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# Contribution of Agriculture Projects and Project Beneficiary Welfare: Case of Sustainable Agriculture Intensification and Food Security Project in Gwiza, Rwanda

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## Abstract

The welfare of farmers is influenced by many factors such as the performance of agriculture projects which help give good productivity to the farmers. Some agriculture projects did not show an effect on the farmers improving their welfare. This research mainly aimed to investigate the agriculture project's contribution to the project beneficiary welfare, the case of Sustainable agriculture intensification, and food security projects for the Gwiza cooperative. This research was divided into three objectives: Agri-inputs, capacity building, and market access. A descriptive research design was utilized to conduct the study. The target population was 345 respondents comprising Gwiza farmers and project managers of Sustainable agriculture intensification and food security projects. A sample of 136 was selected from the population of 345 using simple random probability sampling to pick the participants from Gwiza Cooperative farmers. Self- Administered questionnaires were utilized to collect the primary data. SPSS version 25 was utilized for analyzing the data. Quantitatively, the data were analyzed using descriptive statistics; multiple chi-square and linear regression. The linear regression established the link between variables. The data was presented in tables through percentage, frequencies, and standard deviations. The study found that Agri inputs contributed to farmers' productivity with a high-level average mean of 3.97 and a standard deviation of 0.808. The study also found that the overall average mean was 3.6 with a standard deviation of 1.0, implying that respondents agreed that the skills obtained from SAIP on capacity building of modern agriculture. The study also found an overall mean of 3.83 and a standard deviation of 0.95, implying that the respondents agreed that the SAIP helps farmers of Gwiza access finance and the market. Therefore, the statistics on test on Agri- inputs, capacity building, and access to the market by farmers has provided enough evidence to conclude that SAIP has contributed to the welfare of farmers because variables are statistically significant because their p-values equal 0.000 or less than 0.005 (sign=0.0000<0.05). The study results showed variations in the dependent variable that the statistical model predicts; an adjusted R squared value of 0.862 shows that about 86% of changes in the welfare of farmers are explained by Agri inputs, capacity building of farmers, and access to a market of farmers; therefore, it shows that the model has a good fit. The study recommended that stakeholders should be involved in the management of the projects.

**Keywords:** *Contribution of Agriculture, Projects, Beneficiary Welfare Sustainable Agriculture, Food Security*

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## 1.1 Introduction

The welfare of farmers is influenced by many factors, such as the excellent performance of agriculture projects which give good productivity to the farmers. Some agriculture projects did not affect the farmers in improving their welfare. Poor farmers' productivity is due to several causes, such as a lack of better seeds and fertilizers, lack of capacity building on modern agriculture, and limited access to the market. According to Nahayo (2017), the main objective of agriculture projects is to enhance farmers' access to and utilization of agricultural knowledge, technologies, marketing systems, and infrastructure to support increased productivity, profitability, and farm incomes to increase the welfare of farmers.

## 1.2 Problem of Statement

The Rwandan government has developed an investment in agriculture strategy emphasizing agricultural projects meant to increase agricultural revenue. The success of agriculture projects has been uneven despite the enormous potential of the subsector of food crops. (RAB, 2019). The welfare of farmers is still an issue because of low farmer productivity, a lack of agricultural techniques, and a lack of agri-inputs. As a result, rural farmers have received support for agriculture projects. However, the outcomes of these projects occasionally have little or no impact on farmer welfare as people continue to experience low productivity and limited access to additional income sources for a living. The situation for farmers has stayed the same, and there are still issues with food security. (Feliciano, 2019). Based on the above issues researcher was inspired to assess the effect of the agriculture project noted SAIP on the welfare of farmers in Gwiza Cooperative.

## 1.3 Objectives of the Study

This study's main goal is to analyse the contribution of agriculture projects to the welfare of beneficiary projects a case of the Sustainable Agricultural Intensification and Food Security Project in Gwiza cooperative.

## 2.1 Literature review

### 2.1.1 Implementing Agricultural Projects

The majority of the world's poor, who make up around three-quarters of the population, have their primary source of income in agriculture. The agricultural sector in many developing nations must be altered in less than 20 years to eradicate poverty by 2030 and create broadly shared wealth, according to the National Agriculture Policy 2018. According to the World Bank (2010) research, increasing agriculture is necessary for rural development and poverty alleviation. The agricultural industry is crucial for creating jobs and generating money for those employed, increasing people's purchasing power. Increases in total employment capacity and production efficiency, or the added value of output per unit of labor, are two related processes that must be pursued to advance agricultural growth. Access to credit is one of several factors that might impact development in rural regions, especially in agricultural project financing. This may impact farm productivity since restricted farmers may choose to utilize lower-quality inputs than those who are not (Kenzer, 2009). In this respect, access to credit can enable farmers to use high-quality products in their farming practices, thereby improving their farms' productivity. This is so because the availability of credit addresses cash needs necessary for the production process. According to Etwire et al. (2013), productivity is the capacity to produce efficiently and cost-effectively. The ratio of output a farmer receives to farm inputs used in farming is known as agricultural productivity in the current study.

Increasing food production and facilitating labor movement from one region to another are important regional agricultural project financing outcomes. Increased agricultural output in one location suggests the region's limited resources are effectively dispersed. More productive farmers can increase their yields as new agricultural techniques spread throughout different regions, while less productive farmers quit farming to try their luck elsewhere (Newton, 2009). As a result, the effectiveness of agricultural initiatives is evaluated in terms of their agricultural inputs and outputs (Liu, 2013). Although products are weighed at the individual level, assessing the total output of agricultural techniques is complicated by the variations in product density. When intermediate products like corn are used in other industries like the meat industry, the output should be measured in terms of the market value of the ultimate output. The output value in this instance could be contrasted with various inputs that make up partial productivity metrics.

### **2.1.2 Management of agriculture projects**

The use of information, skills, tools, and procedures in project management is done to ensure that project objectives are met. Applying and integrating the project management processes of initiating, planning, executing, monitoring and controlling, and closing results in project management (Kholodova, 2020). While there can be a temptation to use projects and programs synonymously, it is important to distinguish between the two. A project is an investment activity where funds are utilized to develop capital assets with a beginning, end, and particular goals. These assets produce advantages over time. A program is a continuous development project or plan that is not always time-bound. For instance, a program to build roads, one to enhance nutrition or health, one to electrify rural areas, etc. A development plan is a broad declaration of economic strategy (Kholodova, 2020).

### **2.1.3 Welfare of farmers**

In the last ten years, the Rwandan government has taken several steps to enhance farmers' quality of life. The government's agriculture strategy prioritizes improving farmers' welfare. Raising farmer incomes and increasing employment in the agriculture sector are essential components of its implementation. By boosting output, cutting costs, giving preference to goods with high market value, and minimizing risks, the government aims to make agriculture more sustainable. The Economic Transformation Pillar received Frw 2.7 trillion from the government, or around 58.5% of the total budget. With these funds, farm production will increase, employment will be made, the private sector will grow, and the fight against climate change will be strengthened. The majority of Rwanda's geographical area—nearly 98%—is categorized as rural, with 49% being arable. (Niyitanga, 2021).

### **2.1.4 Contribution of agriculture projects to the welfare of farmers**

Agriculture projects improve the welfare of farmers through the Agri inputs such as fertilization, seeds, and irrigation which contribute to increasing farmers' production. The World Food Organization claims that agriculture projects enhance the sufficiency and promptness of input supplies and specialized services to farming, forestry, and fisheries or enhance the systems for storage, processing, and marketing. The use of Agri-inputs like fertilizer, seeds, and irrigation, which help farmers produce more, improves the well-being of farmers in agricultural projects. Rural households in developing nations rely heavily on agricultural development initiatives as a means of subsistence. According to Mabaso (2014), maize is a significant crop in Rwanda. Most of the population grows it since it can be used as both animal feed and human food, while vegetables may be utilized to augment maize's nutritional value.

### 2.1.5 Agricultural Inputs

Smallholder farmers must use agricultural inputs to supplement their harvest to increase production. Any outside source inserted into the soil to increase a farmer's perspective harvest is considered an agricultural input. High-tech tractors or premium seeds are both examples of what they can be. They are, to put it simply, whatever resource you utilize to improve crop yield. Inputs for agriculture are things that can be used in organic farming. These consist of ingredients used in the manufacture of food, such as cleaning products and additives, as well as feeds, fertilizers, and approved plant protection products (Alam, 2017). Agricultural inputs come in a huge variety of forms, but we can divide them into two categories: capital and consumable. Smallholder farmers regularly utilize consumable inputs, such as seeds, fertilizer, and pesticides, are agricultural supplies. Natural resources that the crops will absorb often constitute consumable inputs. On the other side, capital inputs include things like tractors and trellis materials that frequently need bigger investments (W.McArthur, 2017).

As we just mentioned, consumable inputs are the kinds of inputs that crops will naturally eat. The most often used consumable inputs include high-quality seeds, soil, fertilizers, herbicides, insecticides, and water. Consumable inputs are the most basic yet important instruments for smallholder farmers' crops. Pest control measures must include the use of insecticides and pesticides. Mulch can prevent weed growth. Do not ignore the importance of superior seeds, either. High-quality seeds ensure robust harvests from the outset (Helen L Walls, 2018). Agri-inputs, known as capital inputs, are frequently mechanical and more sophisticated. These agricultural inputs are useless to the crops themselves. Although this is not completely accurate, when people think of capital inputs, they frequently picture equipment for larger farms. Reflective mulches and other agricultural inputs, such as trellising materials, can benefit both large and smallholder farmers. Other commonly used capital inputs include nylon netting, stakes, tractors, and irrigation systems (Helen L Walls, 2018).

**Irrigation:** Rwanda has 135 000 hectares of water in lakes and rivers, and the country receives 900 to 1 600 mm of precipitation annually. This indicates that there are ample water resources, but that agriculture mostly depends on rainfall, and that areas like the eastern province regularly experience drought. Agriculture can no longer be conducted based on unpredictable rains. Therefore, it is essential to create irrigation systems that are suited to the requirements of farmers. Since there is no suitable irrigation, most of the farms are situated on a hillside. Paddy is the most widely planted irrigated crop in Rwanda, and it is farmed via surface irrigation in constructed marshes. In 2017, around 25% of marshes that were extensively farmed were irrigated, according to a seasonal agricultural study by NISR. Only 1% of the world's agricultural land is covered by hillside irrigation, but where it is used, the principal crops are maize, beans (including soy), vegetables, and fruit, which are watered using conventional techniques. MINAGRI's new hillside projects use gravity systems with hose furrow systems. Sprinkler and centre-pivot systems are still uncommon. Usually, sugarcane is produced on reclaimed marshes without irrigation (Byiringiro, 2019).

**Soil Conservation:** to prevent soil degradation, several techniques are utilized collectively as soil conservation. To conserve soil, one must first recognize it as a living ecosystem. This calls for routinely replenishing the soil with organic materials. Rwanda manages its soil in part by using agroforestry and evergreen farming techniques, improved seeds, and proper fertilizer application as part of its efforts to mitigate climate change. Integrated Soil Fertility Management (ISFM), a strategy for adaptation in drought-prone areas, seeks to boost agricultural output. Most of the world's food is produced using the soil, a vital resource and essential element of the ecosystem (Nambajimana, 2019).

**Post-harvest management:** If post-harvest losses cannot be eliminated due to the restricted yields from the agricultural

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community, it would be of utmost significance to keep them to a minimum. Post-harvest losses are quite significant in the nation today due to the extremely low level of storage and processing facilities. It is well knowledge that substantial amounts are wasted either before harvest owing to inadequate handling infrastructure or during storage due to illnesses and pests (Nshizirungu, 2019).

For farmers searching for higher pricing for better-quality crops, post-harvest management will lead to better handling methods. Most farmers lack knowledge of or access to adequate post-harvest management measures. Some farmers create farmer associations to pool their products and locate more lucrative markets. Unfortunately, many farmer groups are poorly administered, which prevents the members from producing commodities of a high enough caliber to suit the needs of customers who will pay more for them (Nshizirungu, 2019). These agricultural inputs include, among other things, enhanced seeds, fertilizers, crop protection substances, machinery, irrigation, and knowledge. The development of successful crops and, consequently, the productivity and profitability of farms depend heavily on seeds. The soil is given nutrients through fertilizer that are necessary for growth. Increased fertilizer usage and improved seeds are primarily responsible for the significant increases in agricultural productivity growth in Asia during the Green Revolution of the 1960s. Additionally, irrigation is crucial for expansion since it makes it possible to farm outside of the growing season, increases the number of harvests each year, and cultivates more area. Chemicals used for crop protection, such as pesticides, herbicides, insecticides, and fungicides, manage plant diseases, weed species, and hazardous insects that affect crops. Finally, technological expertise and equipment improve the efficiency of human work and raise agricultural yield (Alam, 2017).

### **2.1.6 Agriculture Capacity Building**

Building capacity is the process of acquiring and expanding the information, skills, practices, and resources that communities and organizations require to endure, adapt, and prosper in a fast-changing environment. Building capacity calls for an internal transformation that is developed and maintained over time; this kind of transformation goes beyond completing duties to change mindsets and attitudes (Alexandra Sauter, 2021). Most of the farming in Rwanda is small-scale subsistence farming, and the lack of skills among farmers and other value chain participant's influences farm management, crop use, and farm specialization. To boost production and satisfy worldwide standards, certain profitable foreign investments have been supported with consistent training of the farmers (Regin, 2020). Helping farmers thrive and survive is one of the objectives of many agricultural projects for increasing production. The first step in accomplishing that goal is to increase the capacity of nearby farmers to adopt more sustainable practices. In the capacity-building program, farmers and farm laborers are given first emphasis. We understand the necessity for this to enhance the situation and increase the impact of the agriculture program. The Projects guarantee that farmers and agricultural workers have access to the tools, training, and help they require to continuously improve their practices (Seth Kwizera, 2020).

### **2.1.7 Agriculture Linkage to Market**

Making the switch from subsistence farming to commercial, market-driven agriculture where products are sold into value chains is one approach for farmers to increase their income and standard of living. The fact that smallholder farmers' products frequently fall short of the necessary quality requirements prevents them from selling their goods to purchasers in value chains, however, is one of the main reasons why they generally do not. The impact of giving farmers access to maize processing facilities that might raise the quality of the crop on their choice of inputs is being studied by researchers (Boubaker Ben, 2020).

Farmers in Rwanda are grouped into cooperatives as part of the government's Crop Intensification Program. According to the Rwanda Cooperative Agency, there are 2,400 agricultural cooperatives in the nation, and their over 300,000 members account for around 20% of all agricultural families. On property held by the government, several of these cooperatives operate collective farms. When pooling their output and maybe planning input purchases, these cooperatives might benefit from economies of scale. Most cooperatives, however, do not participate in output value chains and do not have agreements in place with purchasers. Only 32% of the farmers' cooperatives with maize identified as their principal crop had a buyers' contract in the previous agricultural season (Jonathan 2019).

### **2.1.8 Access to Finance for the farmers**

Access to finance is one of several variables that might influence development in rural regions, especially in agricultural project funding. This may impact agricultural production since restricted farmers may choose to utilize lower-quality inputs than those who are not. The ability to use high-quality products in their farming operations and increase the productivity of their land are two ways that having access to money may be advantageous to farmers. This is accurate since credit is readily available and provides the required funding for the industrial process. Productivity is producing work effectively and efficiently (Murty S. Kopparthi, 2012). Investment in agriculture is hampered by high loan rates, problems with collateral, and inadequate banking products. Growing the agricultural insurance industry and the agricultural loan market are two opportunities in Agri finance. In most low-income nations, agriculture continues to be the main economic activity and the largest employer of people. There are over 450 million families whose primary activity is agriculture worldwide. Agricultural producers in developing nations, especially those in low-income nations, confront various challenges, including low productivity, restricted access to markets for their goods, a lack of sufficient risk management products and services, and constrained access to financing. Only around 1% of bank financing goes to the agricultural sector, even though agriculture continues to be a significant economic activity in Africa and still employs over 55% of the people (IFC, 2014).

### **2.1.9 Projects involving agriculture and farmer welfare.**

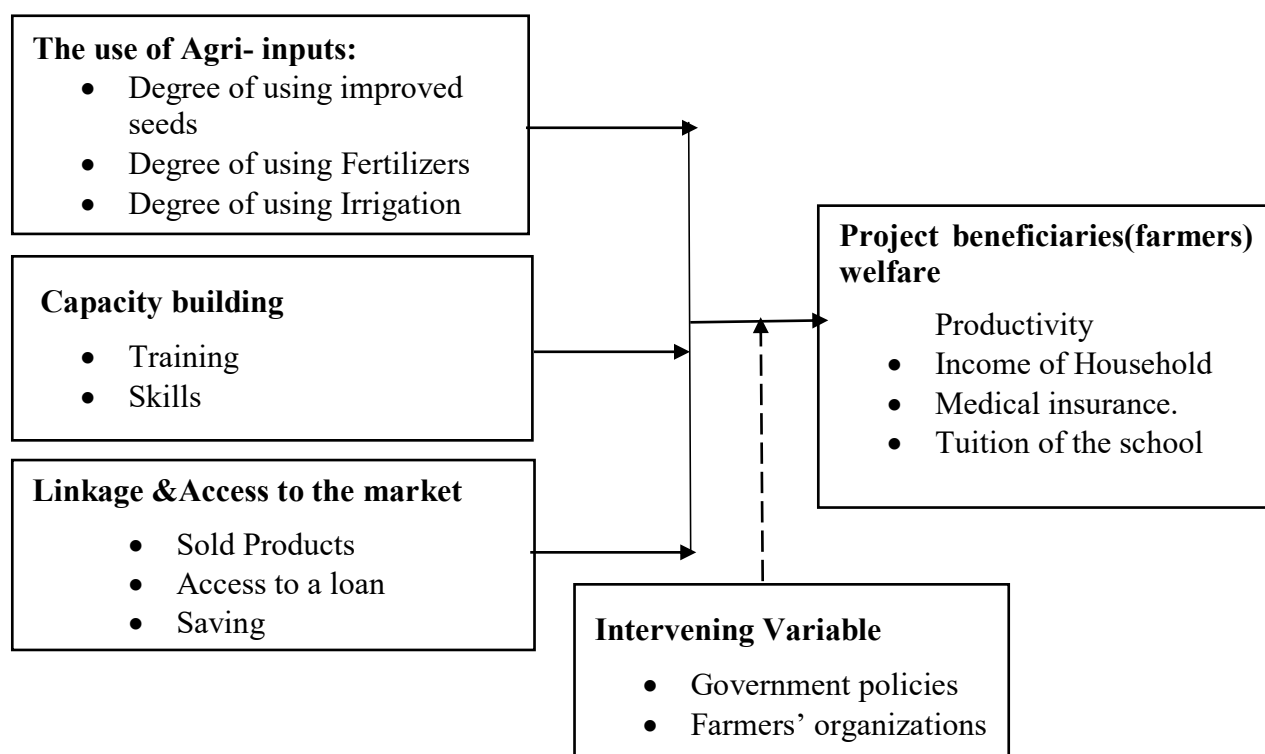
The goals of the agriculture project are to increase agricultural productivity, for instance by teaching farmers how to use fertilizers, giving them quality seeds, creating marshes, offering post-harvest facilities, etc. They can also provide financial assistance to farmers by providing loans, acting as grants in banks, hiring farmers, etc. The well-being farmers is the end outcome of all these many techniques that agriculture projects might utilize to increase agricultural productivity. Improved farmer welfare is a sign of a successful agriculture project (Tschirley, 2015). The adoption of more effective farming techniques backed by cutting-edge technology, the enhancement of farmers' production, and the ongoing upgrading of their farms are all necessary for the accomplishment of global agricultural sustainability. As a method of transferring technology, it has been shown that there is a significant and productive link between improving production techniques and policy tools. Various individual, economical, regional, demographic, political, and technical issues impede farmers' ability to carry out policy directives. The adoption of more sustainable agricultural techniques by farmers is one of the most crucial things that can be done to aid them (George, 2020).

## **2.2 Conceptual framework**

The section presents the study variables in a diagrams as shown in Figure 1.

### Independent Variables

### Dependent Variables



**Figure 1: Conceptual Framework**

### 3.0 Methodology

This Research focused on primary data and secondary data collection where the target was the farmers from Gwiza Cooperative in Rwamagana underfunded by the project of SAIP. The study's population composed of 345 of farmers from Gwiza cooperative and 10 were project managers like project Coordinators, agronomist, and staff of the project on the field. This study focused on primary data and secondary data collection where the target was the farmers from Gwiza Cooperative in Rwamagana underfunded by the project of SAIP. A sample of 136 was selected from the population of 345 using simple random probability sampling to pick the participants from Gwiza Cooperative farmers. Self- Administered questionnaires were utilized to collect the primary data. The collected data were analyzed through the Statistical Package for Social Sciences (SPSS), specifically through frequency and multiple regression to predict the value of dependent variables based on the value of independent variables.

### 4.0 Key result and findings

#### 4.1 Demographic Characteristics of Respondents

The results show the number of questionnaires used for interviewing sampled respondents, respondent categories and respective response rates. 136 questionnaires were used for data collection, of which 129 were used for farmers and 7 for project managers, and the overall response rate was 94%. The study also shows that out of the 129 interviewed farmers, 60.5% were females and 39.5% were males. This may be due to the Rwandan government's encouragement of female participation in income-generating activities. In addition, the age



distribution of the respondents, where the majority of project-supported farmers in Gwiza are aged between 40 and 60 years.

## 4.2 Descriptive statistics of findings

### 4.2.1 Descriptive statistics for Agricultural inputs

In this section, the farmers were asked to rate how the Agri inputs such as seeds, inorganic fertilizers, mineral fertilizer, and irrigation were used and increased the level of agricultural productivity. The results are shown in table 1.

**Table 1: The Level of Farmers’ Satisfaction**

|   | Mean        | Std.         | Interpretation         | Rank |
|---|-------------|--------------|------------------------|------|
| The degree of use of improved seeds increases the level of agricultural productivity.             | 3.76        | 0.952        | high level             | 4    |
| The degree of your agricultural productivity rises with the application of inorganic fertilizers. | 4.04        | 0.802        | very high level        | 2    |
| The use of mineral fertilizer increases the level of your agricultural productivity.              | 4.24        | 0.599        | very high level        | 1    |
| The use of irrigation increases the level of your agricultural productivity.                      | 3.82        | 0.877        | high level             | 3    |
| <b>Average mean index</b>   | <b>3.97</b> | <b>0.808</b> | <b>Very high level</b> |      |

Source: primary data, 2022

The farmers of Gwiza rated “very high” the level of use of mineral fertilizers and inorganic fertilizers. The use of mineral fertilizer and inorganic fertilizers were rated 4.24 and 4.04 of the mean concerning their contribution to increasing agricultural productivity. However, the respondents rated “high” using irrigation and improved seeds to increase productivity (Mean is 3.82 and 3.76, respectively). The Average mean was 3.97 with a standard deviation of 0.808, implying that respondents agreed that the level of use of Agri inputs such as improved seeds, inorganic fertilizers, mineral fertilizers, and use of irrigation has impacts on increasing the level of agricultural productivity in Gwiza Cooperative.

### 4.2.2 Descriptive statistics for Capacity building for Farmers

The second objective of this research aims to find out whether or not the farmers’ capacity building provided by SAIP, has a significant impact on farmers’ welfare, to this end, farmers were asked to rate how the provided capacity building such as skills on modern agriculture, skills on erosion, skills on post-harvest, skills on irrigation and skills on saving and credit; increased the farmers’ knowledge on agriculture practices with end result of increasing agricultural productivity. The results were as shown in table 2.

**Table 2: The Impact of Capacity Building**

|   | Mean       | Std.       | Interpretation | Rank |
|---|------------|------------|----------------|------|
| The skills obtained from SAIP on modern agriculture practices increase knowledge of agriculture practices.        | 3.76       | 0.907      | High Level     | 4    |
| The skills obtained from SAIP on soil erosion control increase agriculture productivity.                          | 3.79       | 0.862      | High Level     | 3    |
| The skills obtained from SAIP on post-harvest increases knowledge on agriculture practices.                       | 3.85       | 0.955      | High Level     | 1    |
| The skills obtained from SAIP on irrigation and water use management increase knowledge of agriculture practices. | 2.96       | 1.252      | Moderate       | 5    |
| The skills obtained from SAIP on saving and credit increase knowledge of agriculture practices.                   | 3.80       | 1.053      | High Level     | 2    |
| <b>Average mean index</b>   | <b>3.6</b> | <b>1.0</b> |                |      |

Source: primary data, 2022

As shown in Table 2 above, the farmers of Gwiza rated “high” the skills obtained from SAIP on post-harvest and the skills obtained from SAIP on saving and credit. The skills on post-harvest and saving and credit were rated 3.85 and 3.80, respectively, of the mean contribution to the increase of knowledge on the practice of agriculture. The respondents also rated “high” the skills obtained on soil erosion and skills on modern agriculture, with Mean = 3.79 and mean = 3.76, respectively. In contrast, the impact of skills on irrigation was rated to be at a “moderate level “with a Mean of 2.96. The overall average Mean was 3.6, with a standard deviation of 1.0, implied that respondents agreed that the skills obtained from SAIP on capacity on modern agriculture, skills on erosion, skills on post-harvest, skills on irrigation, and skills on saving and credit increased the knowledge on agriculture practices, and therefore positively impacted agricultural productivity.

#### **4.2.3 Descriptive statistics for access to the market and finance on the welfare of farmers**

The research sought to analyze the effect of access to the market and finance to the welfare of farmers of Gwiza Cooperative. In this regard, the researcher requested respondents to specify the degree at which access to the market and finance affects the welfare of farmers in Gwiza Cooperative. Table 3 depicts the responses.

**Table 3 impact of access to the market and finance**

|  | <b>Mean</b> | <b>Std.</b> | <b>Interpretation</b> | <b>Rank</b> |
|--|-------------|-------------|-----------------------|-------------|
| The products sold to the market increase your income.                        | 3.94        | 0.901       | high level            | 2           |
| The SAIP project helps you to access the market for your products.           | 4.01        | 0.720       | very high level       | 1           |
| The SAIP project helps you to access the loan                                | 3.75        | 1.107       | high level            | 3           |
| The loan obtained from Bank contributes to increasing your household income. | 3.62        | 1.055       | high level            | 4           |
| <b>Average mean index</b>  | <b>3.83</b> | <b>0.95</b> |                       |             |

Source: primary data, 2022

As per the findings, the respondents agreed at a very high level that farmers were supported by SAIP on access to the market for selling their products, with a mean of 4.01. They also agreed at a high level that the products sold to the market increase farmers' income with a mean of 3.94. The SAIP project helped the farmers access the loan by a mean of 3.75, while they reported with 3.62 that the loan from Bank contributes to the household income increase. The overall mean of 3.83 and a standard deviation of 0.95 implied that the respondents agreed that the SAIP helps farmers of Gwiza to have access to finance and to the market through to help them to sell their products to the market, access market, access to loans and obtain a loan from the Bank which contributed to the increasing the household income with results of increasing their welfare.

#### **4.2.4 Descriptive statistics for the SAIP interventions to the welfare of farmers**

The research sought to find out the impact of Agri projects to the welfare of farmers, in order to know the level of impact of SAIP interventions to the welfare of farmers where the respondents (farmers) agreed that there is the impact of SAIP to their welfare.

**Table 4: The SAIP Interventions to the Welfare of Farmers**

|  | Mean          | Std.          | Interpretation  | Rank |
|--|---------------|---------------|-----------------|------|
| The value of production in Rwfs per season after joining the SAIP project has increased.               | 4.08          | 0.710         | very high level | 2    |
| The income of households has increased after joining the SAIP project.                                 | 4.04          | 0.614         | very high level | 3    |
| Following participation in the SAIP Project, the monthly income from a different source has increased. | 3.85          | 0.806         | high level      | 5    |
| Your household can pay medical insurance because of joining the SAIP project.                          | 4.10          | 0.719         | very high level | 1    |
| Your household can cover the cost of your family members' tuition at school.                           | 3.75          | 1.009         | high level      | 6    |
| Does your household have the capacity to buy food for household members?                               | 3.98          | 0.839         | high level      | 4    |
| Does your household have the capacity to build a house?  | 2.90          | 1.307         | Moderate Level  | 7    |
| <b>Average mean index</b>  | <b>3.8120</b> | <b>0.8577</b> |                 |      |

Source: primary data, 2022

From the results in Table 4, the farmers agreed at very high level that the SAIP Project helped to raise income and they had the ability to pay the health insurance of their children and household by mean of 4.10. Moreover, the farmers agreed that the value of production in Rwfs per season after joining the SAIP project has been increased as shown by a mean of 4.08 and of farmers agreed at high level that the income of households has increased after joining the SAIP project with the mean of 4.44. Furthermore, the farmers rated at high level that they have a capacity to buy food for household members with a mean of 3.98, also farmers agreed at high level that they can cover the cost of their family members' tuition at school with a mean of 3.75 while a mean of 2.90 rated at moderate level the farmers who can build their own house after joining SAIP Project. The average mean of 3.81 and standard deviation of 0.85 implied that the respondents agreed that the SAIP project made impact to the welfare of farmers of Gwiza Cooperative through the income household generated, the income gained per Saison, pay the medical insurance, cover the tuition school for family members and a capacity to the foods for the family following the participation in SAIP projects.

### 4.3 Regression analysis

This was done to determine the link between Agri-inputs, capacity building, access to market and financial service of farmers provided by SAIP project as the independent variables against the dependent variable, which is the welfare of farmers in Gwiza Cooperative. The results are in Table 5., 6. and Table 7.

**Table 5 Mode Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .913 <sup>a</sup> | 0.876    | 0.862             | 0.46437                    |

Source: primary data, 2022

The study results show the variations in the dependent variable predicted by the statistical model. The adjusted R Square value indicated a degree of correlation in the dependent's variable (welfare of farmers) from independent variables (Agri inputs, capacity building of farmers, access to market of farmers). Adjusted R squared value of 0.862 shows that about 86% of farmers' welfare changes are explained by Agri inputs, capacity building of farmers, and access to farmers' markets. Therefore, it shows that the model was a good fit.

**Table 6: Analysis of Variance (ANOVA)**

| Model      | Sum of Squares | df  | Mean Square | F      | Sig.              |
|------------|----------------|-----|-------------|--------|-------------------|
| Regression | 17.179         | 3   | 5.726       | 26.555 | .000 <sup>b</sup> |
| Residual   | 28.465         | 126 | 0.216       |        |                   |
| Total      | 45.644         | 129 |             |        |                   |

Source: primary data, 2022

This table indicates that the regression model predicts the dependent variable significantly well. A p-value of 0.000 shows that the model was significant that Agri inputs, capacity building, access to the market, and financial services provided by SAIP contributed to the welfare of farmers in Gwiza. The F calculated is 26.5, and it is greater than the critical one (2.767) at a 5% significance level, implying that the model is significant. The results lead to the conclusion that the Agri inputs, capacity building, and access to the market contributed to the welfare of farmers.

**Table 7: Regression coefficient**

| Model             | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig.  |
|-------------------|-----------------------------|------------|---------------------------|-------|-------|
|                   | B                           | Std. Error |                           |       |       |
| (Constant)        | 0.874                       | 0.164      |                           | 4.047 | 0.000 |
| Agri inputs       | 0.850                       | 0.372      | 0.448                     | 0.695 | 0.008 |
| Capacity building | 0.655                       | 0.252      | 0.362                     | 4.929 | 0.000 |
| Access to finance | 0.515                       | 0.160      | 0.382                     | 5.241 | 0.000 |

Source: primary data, 2022

With the results from above table 7, the regression equation would be:

$$Y=0874+0.850X_1+0.655X_2+0.515X_3$$

According to the regression analysis results in Table 7 above, shows that if independent variables were held constant at zero, then the welfare of farmers in Gwiza would be 0.874. Also, a unit increase in Agri inputs would lead to a 0.850 increase in the welfare of farmers.

The variable was significant since the  $p = 0.000$  is less than 0.05; hence, the null hypothesis that there is no significant effect of agriculture inputs on the productivity of farmers and welfare of farmers in Gwiza was rejected. Moreover, the research showed that if all other variables were held constant, then the capacity building would lead to a 0.655 increase in the welfare of farmers, while access to market and financial services would also lead to a 0.515 increase in the welfare of farmers. These variables were significant since the  $p = 0.000$  is less than 0.05, then the null hypothesis was rejected. Overall, agriculture inputs, capacity building of farmers, and access to a market of farmers have the greatest contribution to the productivity and welfare of farmers.

## 5.0 Conclusions

This research mainly aims to investigate agriculture projects' contribution to farmers' welfare, the case of Sustainable agriculture intensification, and food security projects for the Gwiza cooperative. Based on the above findings, the study concluded that the level of Agri inputs used has a positive effect or influence that is significant on the welfare of farmers in the Gwiza cooperative. It means that using quality Agri inputs such as improved seeds; inorganic fertilizers; mineral fertilizers; and irrigation could increase the productivity of farmers, which has an impact on the welfare of households. It further concludes that capacity building for the farmers has a positive impact that is significant on the productivity of the farmers of Gwiza. Capacity building, such as equipped with skills in practice to modern agriculture; soil erosion control; post-harvest; irrigation and water use management; and saving and credit increase which increases the productivity of farmers and welfare of farmers. Also, the study concluded that SAIP has contributed to the farmer's access to market and financial services by helping them to sell their products to the market, access to market, and access to loan and obtain loans from the bank, which contributed to increasing the household income with end results of raising their welfare.

## 6.0 Recommendations

Based on this research's findings and the conclusion, the study makes the following recommendations to different stakeholders: agriculture projects, especially SAIP, used in this case study, the government of Rwanda, and the community. To the implementers, the study recommends that stakeholders ensure that agricultural support meets farmers anticipated needs as outlined in the project. Should make sure that farmers' indicators are analyzed and monitored regularly. The project implementers should ensure they have trained a task force committee at the community level to make a follow-up of the activities the project has conducted to make the projects sustainable. The Government of Rwanda should put in place a task team to follow up on all agricultural projects and continue raising community awareness on the importance of agricultural projects. The government of Rwanda, being among the sponsors of the development projects, the researcher recommends improving monitoring and evaluation of agriculture projects in order to follow up the delivery on their mandate, which is in the interest of the community. To the community: The community should take the activity of projects seriously and be fully involved by contributing to the projects' activities and protecting and taking care of the infrastructure of projects. Also, the study recommended that NGOs build capacity for farmers wishing to start their agriculture projects to ensure they acquire the necessary skills and training. This means many extension services are being availed to facilitate the timely dissemination of training and skills. The government should allocate enough resources to extension officers who serve as the farmers' points of contact.

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