman will certainly improve her income and her crop production which confirms the results of this study.

Another article by Shanta Darvajan (2013), where she wanted to know what happened in Rwanda after the releasing of the third Integrated Household Survey Conditions Survey (EIVC3) because of its significant difference in poverty reduction. The first very striking point was the negligible change in poverty rates between EICV1 in 2000/2001 and EICV2 in 2005/6 (58.9% to 56.7%) contrasted with the very significant change between EICV2 in 2005/6 and EICV3 in 2010/11 (56.7% to 44.9%). She also concluded that “this has something to do with agriculture.” From various agriculture programs that has contributed in poverty reduction, she mentioned few and the Girinka program included. She said that “Instead of the more conventional conditional

cash transfer system found across the world and based on a recurring transfer, Girinka makes a onetime transfer but, of a productive asset.”

These results also confirm why in some of the households of the participant we visited, you could find that after giving out the first calf, you would find that the household now have two cows or have sold one to purchase a piece of land. This study also has shown that the Girinka program is a productive asset and also that it can improve the livelihood of a farmer.

CHAPTER SIX

6 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

Impact assessment is based on simple treatment and control comparison. Propensity score matching overcomes the selection bias that arises from the quasi-experimental design often found in international agricultural research activities. Using this method it can be possible to identify the differences between the control and the treatment and this has given as the average treatment of the treated which we call also the impact of our research. The impact of the Girinka program on household income was positive of 115,325.16 Rwf which is equivalent to 174.73$, and the impact of the Girinka program on crop production was positive of 633.57 kg.

The participant in Girinka program had shown improvement in managerial of livestock products and its interest as they embrace the benefits from the cows that were given to them. The research shows that it was fair the way the cows were distributed due to only 1.5% of the respondent who agreed that there was corruption during the implementation.

In conclusion, it can be observed that the Girinka program is one of other policies that are playing a very big role in improving poor household livelihood and in reducing poverty in Gatsibo district.

6.2 RECOMMENDATIONS

The cows that are given according to the level of the household poverty is in, and this study recommends that there should be enough follow up of local leaders (59.7% of the respondents agreed). It would be better when the local leaders visit more often the participants in order to know what the needs are or what are the benefits and know the way forward. There should be enough trainings for the participant in the program, because most of them, it is their first time to take care of a cow.

Several organizations are donating cows to the program. The research findings would urge the government to encourage more organizations (publics or privates) to do so. The research findings would also encourage other areas out of Rwanda that has not implemented such program to do so because it is one the good policies that can reduce poverty.

Further research should be made on the impact of the Girinka program in other Districts of Rwanda, in order to truly know what the program is bringing to the participant not only in Gatsibo district, but in the whole country. In this study, we had focused ourselves on crop production and household income. Further research on the impact of the program should also be made on milk production in order to know its impact on milk production in Rwanda.

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APPENDICES

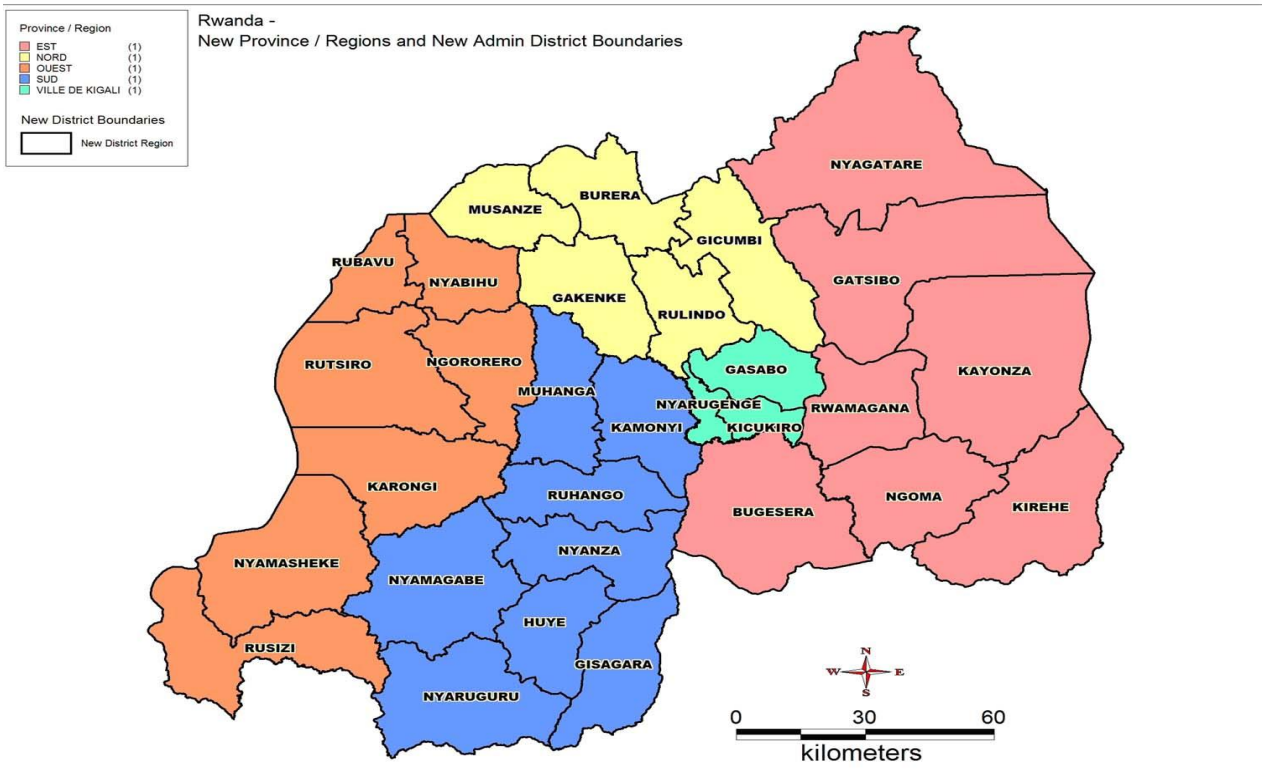
Appendix 1: Heteroscedasticity test

Variable	chi2	p
Distmnmkt	0.59	0.4440
Gender	0.02	0.8872
Age	0.18	0.6714
Housestatus	0.00	0.9679
Hhsize	0.09	0.7699
Education	0.00	0.9549
Memgrp	0.29	0.5923
Landsize	0.02	0.8745
Cropinput	1.99	0.158
Simultaneous	2.75	0.9734

Appendix 2: Multicollinearity test

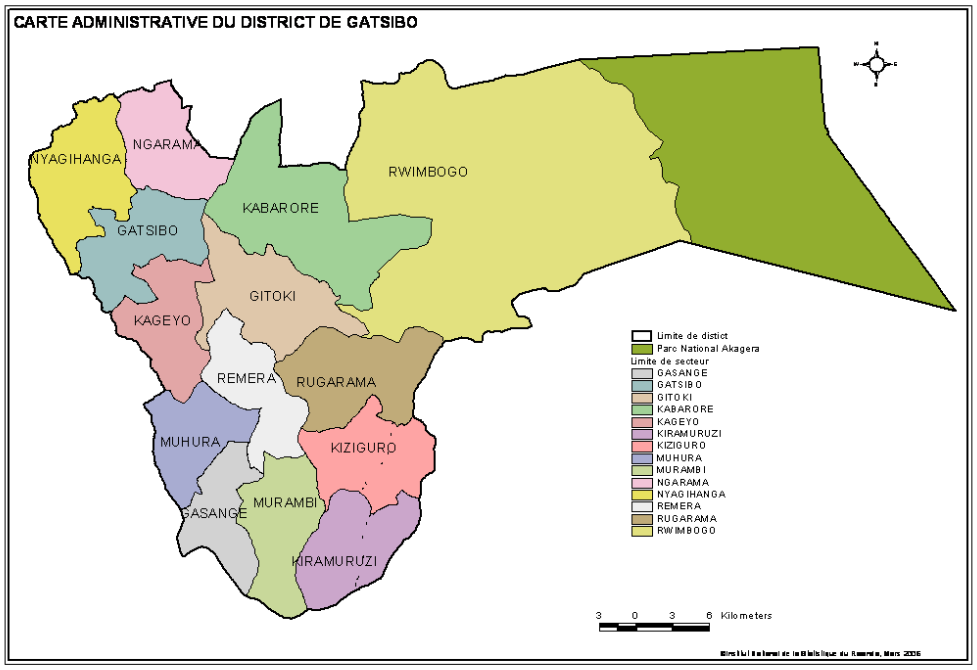
Variable	VIF	1/VIF
Housestatus	4.36	0.229293
Gender	4.00	0.250126
Hhsize	1.34	0.746371
Memgrp	1.20	0.835035
Age	1.18	0.845543
Education	1.17	0.852643
Landsize	1.17	0.856557
Distmnmkt	1.15	0.870667
Cropinput	1.13	0.88495
Mean VIF	1.86	

Appendix 3: Rwanda map



Source: Wikipedia

Appendix 4: Gatsibo district map



Source: google map

Appendix 5: Interview schedule

IMPACT OF GIRINKA PROGRAM ON HOUSEHOLD INCOME IN GATSIBO DISRICT

Survey Quality Control

Date of interview: Day: …… Month …….. Year: ……. …..

Interviewed by: …….

Date checked: Day: …….....Month: ……..Year: .....

Checked by: …….....

Date entered: Day: .....Month: ……..Year: .....

Entered by: .....

1.0 Farmer and Site Identification

1.1 Farmer (respondent) name…….……

1.2 DISTRICT…….……

1.3 SECTOR…..…….. 1.4 CELL……..…….

1.5 Distance to the nearest main market (km)…….……..……

1.6 Is he/she participating in Girinka program……1. Yes 0. No

1.7 If Yes toQ6 for how long…….……

1.8 Any responsibility in the community (including official roles)……... **1.** Yes **0.** No

1.9 If YES to Q8, name type of major responsibility/role in the community …….

2.0 Household Socio-Economics and Demography

2.1. Status of the respondent in the household……

Codes (1= Household head, 2=Child, 3= Spouse, 4= other)

2.2. Sex of respondent……..

Codes (1=male, 0= Female)

3.3. Marital status……..

Codes (1=Single, 2= Married, 3= Widow/widower, 4= Divorced/separated, 5=other (specify)……..)

2.4. Household Status……

Codes (1= male headed, 0= Female Headed)

2.5. Number of people living in the household……..

2.6. Household Membership list of members.

Name of HH member (start with respondent)	Gender Codes A	Relationship to HH Codes B	Age (Years)	Education level Codes C	Main Occupation Codes D	Farm labour participation Codes E
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						

Codes

Codes A
1. Male
0. Female

Codes C
1.None
2.Primary
3.Secondary
4. Tertiary
5.Adult literacy

Codes B
1. Household head
2. Spouse
3. Son/daughter
4. Parent
5. Son/daughter in-law
6. Grand child
7. Other relative
8. Hired worker
9. Other, specify……

Codes D
1. Farming (crop + livestock)
2. Salaried employment
3. Self-employed off-farm
4. Casual labourer on/off-farm
5. School/college child
6. Herdsboy/girl
7. Household chores
8. Non-school child
9. Other, specify……

Codes E
1. Full time
2. Part-time
3. Not a worker

3.0. Membership to associations / clubs

Do you belong to any association or club? (Codes A)	Type of association or club you belong to. (Codes B)	Role in the club (Codes C)	If not a member. Why?

Codes A	Codes B	Codes C
1. Yes	1. Local administration	1. Chairperson
0. No	2. Farmers' club	2.Vice chairperson
	3. Women's club	3. Secretary
	4. Youth club	4. Vice secretary
	5. Faith-based organization	5. Treasurer
	6. Saving and credit group	6. Ordinary member
	7. Welfare (dutabarane)	7. Lead/contact farmer
	8. Government team	8. Cashier
	9. Other, specify…….	9. Coordinator
		10. Store keeper
		11. Other...……

4.0. Household Farm assets other than Land

4.1. Does your household own any of the following assets?

Asset Name	Number	Current Unit value	Total Value
Ox-Ploughs			
Ox-cart			
Sickle			
Panga Knife			
Axe			
Spade/Shovel			
Hoes			
Sprayer/ Pump			
Wheel Barrow			
Bicycle			
Tractor			
Radio			
Mobile phone			
Television			
Other Specify			

4.2. Building in the homestead

Type of Building (codes A)	Total Number	Walling material for the building (codes B)	Roofing material for the building (codes C)

Codes A	**Codes B**	**Codes C**
1. Residential	1. Bricks	1. Grass thatch
2. Livestock pen/kraal	2. Stone	2. Iron sheet
3. Store	3. Earth	3. Tiles
4. Other, specify…….	4.Unburned bricks	4. Other, specify……
	5. Other, specify……..…	

4.3. Land holding size (acres) during the 2011/2012 planting season

	Season A		**Season B**	
	Cultivated	Fallow (e.g. grazing)	Cultivated	Fallow (e.g. grazing)
Own used (A)				
Rented in (B)				
Rented out (C)				
Borrowed in (D)				
Borrowed out (E)				
Total owned (A+C+E)				
Total operated (A+B+D)				
Total irrigated (owned)				
Total rain fed (owned)				

5. Crop Production

5.1. Characteristics of crop production plots in the 2011/2012 season

Record for ALL crops in 2011/12 season [Record separately by variety]

Plot code (number starting from nearest plot to house)	Plot specific location name	Plot distance to residence (km)	Crops grown (Codes A)	Crop variety (Codes B)	Plot size (acres)	Plot ownership (Codes C)	Soil fertility (Codes D)	Soil depth (Codes E)	Soil type (Codes F)	Soil slope (Codes G)	Soil water conservation (Codes H)	Water logging on plot (Codes H)	Irrigated (Codes H)

Codes A
[Use the CROP CODE sheet]

Codes B
1. Improved
0. Local

Codes C
1. Owned
2. Rented in
3. Borrowed

Codes D
1. Poor
2. Medium
3. Good

Codes E
1. Shallow
2. Medium
3. Deep

Codes F
1. Black (loam)
2. Brown (sandy)
3. Red
4. Grey (clay)

Codes G
1. Gently slope (flat)
2. Medium slope
3. Steep slope

Codes H
1. Yes
0. No

5.2. Crop production inputs and output in 2011/2012 planting season

[Record all crops in 2011/2012 planting season, record separately by variety as in the previous table]

Plot code	crop	Manure (Kg)			Fertilizer				Seed			Pesticides/ herdicides		Hired oxen (Frw)									Production (Kg)
		Own (Kg)	Bought		DAP		Urea		Own saved/gift (Kg)	Bought		Litres	Frw/ Litres		Total hired labour	Ploughing, harrowing &	Frequancy of ploughing	Weeding (1st & 2nd etc	Frequancy of weeding	Chemical application	Harvesting	Threshing	
			Kg	Value (Frw)	Kg	Value (Frw)	Kg	Value (Kg)		Amount (Kg)	Frw/Kg												

5.3. Utilization of crop produced

Crop type (use crop codes)	Production (kg) from last column of table F.1 (add similar crops together	Sales (kg)	Served as seed (Kg)	Gift, tithe, donations (Kg)	Consumption (Kg)

6.0. Crop Marketing. Ask first if he has sold any of his/her crops 1.Yes 0.No if no go to Q7

Crop **Codes A**	Quantity sold (Kg)	Price (Frw/Kg)	Month Sold **Codes B**	Period to Payment after Selling Weeks	Buyer **Codes C**	Relation to buyer **Codes D**	Crop quality **Codes E**	Sales Tax/ Charges (Frw)	Distance to point of sale (Km)	Time taken to sell (minutes)	Mode of transport **Codes F**	Transport cost (Frw)

SHEET]

Codes B
1. January
2. February
3. March
4. April
5. May
6. June
7. July
8. August
9. September
10. October
11. November
12. December

Codes C
1. Farmer club
2. Farmer Union or Coop
3. Consumer or other farmer
4. Rural assembler (vendor)
5. Broker/middlemen
6. Urban grain trader
7. Exporter
8. Other, specify……..

Codes D
1. Next of kin
2. Friend
3. Preferred customer
4. Other, specify……
5. None

Codes E
1. Below average
2. Fair and Average
3. Above average

Codes F
1. Bicycle
2. Hired truck
3. Public transpor
4. Donkey/ox cart
5. Head/back loa
7. Other, specify.

7.0 Livestock production activities. *[Record for January to December 2012only]*

Animal type	**Original Stock 2012**	**Stock changes during 2012**						
		Born/weaned	Died	Consumed	Bought	Gifts in	Gifts out	Sold
Cattle								
Goats								
Sheep								
Other livestock								
Young donkeys								

Mature chicken								
Ducks & Fowl								
Pigs								

8.0 Livestock maintenance cost [Record for January to December 2012 only]

Description	Targeted animals group Codes A	Total quantity bought last year	Units	Per unit Price (Frw)	Market name if outside the sector	Distance to the market	Total cost (Frw)
1.Crop residue							
2.Green fodder							
3.Dry fodder (hay)							
4.Concentrates							
5.Veterinary services							
6.AI services							
7.Herds boy (animal tending)							
Other costs, specify							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							

Codes A

1. Milking cows
2. Other cows
3. Oxen
4. Other cattle (heifer, bulls, calves)
5. Sheep
6. Goats
7. Poultry
8. Pigs
9. Donkeys
10. Bees
11. Other, specify……

9.0 Selling and buying of livestock, livestock products and other assets. ***[Record for January to December 2012 only]***

Livestock and livestock products	**Selling**								**Buying**							
	Quantity sold	Units	Price (Frw/unit)	Month sold **Codes A**	Main buyer **Codes B**	Animal condition **Codes C**	Distance to main selling point **(km)**	Sales tax or charges (Frw)	Quantity bought	Units	Price (Frw/unit)	Month bought **Codes A**	Animal condition **Codes C**	Main seller **Codes B**	Distance to main buying point **(km)**	Sales tax or charges (Frw)
Other assets																
Land (*acres*)																

Codes A
1. January
2. Feb
3. March
4. April
5. May
6. June
7. July
8. August
9. September
10. October
11. November
12. December

Codes B
1. Other farmer (breeding)
2. Brokers/middlemen
3. Butcher
4. Urban consumer
5. Local consumer
6. Other, specify……

Codes C
1. Below average
2. Average
3. Above average

Land quality
1. Poor soil fertility
2. Medium/average
3. High/ above average

10.0. Other sources of income (January – December 2012)

[*If several household members earn the same income source, fill according to the earning family member in separate rows*]

Sources	**Earning family member (Codes A)**	**Where earned? (specify if out of village)**	**Actual amount sold**	**Price per unit (cash & in-kind)**		**Total income (cash & in-kind)**	
				Cash payment **(Frw)**	Payment in kind **(Cash equivalent)**	Cash **(Frw)**	Payment in kind **(Cash equivalent)**
Selling of crop residue							
Rented out land (…….**Codes B**)							
Rented out oxen for ploughing							
Permanent non-farm labour							
Casual non-farm labour							
Long-term farm labour							
Casual farm labor							
Non-farm agribusiness NET income (e.g. grain mill)							
Other business NET income (shops, trade, tailor, etc)							
Pension income							
Drought relief							
Remittances (sent from non-resident family and relatives living elsewhere)							
Marriage gifts (e.g., dowry)							
Sale of own trees (firewood, etc)							
Sale of dung cake for fuel							
Sales from CPRs (firewood, charcoal, bricks, etc)							
Other short term employment							

Codes A: **1.**=Respondent, **2.** Spouse, **3.** Son/daughter. **4.** Parent, **5.** Son/daughter in-law, **6.** Grand child, **7.** Other relative, **8.** Hired worker **9.** Other, specify……

Codes B: **1.** Poor fertility **2.** Medium fertility 3**.** High fertility

11.0 Financial Assets and Sources of Credit
[Record for 2011/2012 planting season]

11.1 Need and access to credit

Purposes for borrowing	Needed credit? **(Codes A)**	If YES, did you get it **(codes A)**	If you **did not get** credit, explain why **(codes B)**	If **you got credit**, did you get amount needed at market rate of interest? **(codes A)**	From where did you get the credit?
1. Buying seeds					
2. Buying fertilizer					
3. Buy other agricultural inputs					
4. Farm equipment/implements					
5. Buying oxen for traction					
6. Buy other livestock					
7. Soil and water conservation					
8. Invest in irrigation					
9. Non-farm business or trade					
10. Buying food					
11. Children's education					
12. Family Health/medical					
13. Buy land					
14. Improve your house					
15. Social obligations					

Codes A
1. Yes
0. No

Codes B
1. Borrowing is risky
2. Interest rate is too high
3.Too much paperwork
4. No lenders in this area for this purpose
5. Lenders do not provide the amount needed
6. Other, specify…….

11.2. Borrowing and lending for different purposes last year *[All Codes for this table are below Table 11.3]*

Transactions	Relation (Code B)	Collateral used		Month Received	Amount (Frw)	Purpose of borrowing (Code E)	For duration of (months)	Rate of interest (% per year)	Amount paid with interest by end of 2012 (Frw)	Outstanding Loans (Frw)
		Code D	Value (Frw)							
Borrowing from **(code A)**										
Lending to **(code C)**										

11.3. Savings during the 2011/2012planting season

Saving family member (give No. from table 11.0)	Saving with (Code F)	Freq. of contributions (Code G)	Amount saved each time (Frw)
1.			
2.			
3.			
4.			
5.			

Code A
1. Commercial bank
2. Rural Microfinance
3. Savings & credit
4. Money lender
5. Merry go-round[1]
6. Farmer club/association
7. Other, specify……

Code B
1. Landlord
2. Employer
3. Relative/friend
4. Club member
5. Customer
6. No special links
7. Other, specify……

Code C
1. Relative
2. Friend
3. No special links
4. Other, specify…..

Code D
1. No collateral
2. Land
3. Livestock
4. Guarantor
5. Other, specify……

Code E
1. Seeds
2. Fertilizer
3. Chemicals
4. Livestock breeding
5. Farm equipment/implement
6. Soil & water conservation
7. Buying food
8. Education
9. Health/medical
10. Buy land
11. Buy plot
12. Social obligations
13. Other, specify……

Code F
1 Commercial bank
2. Rural micro-finance
3. SACCO
4. Money lender
5. Merry go-round
6. Other, specify……

Code G
1. Yearly
2. Monthly
3. Fortnightly
4. Weekly
5. Other, specify…..

[1] Also called *ikimina*

12.0. Important Consumption Expenses in 2012 from January to December

[Here, wife or person involved in purchases should be the principal respondent]

14.1. Food Grains (make sure to state that this is for consumption only)

Expense Item	Frequancy of purchase (e g 2 times per month	Average quantity each time	Total quantity (calculate)	Units	Average price of units purchased	Total value of purchase (Frw) (calculate)
1.Beans						
2. potatoes						
3. Rice						
4.Wheat						
5. Soya beans						
6. Maize						
7. Sweet potatoes						
8. Sorghum						
9. Ground nuts						
10. Bananas						
11. Cowpea						
12.Cassava						
. **Other specify**						
13						
14.						
15.						

12.2. Meat and other livestock products

Expense Item	Frequency of purchase (e g 2 times per month	Average quantity each time	Total quantity (calculate)	Units	Average price of units purchased	Total value of purchase (Frw) (calculate)
1. Beef						
2. Sheep meat						
3. Goat meat						
4. Chicken						
5. Fish						
6. Milk						
7. Butter						
8. Eggs						
Other specify						
9.						
10.						

12.3. Vegetables and other food items

Expense Item	Frequency of purchase (e g 2 times per month	Average quantity each time	Total quantity (calculate)	Units	Average price of units purchased	Total value of purchase (Frw) (calculate)
1. Cooking oil						
2. Sugar						
3. Salt						
4. Pepper						
5. Tomatoes						
6. Onions						
7. Rape						
8. Cabbage						
9. Potatoes						
10. Spice						
11. Snacks, sweets, biscuits						
12.Restrant/ ;repared meals						
Other specify						
13.						
14.						

12.4. Beverages, drinks and other consumables

Expense Item	Frequency of purchase (e g 2 times per month	Average quantity each time	Total quantity (calculate)	Units	Average price of units purchased	Total value of purchase (Frw) (calculate)
1. Coffee						
2. Tea leaves						
3. Alcoholic beverages						
4. Non alcoholic beverages						
5. Cigarettes/ Tobacco						
Other specify						
6.						
7.						

13.0 During the implementation of the Girinka program what was the main constrains that had occurred:

13.1 Was it corruption?

Strongly agree (1) **I agree** (2) **Neither** (3) **Disagree** (4) **strongly disagree** (5)

13.2 Training of beneficiaries:

Strongly agree	I agree	Neither	Disagree	strongly disagree
1	2	3	4	5

13.3 Follow up of the local leaders:

Strongly agree	I agree	Neither	Disagree	strongly disagree
1	2	3	4	5

13.4 Lack of information:

Strongly agree	I agree	Neither	Disagree	strongly disagree
1	2	3	4	5

Thank you

Crop Codes

Codes A

1. Beans

2. Banana

3. Wheat

4. Potatoes

5. Sweet potatoes

6. Cassava

7. Cow pea

8. Ground nut

9. Sorghum

10. Rice

11. Tomatoes

12. Ognion

13. Cabage

14. Dodo

15. pirether