

## **Impact of Agriculture Practices on Poverty Reduction Case of Irrigation in Kirehe District of Rwanda**

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### **Abstract**

The major constraints to agricultural growth of Rwanda are population pressure coupled with the dominance of the use of traditional agricultural production technology, including traditional farm tools and farming practices. The purpose of this study was to examine the impact of agriculture modernization on poverty alleviation in Rwanda case study of girinka program in kirehe district. The target population of the study was 355 respondents including 45 local leaders, 24 agronomist as technicians in charges of cows health 286 households benefited from Girinka program in Kirehe district. It was also indicated that there was a high degree of positive correlation between the poverty alleviation and Girinka Program as it was proved by Karl Pearson coefficient correlation ( $r$ ) which was 0.881. This also implies that Girinka Program contributed in poverty alleviation positively and at high level. The results of this study also show that after getting the Girinka program cow, its beneficiaries improved their livelihoods and results revealed that the majority of respondents indicated that the Girinka program had affected them positively as shown that 98.5% of respondent improved their livelihoods through Girinka program. The Government of Rwanda and NGOs that deal with climate resilience are recommended to teach Girinka program beneficiaries about the role of biogas energy use and support financially those who cannot afford its start-up cost.

**Keywords:** Girinka, Poverty alleviation, Agriculture Modernization

### **1. Introduction**

Rwanda is a land-locked small developing country located in central Africa. Any mention of Rwanda instantly brings to mind

the '1994 Genocide of Tutsis'. This tragedy claimed up to a million lives and left two million homeless (Short, 2007). Hundreds of thousands of Hutus left the country with a

legacy that seemed to have hindered sustainable development, resulting in Rwanda being among the poorest countries in the world (Farmer et al., 2013). The Rwandan economy is challenged by limited natural resources and high population density (Rubagiza et al., 2011). However, through its 2020 Vision, Rwanda intends to become a middle income country by the year 2020 (Rubagiza et al., 2011).

The Rwandan vision 2020 has been developed into two papers: the Poverty Reduction Strategy Paper (PRSP) published in 2002 and the Economic Development and Poverty Reduction Strategy (EDPRS) paper published in 2007 (Short, 2007). These papers helped Rwanda to move towards achieving the Millennium Development Goals (MDGs). For example, Rwanda has achieved Goal 2 of MDGs that aims to achieve universal primary education because it has a 9 years fee-free education program (Noack, 2012).

The Government of Rwanda has implemented many strategies in agriculture to increase food security such as agro-forestry as one of the methods of controlling soil erosion by planting different types of trees that contribute as construction materials, livestock fodder and food such as

fruits and nuts which improve food security (Republic of Rwanda, 2011). Also, agro forestry provides biomass in the soil in order to improve soil fertility that increases agricultural production which results in increasing food security (Republic of Rwanda, 2011). Girinka (the “one cow per poor family” program) is encouraged as a strategy in Rwanda to reduce poverty, specifically where resource-poor farmers get a cow aimed at developing skills and accumulating assets for livelihood improvement as well as the promotion of improved soil fertility in relation to manure use (Kim et al., 2013). Kim et al. (2013) report that more than 90% of Girinka beneficiaries use manure and attribute increased yields to enhanced soil fertility which has resulted from the program.

The Girinka program can be one of the adaptations as a climate resilience strategy for food security in Rwanda because it provides food such as milk, milk products (cheese, yoghurt, butter), meat and manure that is used to improve soil structure and rejuvenate tired land resulting in high crop production and food security (Send a Cow, 2008). Furthermore, Send a Cow (2008) asserts that animal urine and manure are used to produce natural pesticides and plant food. Cows are of considerable importance as they

contribute in offering an excellent nutritious food known as milk. This is a liquid nutrient of great value rich in protein, vitamin and mineral salts (Fleming and Rae, 1994). Furthermore, Fleming and Rae (1994) assert that milk contains most of dietary needs for an active and healthy life therefore it is very important for food security. The Republic of Rwanda (2011) states that cows provide manure that is very important in agriculture. Manure is an organic fertilizer that helps to improve crop production. High crop production coincides with access to food that leads to food security. Manure is better than inorganic fertilizer as mitigation for climate change because inorganic fertilizers intensify greenhouse gas (GHG) emissions through soil nitrous oxide (N<sub>2</sub>O) emissions and through the fertilizer manufacturing process and transportation (Republic of Rwanda, 2011).

The Food and Agricultural Organization (FAO, 2013) reveals that the management of manure from livestock is important in the reduction of the environmental impact of intensive and confined pig and dairy production systems. Nutrients recovered and energy contained in animal manure stops pollution and improves public health, recycled nutrients fertilize the soils and help as a substitute for mineral fertilizer, and fossil

fuel and recovered energy reduces GHG emissions (FAO, 2013). Henerica et al. (2011) estimate that at least two cows (depending on the size of the household) can generate valuable manure (bio-waste) to use biogas digesters that will generate sufficient biogas to supply the household cooking fuel needs. They argue that the reduction in poverty will decrease the use of biomass and related activities such as deforestation, overgrazing and over-cultivation. They further state that forests contribute to climate change adaptation through carbon sequestration as well as offering economic, environmental and socio-cultural benefits. The main opportunity of biogas energy is the reduction of carbon emissions from deforestation and degradation such as overgrazing and over-cultivation (Henerica et al., 2011)

The FAO (2006) indicates the importance of manure as a power generating (biogas) source and that it can reduce deforestation and carbonic dioxide (CO<sub>2</sub>) emission in the atmosphere. On the other hand, the FAO (2006) also warns that there is a little doubt that livestock can produce methane gas which can cause global warming. This statement was confirmed by other researchers. Tauseef et al. (2013) reveal that ruminant animals, for example, cattle, sheep

and goats produce large quantities of methane gas as a by-product of their digestive processes. Tauseef et al. (2013) further state that “manure-based methane has been estimated to contribute 4% of all anthropogenic methane that is presently being added up to other natural and anthropogenic sources of global warming”. In addition, Havlik et al. (2012) reveal that livestock is a major driver of land use because it accounts for 30% of global land use change. The expansion of pasture causes deforestation and it is responsible of 8% of total anthropogenic CO<sub>2</sub> emissions (Havlik et al., 2012). Havlik et al. (2012) suggest that future developments in the livestock sector will thus have large impacts on GHG emission levels. As indicated earlier, FAO (2006) reveals that manure-based methane has an impact on global warming, especially in relation to big commercial agriculture systems in developed countries.

## 1.2 Statement of the Problem

Cattle are believed to contribute to the improvement of the quality of life (Holman et al., 2005). Randolph et al. (2007) state that livestock contributes to food and nutritional security by offering milk and milk products that contain most of the dietary needs for an active and healthy life, and manure that

increases crop production resulting in food security. One local resident in this study highlighted during the pre-fieldwork visits that in 2000 there was a severe famine in Kirehe called Kinga umwuzukuruaraje caused by drought and it persisted until 2006. Also, according to the World Food Program (WFP, 2012) the high dependence on agriculture coupled with hilly topography and high annual precipitation rates, overexploitation of the natural environment and farming methods that are ill-adapted to steep slopes result in climate related disasters such as rainfall deficit (perceived as drought), torrential rains and floods, being the main disasters suffered by the Rwandan population. In particular, the Republic of Rwanda (2006) states that from 2005 to 2010 prolonged droughts impacted severely on harvests which resulted in some Districts being severely food insecure, needing immediate assistance (Republic of Rwanda, 2006). One of immediate interventions was the implementation of the Girinka program in 2006 by the Rwandan Government that had poverty alleviation as its main objective (Kim et al., 2013). After the implementation of Girinka program. For example, the WFP-Rwanda (2013) reports that the results of the survey on food security carried out in 2012 shows clear improvement in food security in

Rwanda compared to the previous similar surveys carried out in 2006 and 2009. The Food Security and Nutrition Monitoring System (FSNMS) survey carried out around the country indicated some improvement in food security in several areas of the country including Kirehe District (NET, 2011). This can be mainly the result of the Girinka program because it plays a significant role in food security by providing food (milk, meat and milk products) and soil fertilizer (manure) that increases crop production (Kim et al., 2013). Furthermore, this study focuses on the Girinka program as an agriculture resilience strategy for food security using Kirehe District as a case study because Kirehe is among Districts that received many Girinka cows. Also, according to SNV (2008), the Eastern Province where Kirehe District is located has more than 49% of all the cattle population in Rwanda. According to Umworozi (2013), Kirehe District has implemented many strategies to improve the productivity of the cattle. For example, there is a program of artificially inseminating all cows in the District and, at the beginning, 2 941 cows have been inseminated. Semen to artificially inseminate cows are taken from good breeds of bulls found in the animal husbandry center of the Government of Rwanda (Umworozi, 2013). Another strategy

is the initiation of a livestock insurance scheme implemented in order to acquire veterinary assistance in case of diseases which has been initiated in three Nyamirama, Gahara and nasho (Umworozi, 2011). Cattle keepers are being sensitized to join livestock insurance scheme and farmers' participation to the scheme in the first three sectors is 70% (Umworozi, 2011). Also, according to Mutimura and Everson (2011), the adoption of a zero grazing system by the Government of Rwanda in order to keep and solely feed all domestic animals in a shed in also promoted and this system is dominant in Kirehe and Bugesera Districts. In Kirehe 78.4% of all households raise some type of livestock and this percentage is above the national level which is 68.2% (NISR, 2011). The Republic of Rwanda (2012) states that compared to other regions of the country, Kirehe is the most affected by climate change and that it is characterized by a very hot climate with excessively prolonged droughts. While there is general recognition of the importance of the Girinka program in improving food security among poor households, to the best of the researcher's knowledge no study has been conducted to also include a critical examination of the program's climate resilience properties from a household perspective. Thus, this

empirically-based research using Kirehe District as a case study is an important contribution of girinka program on poverty alleviation intervention in Rwanda that is aimed at improving food security levels. The results of this assessment provided recommendations on how to improve the Girinka program in terms of both food security and the general objective of the study was to investigate the impact of agriculture modernization on poverty alleviation in Rwanda, case study Girinka program in Kirehe district. The research will be used to gain knowledge of conducting a research through the firsthand experience of data collection and interpretation. The results of this study will be also used to raise the knowledge on variety of issues related to the entire land Girinka program. The study will widen up range of knowledge to other researchers and hence constitute an addition to literature in the field of agriculture project

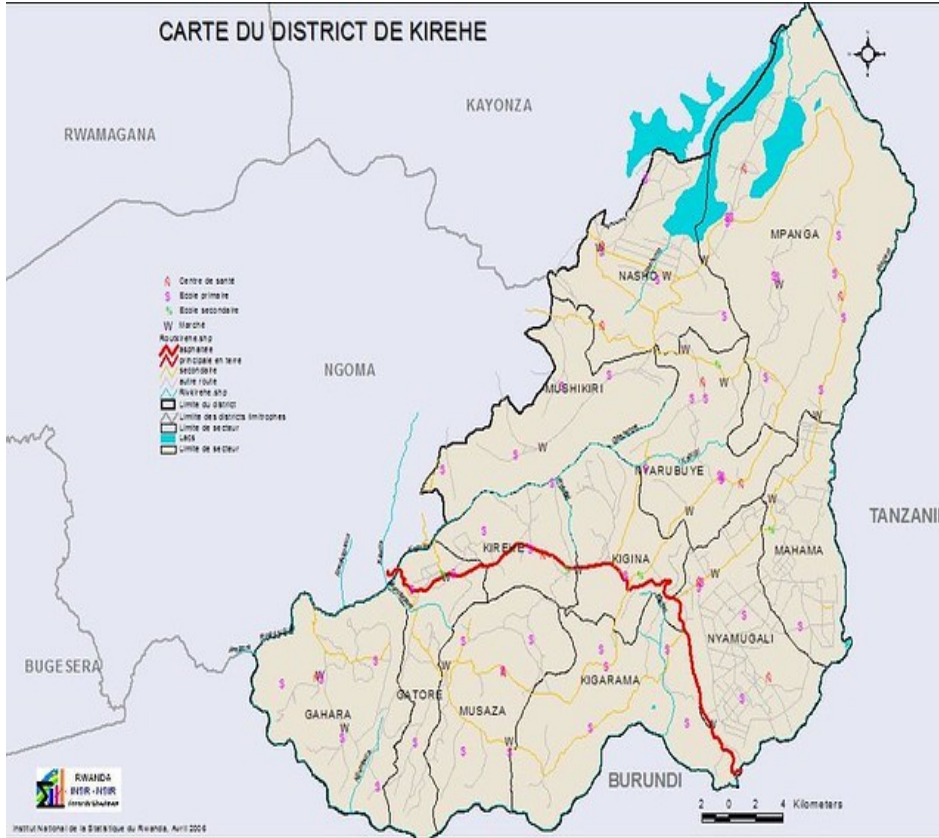
## **2. Materials and Methods**

### **2.1. Study areas description**

Kirehe is a district in Eastern Province, Rwanda. Its capital is Kirehe town (which is usually known as Rusumo, being the major settlement of the former Rusumo district). The district comprises areas in the

far south-eastern corner of Rwanda, bordering Tanzania and Burundi. Its most noteworthy feature is Rusumo Falls, the waterfall on the Kagera River, which has been key to Rwandan history. The district is divided into twelve sectors namely: Gahara, Gatore, Kigarama, Kigina, Kirehe, Mahama, Mpanga, Musaza, Mushikiri, Nasho, Nyamugari and Nyarubuye; made up of 60 cells and 612 villages. With 77,879 households and a population of 340,983, Kirehe is one of the seven districts that make up Eastern Province. It covers 1,11with 8.5Km<sup>2</sup>of the surface area and Kirehe district borders with Tanzania, Burundi in the south, Ngoma District in the south western part and Kayonza District in the North.It experiences favorable climate that supports agriculture with four seasons per year making it possible to make two annual harvests. A total of 90% of Kirehe district population depend on crop and animal husbandry. In the past seven years, the district saw a number of socio-economic development initiatives benefitting the entire population (Newtimes,2017).

### **Figure 3. 1: Administrative map of Kirehe district**



Source: Kirehe district,2017

## 2.2. Sample and data collection techniques

The survey design for research where attitudes, ideas, opinions and comments on the problem or issue under investigation (Poronsk 2009). The descriptive survey design was chosen for the present study because the study sought to gain insight or perception into a phenomenon as a way of providing basic information in an area of study, however descriptive design is concerned with “how” or “what”. What exists and is related to some previous event that has influenced or affects a present condition. Therefore, this type of design was applied to

the present research. The researcher adopted the descriptive survey design, and then this is an appropriate choice which was based on progressive inquiry concerning the impact of agriculture modernization on poverty alleviation in Rwanda case study Girinka program in Kirehe district.

Grove (1993) claimed that targeted population as a collection of personalities which are eligible to participate in the enquiry. The participants comprised 355 respondents including 45 local leaders in charges of the donation of cows, 24 agronomists as technicians in charges of cows health 286 households benefited from Girinka program in kirehe district

The choice of sample deserves attentive hints in withdrawing from entire group and to provide information that can scientifically be tested. Random sampling technique was used to select a representative sample (Denscombe,2008). The number respondents were sampled using the Yamen formula (1970). This formula involves in calculating the sample size from target population: when the population is 355, the possible sample is 78 respondents.

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

Source: Yamane, 1970

N: stands for the target population/ population size of the study

e: is the level of precision equals to (10%)

n: Sample size

$$n = \frac{355}{1+355(0.1)^2} = \frac{355}{1+355(0.01)} \text{ n} = \textbf{78}$$

(2)

**Table 1. Targeted population and sample size**

Group of respondents	Targeted population	Percentage (%)	Sample size
Local Leaders	45	12.67	10
Program beneficiaries	286	80.56	62
Agronomists	24	6.77	6
<b>Total</b>	<b>355</b>	<b>100</b>	<b>78</b>

**Source: Researcher, 2020**

Method for getting data is an organized approach to arrive at needed news as reflecting purposes of the research (Burns & Grove, 1993). The researcher used the combined method that consisted of descriptive survey and interview. The descriptive survey was used by the researcher because of limited time of research project to deal with a large number of respondents from the Kirehe district The respondents under

investigation geographically dispersed in the area under investigation.

This is the factor that it made the researcher to choose the descriptive survey method. And the method of interview was applied to the selected local leaders and agronomist under investigation. The other criterion to choose mixed methods was the financial means of researcher to reach every respondent of targeted population and stay with him or her during investigation time

**3. Results**



The results indicated in table 3 show the lands used by each households in kirehe agriculture areas and shows the area of land cultivated by

the respondents before and after getting the cow. Before getting the cow.

**Table 3 Land used in the households**

Statement	attributes	Frequency	Valid %
Land cultivated before getting cow	[0-1]ha	35	51.47
	[2-3]ha	22	32.35
	[4-5]ha	7	10.29
	≤ 5ha	4	5.89
	<b>Total</b>	<b>68</b>	<b>100</b>
Land cultivated after getting cow	[0.5-2]ha	11	16.17
	[2-3]ha	37	54.41
	]3-4.5]ha	13	19.11
	]4.5-6[ha	4	5.88
	≤ 6ha	3	4.43
	<b>Total</b>	<b>68</b>	<b>100</b>
The total land available to the household for agricultural production	[1-20%]	1	1.47
	[20-35%	4	5.88
	[35-60%]	3	4.41
	[60-80%]	2	2.94
	[80-99%]	5	7.35
Reasons for not cultivate all land	100%	53	77.95
	Inadequate labor	30	44.11
	Lack of fertilizers	19	27.94
	Poor rainfall	2	2.94
	Lack of seeds	7	10.31
	Poor and uncultivable land	5	7.35
	Land to fallow	5	7.35

**Source: Field data, 2020**

The findings indicated in the table 4 shown that the program had affected the crops intensification where all respondents improved their agriculture modernization

practice through crops modification and improvement and land extension.

**Table4Crops modification and improvement and land extension.**

Statements	Attribute	Frequency	Percentages
Extension of land for cultivation	yes	23	33.83
	No	45	66.17
Reasons for extension of land for cultivation	Increase of crops production	61	89.7
	Acquiring land to fallow	7	10.3

**Source field data,2020**

Table5 shows percentages of crops cultivated before and after the introduction of the Girinka program. These results show that types of crops cultivated before getting the

cow are generally the different when compared to crops cultivated after getting the cow

**Table 5 Crops grown before and after getting the cow from household**

Crops	% Before getting cow	% After getting cow
MAIZE	92.2	94.9
CASSAVA	61.31	79.53
Groundnuts	1.23	1.23
potatoes	62.25	87.2
Beans	71.6	92.05
Rice	3	7
Banana plantation	49.8	52.8
Sorghum	0.73	0.91

**Source field data,202**

Percentages of all sources of incomes of the Girinka program beneficiaries are presented in table 6 The results show that the respondents' main sources of incomes are

sale of rain-fed crops sale of livestock products and sale of milk and manure (95.59% ,82.36% and 76.48% respectively).

**Table1 sources of income of households**

Parameters	Disagree		Neutral		Agree	
	Frequenc y	%	Frequenc y	%	Frequen cy	%
Sale of livestock	3	4.41	9	13.23	56	82.36
Sale of rain-fed crops	1	1.47	2	2.94	65	95.59
Fulltime paid employments	61	89.70	4	5.88	3	4.42
Trading	59	86.76	8	11.76	1	1.48
Sale of milk and manure	14	20.58	2	2.94	52	76.48
Ingoboka	60	88.23	0	0	8	11.77
pisciculture	51	75.00	8	11.76	9	13.24
own business	63	92.64	4	5.88	1	1.48
piecework	48	70.58	5	7.35	15	22.07

**Source: Field data, 2020.**

**Table 2 Importance of Girinka program**

Statements	Disagreed		Neutral		Agreed		Mean	Std
	Fre q	%	Fre q	%	Fre q	%		
Livelihoods improved by Girinka program	1	1.5	0	0	67	98.5	2.97	1.32
Crops production increased	3	4.4	4	5.9	61	89.7	2.90	1.77
Child malnutrition eradication	0	0	5	7.4	63	92.6	3.88	2.99
Saving increased	18	26.5	2	2.9	48	70.6	2.48	1.94
Creation of friendship through sharing of milk and manure	31	45.6	9	13.2	28	41.2	2.29	1.43
Increase of confidence and dignity of having cow	17	25.0	14	20.6	37	54.4	3.55	1.71

**Source: Field data, 2020. \*\*\*[3-4]= Moderated means, [1-2]= very high mean, [2-3] = high mean,[4-5]= low means, [5-6]= very low mean,**

The findings also shown in the table 7 revealed that crops production was increased due the Girinka program means that Girinka

program provides cows for manure as fertilizers and those manure was used for agriculture to affect the agriculture productivity

**Table 4. 3Correlation of variables**

Parameters		Girinka program	poverty alleviation
Girinka program	Pearson Correlation	1	.881**
	Sig. (2-tailed)		.000
	N	68	68
poverty alleviation	Pearson Correlation	.881**	1
	Sig. (2-tailed)	.000	
	N	68	68

**Source: Field Data 2020**      \*\*. Correlation is significant at the 0.01 level (2-tailed).

Table 8 indicate the relationship between agriculture modernization and poverty alleviation in Kirehe district

#### 4. Discussion

The main objective of this study was to assess the impact of agriculture modernization on poverty alleviation in Rwanda, case study Girinka program in Kirehe district

Table 3 shows the area of land cultivated by the respondents before and after getting the cow. Before getting the cow, 51.47% of the respondents cultivated between zero and 1 hectares and after getting the cow, this number diminished to 16.17 % of the respondents. The area ranging in the interval of 2-3 hectares had been cultivated by 32.35% of the respondents before getting the cow and 54.41% after. The area ranging in the interval of 3-4.5 hectares had been cultivated by 10.29% of the respondents before getting the cow and 19.11% after. More than 5 hectares were cultivated by 5.89% of the respondents before getting the cow and 10.31 % after. The average area cultivated before getting the cow is 1.12 hectares and 2.26 hectares after getting the cow. According to Smith et al. (2013), suggestion discussed in chapter two, the money from cow products or cow sale can also contribute to hiring labor for planting, weeding, harvesting or increasing the area of

land cultivated. These results show that the respondents increased the area of land cultivated after getting the cow and this indicates that objective one of this study in terms of agriculture modernization practice may be evident.

Most of respondents (77.95%) cultivated the total land they accessed, but some (22.05%) respondents did not cultivate the total they accessed because of diverse reasons. Those who did not cultivate all the land, cultivated 1-20% (1.47%), 20-35% (5.88%), 35-60% (4.41%) and 60-80 (7.35%) of the total land. The main reason for not cultivating the total available land is inadequate labor (44.11%), followed by leaving the land for lack of fertilizer purposes (27.94%). Inadequate labor is mainly due to the advanced age of some the respondents. Another reason for not cultivating the total available land is leaving the land to fallow (7.35%). A small number of respondents (7.35%) also do not cultivate their total available land because a part of their land is poor quality. Despite the fact that most of respondents have lack of seeds, their productive labor is good because only 10.31% of all respondents are those who do not cultivate all their land because of inadequate labor.

During the focus group discussion, respondents stated that those with poor

human capital sometimes use the money derived from cow products (milk and manure) to hire labor for weeding and harvesting. This indicates that the Girinka program contributes to improving livelihood strategies. The literature indicates that agricultural production is one of the main survival strategies in rural communities in Rwanda and the specific case studies in this research endeavor. The finding therefore is a positive response to the second objective of this study which focuses on the impacts of the Girinka program on livelihood strategies. However, the land to fallow is a worrying result and is perhaps insufficient because only 7.35% of the respondents are not cultivating the entire land available to allow for fallow farming practice while 44.11% of all respondents cultivate all their land every season which may result in reduced soil fertility. Also, the findings indicated in the table 4 shown that the program had affected the crops intensification where all respondents improved their agriculture modernization practice through crops modification and improvement and land extension. The results presented in table 4 show that 66.17% of the respondents did not extend the land for cultivation while 53% had extended it. The main reason of increasing the land for cultivation is to increase crop

production that represents 89.7% of the respondents. Only 10.29% of respondents extended the land to acquire land for grazing. According to the findings from the focus group discussions, the extension of land for cultivation is due to the money derived from the sale of milk and male calves. This is could also be the reason for increased cultivation in land after receiving the cow as indicated in table 4

Table 5 shows percentages of crops cultivated before and after the introduction of the Girinka program. These results show that types of crops cultivated before getting the cow are generally the different when compared to crops cultivated after getting the cow. Respondents who cultivated maize, cassava, potato, and banana plantations before getting the cow increased slightly after getting the cow. Those who cultivated beans, groundnuts, sorghum, rice and did not change before and after getting the cow. These results show that the main crops grown in Kirehe were beans (92.05%), maize (94%), cassava (79.53%), potato (87.2%) and banana plantations (52.8%). The crops that were least grown in Kirehe were rice (7%), ground nuts (1.23%) and sorghum (0.91%). The literature indicates that money from cow products and cow sale can help to increase crop production by extending cultivation land

(Smith et al. 2013). Respondents said that the cow helped them to increase considerably crop production by providing manure as source of fertilizer and money for cultivation land extension. This is also confirmed by the findings from all focus group discussions. This again is also a positive response to the objective one of this study in terms of crop intensification.

Percentages of all sources of incomes of the Girinka program beneficiaries are presented in table 6. The results show that the respondents' main sources of incomes are sale of rain-fed crops, sale of livestock products and sale of milk and manure (95.59%, 82.36% and 76.48% respectively). This relates to the literature which indicates that incomes and employment in rural areas are generated by agricultural/ farming activities that also provide food at reasonable prices in urban areas in developing countries which leads to poverty reduction and income growth (Dethier and Effenberger, 2011). These results suggest that the respondents' main sources of activities may have been supported by Girinka program because it is known that cows provide manure that serves as organic fertilizer that increase rain-fed crops. Also the sale of livestock is probably the sale of cow calves or other livestock acquired from the money from the sale of

cow products. This is also confirmed by the data from all focus group discussions. These results confirm that the Girinka program has a positive impact on its beneficiaries' livelihoods, which is also a positive result of the aim of this study. This will be discussed in greater detail in the final chapter of this study. Other sources of income for the respondents are full-time paid employment and Trading (4.42% and 1.48%, respectively). Ingoboka are also sources of income for a few of the respondents and count 11.76% each. The respondents that own businesses are 1.48% while those who are involved in pisciculture are 13.24% each. The findings were summarized in the table 7. The study revealed that the majority of respondents indicated that the Girinka program had affected them positively as shown in the table 7 where 98.5% of respondent improved their livelihoods through Girinka program while 1.5% of respondent had not improved their livelihoods through Girinka program, this statement have the mean of 2.97 and its standard deviation of 1.32 which is very high and indicated that the Girinka program improved and affected the livelihoods of populations. The findings also shown in the table 7 revealed that crops production was increased due the Girinka program means

that Girinka program provides cows for manure as fertilizers and those manure was used for agriculture to affect the agriculture productivity so the 89.7 % of respondents accepted that their crops production was increased due the Girinka program while 4.4% of respondents disagreed with the statements and 5.9% of respondents were not aware to show their side about how the Girinka program increased the crops productions ,this view have the mean of 2.9 and its standard deviation was 1.77 which is also high mean. The third statement was about the malnutrition as main challenges to be overcome in the areas of the study and the results was that 92.6% of respondents were agreed with the statement by saying that the Girinka program eradicated the child malnutrition because once the households have given a cow means they receive both milk and manure which have contributed in the prevention of some illness like malnutrition while 7.4% of respondents were neutral to the statement.

Ntanyoma (2010) states that in the short and long run, the Girinka program has a positive effect on households' income. These results discussed above are also confirmed by the data from focus group discussions. Additionally, the findings from focus group discussions show that eradication of child

malnutrition is confirmed by the fact that since 2009 there are no more Nutritional Centers in Kirehe District. Those Centers were in charge of providing food to children that suffered from malnutrition-related diseases in the region but two years after Girinka program has been implemented in Kirehe District they closed because there were no more child malnutrition in the region. All respondents stated that the main benefits of the program are manure that rejuvenated their farms and the milk produced. Also the literature suggests that according to Rwandan culture, the Girinka program will create friendship between neighbors, improve unity and reconciliation, increase meat production and be used as dowry payment. The focus group discussions also indicated that the Girinka program helped them to buy other household assets such bicycles, cell phones and some of them built better houses. The results of this study show that meat, friendship and dowry as benefits from the Girinka program while the findings from focus group discussions show that the Girinka program improved considerably friendship, unity and reconciliation in the community. These results discussed above show that Girinka program has a positive impact on its beneficiaries' livelihoods and indicate food

security for its beneficiaries because of the eradication of malnutrition. Also, the respondents generally have a good knowledge of the benefits of having at least one cow. This is a positive response to the second objective of this study regarding households' knowledge towards the benefits of the Girinka program.

The table 8 presented the perception of respondents on the relationship between the poverty alleviation and Girinka Program. It was indicated that there was a significance relationship between the Girinka Program and poverty alleviation where P-value was 0.000 which was less than 0.05 as the level of significance. It was also indicated that there was a high degree of positive correlation between the poverty alleviation and Girinka Program as it was proved by Karl Pearson coefficient correlation ( $r$ ) which was 0.881. This also implies that Girinka Program contributed in poverty alleviation positively and at high level

## 5. Conclusion

This study revealed the impact of the Girinka program on poverty alleviation. Milk as nutrient food and manure as a source of fertilizer have been noted as benefits of this study. It was found that the Girinka program also plays a notable role in relation to livelihoods of respondents and Benefits and

challenges of this program have been highlighted in this study. The Girinka program has notably improved its beneficiaries' livelihoods. This program has promoted unity and reconciliation in Rwanda. Various benefits of the Girinka program are demonstrated in this study such as crop intensification, eradication of child malnutrition, increase of milk and meat, dowry payment and the confidence or dignity of having a cow which is imperative in Rwandan culture. Lastly, recommendations have been provided in this study. Different development organizations such as local NGOs and international organizations (Heifer International, Send a Cow, World Vision, etc.) are recommended to support the Girinka program because it has a notable role to play in poverty reduction. This study revealed that cows are of considerable importance as they contribute to poverty alleviation. The Government of Rwanda and NGOs that deal with climate resilience are recommended to teach Girinka program beneficiaries about the role of biogas energy use and support financially those who cannot afford its start-up costs. The Government of Rwanda, NGOs and donors are recommended to increase their financial support to the Girinka program in order to provide cows to all poor people because they



contribute to poverty alleviation. The results show eradication of child malnutrition and the manure provided by the Girinka program cows were used to rejuvenate the land for cultivation and increased soil fertility. Therefore, research on the Girinka program all around the country is recommended in order to reveal benefits and challenges of the program according to different regions.

### Conflicts of Interest

The authors declare no conflicts of interest.

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