ASSESSMENT OF THE PROFITABILITY OF TUZAMURANE CYEZA COOPERATIVE MEMBERS IN MUHANGA DISTRICT, RWANDA

THESIS

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MASTER OF AGRIBUSINESS STUDY PROGRAM
FACULTY OF ANIMAL AND AGRICULTURAL SCIENCES
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As One of the Requirements for Obtaining an Agricultural Master's Degree
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STATEMENT

I declare truthfully that the thesis I have compiled as a requirement for obtaining a Master's Degree from the Master Program in Agribusiness is entirely my own work and has never been submitted as a fulfillment of the requirements for obtaining a Master's Degree from Diponegoro University or other universities.

As for certain parts of the thesis writing that I quoted from the work of others, the source has been clearly written in accordance with the norms, rules and ethics of scientific writing.

Hereby declare as follows:

1. Titled Thesis: **Assessment of the Profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District, Rwanda.**
2. I also admit that this final project can be completed because of the full guidance and support of my supervisor, they are: **Dr. Ir. Titik Ekowati, M.Sc. and Siwi Gayatri, S.Pt., M.Sc., Ph.D.**

If in the future it is found that all or part of this thesis is not my own work or there is plagiarism in certain parts, I am willing to accept the revocation of my academic degree and other sanctions in accordance with the applicable laws and regulations.

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PREFACE

This thesis is submitted as one of the requirements for obtaining an agricultural master's degree in Master Program in Agribusiness at Diponegoro University. Thesis entitled **"Assessment of the Profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District, Rwanda"** was conducted under the supervision of Dr. Ir. Titik Ekowati, MSc. as the main guide, Siwi Gayatri, S.Pt. M.Sc., Ph.D. as member of advisors. Agricultural cooperatives especially maize farmers would increase the profit and socioeconomic livelihoods; different literature showed that cooperative membership is still low in the rural farmer's community. This research will help to find out the fundamental of the problem of not joining cooperatives then the solution will be made for sustainable maize grow development in Rwanda. For completing this thesis, author only would not finish this research; let's praise the presence of God Almighty for the Gift that has been given, so that the author can complete the writing of the Thesis. Moreover, I am immensely thankful to Universitas Diponegoro for offering me this scholarship award through DISS**.**

I take this opportunity to express my gratitude to the people who have been very helpful in the successful completion of this thesis, as follows:

1. I would like to express my heartfelt thanks to my supervisors Dr. Ir.Titik Ekowati, MSc. as the main guide, Siwi Gayatri, S.Pt. M.Sc., Ph.D. as a member advisor and the head of the Master of Agribusiness study program for their tirelessly guidance and support in completing this thesis.

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Finally, I express my heart thanks to my wife Tuyisenge Marie Claire, my child Iriza Ricki Thecla, for your unwavering support and faith in me. I love you so much. Special thanks go to Tuzamurane Cyeza Cooperative members, staff, maize farmers and local leaders in Muhanga District for your help in data collection and to my classmates who always shared their experiences that helped in the course of completing this master program successfully.

Semarang, 2022

NZAMURAMBAHO FELICIEN

SUMMARY

Mr. NZAMURAMBAHO FELICIEN under the supervision of TITIK EKOWATI and SIWI GAYATRI has worked the thesis research entitled **"Assessment of the Profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District, Rwanda."**

The study conducted in Muhanga District for members of the Tuzamurane Cyeza cooperative maize farmers and maize farmers who are not members of the cooperative. The main objective was to assess the profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District, Rwanda. The specific objectives were to analyze the challenges faced by agricultural cooperatives members of Tuzamurane for maximization of their profitability, to analyze farmers' income between members and non-members of cooperative and to find out the influential factors that lead to the profitability of Tuzamurane Cyeza Cooperative Members.

The area where the research was conducted there was low participation in the agricultural cooperatives. However, agricultural cooperatives are one of the solutions that would help to increase profits, and the socio-economic improvement. Different literature showed that agricultural cooperatives played a key role in development of its members, and some studies indicated that without farmer organizations, it is virtually difficult for poor smallholder farmers to access markets particularly in high value agriculture. The research used a descriptive design based on quantitative approaches. 60 cooperative members and 60 non-cooperative members which were maize farmers selected randomly in the study, plus 6 local leaders and staff of Tuzamurane Cyeza Cooperative. Data were analyzed by Income, profitability and multiple regression analysis to calculate the profitability of Tuzamurane Cyeza Cooperative Members.

The findings showed that Tuzamurane Cyeza Cooperative provided services such: easy access to credit, easily access to agricultural inputs, acquisition of new technology and helped farmers to increase income from cooperative.

The results from calculation indicated that mean the income of 60 maize farmers who are members of the cooperative (366420RWF=358.18USD) is greater than the mean of the income of 60 maize farmers who are non-members of the cooperative (137151RWF=134.25USD). Further, The value of Sig. (0.047) which less than 0.05 is a good indicator that the variance in incomes of maize farmers who are members of the cooperative and the income of maize farmers who are not members of the cooperative is significantly different. This is also confirmed by the t-test of Equality of means which indicated that the Sig. (.000) that is less than 0.05. Agricultural cooperatives membership contributed to expand access to markets, and people need to unit themselves in cooperatives because they play a crucial role in reducing poverty, improving food security, enable them to gain access to market and generating employment opportunities.

The results also showed that the value of adjusted R-Squared equaled 97.3%; it confirmed that all the independent variables together caused variation in profitability of

Tuzamurane Cyeza Cooperative members at the level of 97.3%. The value of the F-Critical (2.26) was less than the F-calculated (7.2) and the P-Value (0.003) was below the significant level, implying that the model could be used in predicting the contribution of independent variables on the profitability of Tuzamurane Cyeza Cooperative Members. It is found that all variables (Price of fertilizers, price six coefficients (wage of labor Price of maize seeds, Price of pesticides, land lease price, Price of fertilizers, maize production) included in the model were significant. Two coefficients have positive relationship with the Tuzamurane Cyeza cooperative farmers while four coefficients (price of maize seeds, price of pesticides, wages of labors, land lease price) have inverse relationship with Tuzamurane Cyeza cooperative farmers. The F-statistics of 7.2 which shows the marginal contribution of the coefficients was significant at 0.009 level of significance.

As matter of the fact, it was very true to confirm that all independent variables had an impact on profitability of Tuzamurane Cyeza cooperative Members. Although Tuzamurane Cooperative has positive impacts on agriculture sector, the level of agricultural profitability in Rwanda and Muhanga in particular is still low. All concerned authorities should adhere to the same target in order to increase the profits of farmers who are in agricultural cooperative members and attract non cooperative members.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

1.1. Background

Agricultural cooperatives play important contributions to the agricultural and rural economies of all regions of the world. As mentioned by Chiyoge (2012) the purpose of agricultural cooperatives is to help farmers increase their yields and incomes by pooling their resources to support collective service provisions and economic empowerment also agricultural cooperatives can help farmer's members to get a better deal at various stages of production and distribution. Other advantages are reported by ATA Agricultural Cooperatives Sector Development Strategy 2012-2016, 2012 that Agricultural co-operatives are agricultural-producer-owned coops whose primary purpose is increase member producers' production and incomes by helping better link with finance, agricultural inputs, information, and output markets and through membership of cooperative, farmers are collectively able to negotiate better prices for inputs, transport of produce, storage facilities and get a good market. Cooperatives can also help them to unit themselves in cooperatives because they play a crucial role in reducing poverty, improving food security and generating employment opportunities.

Today, in an era when many people stressed to change their lives, cooperatives represent a strong, vibrant, and viable economic alternative. Cooperatives are formed to meet peoples' mutual needs. Agricultural cooperatives are based on the powerful idea that together, a group of people can achieve goals that none of them could achieve alone.

They are believed to play a crucial role in this as they can help farmers to overcome market failures (Chiyoge, 2012). Agricultural cooperatives are considered as key to increase food security and help farmers to cope with challenges and enable them to gain access to markets. Cooperatives also offer services to members as a way of building their capacity where farmers receive training on production techniques and postharvest (International Cooperative Agency, 2013).

Agricultural cooperatives to be profitable, some influential factors such : price of maize seeds, price of fertilizers, price of pesticides, wage of labors, maize production., and land ownership and all lead to increase incomes generation

In Rwanda, since the start of the cooperatives, there has been a tendency to poor management, not fulfilling its responsibilities that causes to low participation of farmers in joining agricultural cooperatives. There is a need of regular mobilization of farmers from youth and women to engage in cooperatives since studies demonstrate that they are dominant population and yet cooperative are revealed as a tool for poverty reduction (Harelimana and Mukarukaka, 2019).

According to National Institute of statistics Rwanda (2013) the population of Muhanga District is 297,000 where agriculture is regarded as the main economic activity with 78% of the population aged 16 years and above. Agricultural cooperative's members are less 10 % of all farmers and the remaining are non-cooperatives members (Muhanga District, 2019). The number of agricultural cooperatives in Muhanga is 51 comparing to 2,712 agricultural cooperatives recorded in Rwanda and some of them are ghost. Agricultural cooperatives would be the solution to increase productivity, reduce poverty, and improve the livelihoods of farmers.

Cyeza Sector is the one in Muhanga District with more marshlands favorable to maize production. The Tuzamurane Cyeza Maize Farmers' Cooperative offers services to members as a way of building their capacity where farmers receive training on production techniques and postharvest. Researcher found that there are profits and a difference of being an agricultural cooperative member in terms of economic and social profitability than being a non-cooperative member in Muhanga District. However, it appeared that participation in agricultural cooperatives was still low compared to local farmers in Muhanga District.

1.2. Research Problem

Muhanga District is among the districts with high percentage of extreme-poverty where 46.4% of its population identified as non-poor, 26.2% are extremely poor and 27.4% are poor (excluding extreme-poor). Compared to other Districts of Rwanda, Muhanga District ranks the eighth on poverty where the level of poverty remains high with 53.6% of population below the poverty line and 24.1% in extreme poverty.

In Muhanga District where the economy based on agriculture, it is not done professionally; because access to inorganic fertilizers and pesticides is not easy for farmers, relevant agricultural trainings are not available to individual farmers, sponsors and partners when they come, their target is to see the aggregators because it is easier to help them. The production was also sold cheaply, with many farmers having difficulty for getting health insurance (Mutuelle de santé) and being able to work with the banks was difficult. It is in this context that some farmers decided to join cooperative and many others had no intention of joining agricultural. The data indicated that there is a

gap for joining agricultural cooperatives where less than 10 % of farmers are cooperatives members. The agricultural cooperatives play a crucial role in providing a more stable marketing channel and secure access to inputs and technical advice.

It is important to do research to find out what it is like or not to join a cooperative. The research indicated that farmer's cooperative has a more profit and incomes than non-cooperative members. A researcher also found out deeply that there are influential factors that lead to the profitability of Tuzamurane Cyeza Cooperative Members. Those factors were price of maize seeds, price of fertilizers, price of pesticides, wage of labors, land lease price, and price of maize production. Most of farmers would have intention of joining agricultural cooperatives because it is the best way of working. Previously, there was a little study about the role played by agricultural maize cooperatives in Muhanga District.

1.3. Research Objectives

Objectives of Study

The overall objective of this thesis entitled **"To assess the profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District, Rwanda".**

Specific objectives

1. To analyze the challenges faced by agricultural cooperatives members of Tuzamurane Cyeza for maximization of their profitability.
2. To analyze farmers' income between members and non-members of cooperative
3. To find out the influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members.

1.4. Research Benefits

The study is beneficial for the researcher to get more knowledge on role played by agricultural cooperatives in economic and social development of farmers and discovering the problems that they met in developing themselves, especially in Muhanga District. The study also is important to the government in policy making, setting strategies and supervision of cooperatives; author is confident that this research will be a didactic material to improve the level of other cooperatives in reducing poverty and development.

1.5. Scope and Limitations of the Study

For content scope, a researcher analyzed the impact of Tuzamurane Cyeza Cooperative toward its member's profitability in Muhanga District. For the space, the researcher conducted the study within the Tuzamurane Cyeza Cooperative work place in Muhanga District. For the limitations of the study, the research had been carried out in rural areas where there was the problem of transport, roads are not in good conditions, there are no cars with a long journey only motorcycles are used and expensive. There are some respondents who are illiterate, they did not know how to read and their colleagues wrote for them, it took additional time. Others were unwilling to respond because they considered the study as useless basing on challenges they meet in agriculture.

1.6. Hypothesis

1. Tuzamurane Cyeza Cooperative members performance is profitable

2. There is a significance difference of income between member and non-member of cooperative.
3. There is a significance influential factors that lead to the profitability of Tuzamurane Cyeza Cooperative Members.

CHAPTER II

LITERATURE REVIEW

2.1. General Information on Cooperatives

"A cooperative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise, according to internationally recognized co-operative values and principles". Cooperatives as a form of business organization are distinct from the more common investor-owned firms (IOFs). Both are organized as cooperation, but IOFs pursue profit maximization objectives, whereas cooperatives strive to maximize the benefits they generate for their members. Agricultural cooperatives are therefore created in situations where farmers cannot obtain essential services from IOFs, or when IOFs provide the services at disadvantageous terms to the farmers. Cooperatives are series of organized activities and later spread to most countries of world, whereby people organized themselves around common goals, usually economic (ICA, 1995).

The idea of cooperatives began in 19th century in Great Britain by two scholars called "Fathers of cooperatives "Owen Robert (1771-1858) and Fourrier Charles (1772-1837) for their first cooperative principles set "cooperative is a voluntary association of people, democratically controlled enterprise aiming at achieving common economic goals". Today the major types of cooperatives include of farmers, wholesales, consumers as well as insurance, banking and credits, etc. there has been increasing

international collaboration among the various kinds of cooperatives and growing trend towards the establishment of international cooperative distribution (Harelimana and Mukarukaka, 2021). The main objective of cooperative is to organize and provide services to its members where other forms of business maximize the profits.

The information of cooperatives is usually a survival mechanism adapted by member of the community to counter the exploitative tendencies of profit seeking business entrepreneurs. Thus their motivation is provision of services not profit and cooperation among members, self-help initiative and attitude of solidarity constitutes the cornerstones of cooperatives. In many cases, the contribution of cooperative members are equal to the capital required to start up obtaining in the income and operate the cooperative while accepting a certain degree of risks and benefits in the venture (Rwagaju,2018). Cooperatives have a rich history of empowering people, providing needed services in isolated communities, and finding unique solutions for many economic and social problems. In rural areas, cooperative associations have pioneered the provision of important services for their member, but also for the communities in which they operate.

A practical motivation for the creation of agricultural cooperatives is related to the ability of farmers to pool production and/or resources. In many situations within agriculture, it is simply too expensive for farmers to manufacture products or undertake a service. Cooperatives provide a method for farmers to join together in an 'association', through which a group of farmers can acquire a better outcome, typically financial, than by going alone. This approach is aligned to the concept of economies of scale and can also be related as a form of economic synergy, where "two or more agents working

together to produce a result not obtainable by any of the agents independently" (Rwanda Cooperative Agency, 2013).

Agricultural cooperative facilitate smallholder farmers' access to natural resources such as land and water, information, communication and knowledge markets, food and productive assets such as seeds and tools, policy- and decision-making (FAO,2012).

2.2. Types of Cooperatives

Dealing with types of cooperatives, ICO (2013) argued that cooperatives can be formed for individuals, business, or communities‟ drives. They differ in size, with regard to the number of members and the activity they perform which may be either economic (agriculture, savings, transport, handicrafts), Social services (housing, medical services) and others like musician cooperative, Soccer Fans cooperative.

In addition to that, the United ILO (2014) focusing on types of cooperatives stated that there are three main types of cooperatives. Consumer cooperatives are owned by the people who buy the goods or use the services at close to cost price of the cooperative. They include credit unions, child care cooperatives, electric and telecommunications cooperatives, food co-ops, and health care cooperatives. They are organized by individuals who seek to purchase goods and services. By organizing a cooperative, consumers are able to achieve prices and quality not available from profit businesses.

Producer cooperatives, which include agricultural cooperatives, enable members to achieve higher profits through reduced input costs and better marketing their products.

Worker or employee-owned cooperatives that provide members with opportunities for employment and skills improvement.

Before cooperatives were organized, Kankindi (2018) reported that farmers were often trapped in a situation in which processors could dictate the prices paid for crops. Members of these cooperatives have found that they can adapt quickly to changing economic conditions rather than become victims; they can lower their operating costs by pooling purchasing power for goods and services. In many cases, this is tied to members‟ dual roles as producers and consumers, most often in agricultural cooperatives.

This study falls in the second type of cooperative which is Producer cooperatives because farmer's band together in order to solve problems related to agriculture with the aim of uplifting their living conditions.

Dealing with Agricultural cooperatives (Mukamutesi, 2014) classified them into three broad categories according to their main activity namely:

1. **Marketing cooperatives** (which may bargain for better prices, handle, process or manufacture, and sell farm products).
2. **Farm supply cooperatives** (which may purchase in volume, manufacture, process or formulate, and distribute farm supplies and inputs such as seed, fertilizer, feed, chemicals, petroleum products, farm equipment, hardware, and building supplies), and
3. **Service cooperatives** (they provide services such as trucking, storage, grinding, drying, artificial insemination, irrigation, credit, utilities and medical insurance. These cooperatives usually vary greatly with regard to functions performed, and can

also vary greatly in size. Among these categories of cooperatives, Tuzamurane cooperative refer to Farm supply cooperatives because it gives extension services, supply inputs such seed, fertilizer, and purchase the agricultural products (maize) for members.

2.3. Cooperatives principles

The cooperative principles are guidelines by which cooperatives put their values into practice.

1st Principle: Voluntary and Open Membership

Cooperatives are voluntary organizations; open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination.

2nd Principle: Democratic Member Control

Cooperatives are democratic organizations controlled by their members who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership. In primary cooperatives members have equal voting rights (one member, one vote) and cooperatives at other levels are also organized in a democratic manner.

3rd Principle: Member Economic Participation

Members contribute equitably to, and democratically control, the capital of their cooperative. At least part of that capital is usually the common property of the cooperative. Members usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of

following purposes: developing their cooperative, possibly by setting up reserves, part of which at least would be indivisible; benefiting members in proportion to their transactions with the cooperative; supporting other activities approved by membership.

4th Principle: Autonomy and Independence

Cooperatives are autonomous, self-help organizations controlled by members. If they enter into agreements with other organizations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their cooperative autonomy.

5th Principle: Education, Training and Information

Cooperatives are providing education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their cooperatives. They inform the general public - particularly young people and opinion leaders- about the nature and benefits of cooperation.

6th Principle: cooperation among cooperatives

Cooperatives serve their members most effectively and strengthen the cooperative movement by working together through local, national; regional and international structures.

7th Principle: Concern for Community

Cooperatives work for the sustainable development of their communities through policies approved by their members.

2.4. Origin of Cooperatives in Rwanda

Traditionally, Rwanda had its own self-help forms that conform to the principles of self-help: Ubudehe, Umubyizi and Umuganda. After the independence in 1962, the situation did not progress much in regards to cooperative movement. Since then, a new policy and legislative framework was put in place, materialized with the adoption of Rwanda's first ever Policy on the promotion of cooperatives in 2006, and the promulgation of the current 2007 Law determining the establishment, organization and functioning of cooperative organizations in Rwanda. Both the current Policy and Law recognize co-operatives in the context of International Co-operative Alliance (ICA) by adhering to standard definition, values and principles of the cooperatives.

Concerning to the historical process of cooperative movement in Rwanda, (Harelimana and Mukarukaka, 2021) indicated that cooperatives were established for the first time in Rwanda in 1953 by the Belgians in the colonial period as instruments for driving the agenda of the government's socioeconomic goals. Due to the paternalistic approach of the colonial administration that sought to keep Africans in underprivileged positions, cooperatives were not considered to be attractive to Africans, as they restricted their activities to the social and agricultural sectors where cooperatives were strictly controlled by the colonial administration to the point of fixing the prices that cooperatives could pay their members for their produce, which was lower than what private European entrepreneurs paid. Musahara (2012) argued that cooperatives were governed by the Royal Decree of 16, August 1949 which has been replaced by a new one in 1956.

The Royal Decree was abrogated on 22, November 1966 on the occasion of the publication of the first Rwandan Law on cooperatives. Since 12, October 1988, cooperatives have been functioning in Rwanda in reference to the Decree Nº 31/88 till the new Law N° 50/2007 of 18/09/2007 providing for the establishment, organization and functioning of cooperative organizations in Rwanda was enacted. Mukarugwiza (2010) indicated that the cooperative movement process has been very slow for a long time and there were only 8 cooperatives in 1962 organized in colonial manner: they were mainly centered on mining or cash crops (tea or coffee) and the leading motive was more economic than (rural) social and welfare interests.

After independence, Musahara (2012) mentioned that the new government wanted to use cooperatives to organize people for economic development and between 1962 and 1966 alone the number shot to 36. In 1966 the government passed another law on cooperatives. Between 1967 and 1973 they grew to 423 and from 1974 to 1980 they had grown three fold to 1203. During the period there was considerable institutional development. In 1975 an office in charge of cooperatives and community development started and in the same year a cooperative bank was registered. Cooperatives in Rwanda, after 1994 played an important role in addressing vulnerability, assisting in poverty reduction and acted as one of the few vehicles for reconciliation. In 1996 a count of cooperatives is given as 4,557 and by 2005 about 10,038 associations were identified.

Among these cooperatives organization, 68 % were operating in agriculture 12.2% in finance 4.4 %in commerce, 4.2% in services Nowadays, Nkuranga (2013) emphasized that cooperatives are considered as a good means to promote socio-economic development especially in rural areas since they put together people in

different domains such as agriculture, rearing (cattle breeding), beekeeping, fishing, commerce, craft, savings and credit. Cooperatives have been a model for bringing together people across all spheres of society in common economic and social interests.

By new updates, in Rwanda, Nkuranga (2013) indicated that cooperatives comprised nearly 2.5 million members grouped into approximately 5,000 active cooperative entities. Most commonly found in Rwanda in the agricultural sector, cooperatives are providing significant results in the production of tea, coffee, rice, wheat, maize, Irish potatoes, vegetables, fruits, milk, meat and fish but also seeing gains in other sectors such as finance SACCOs (savings and credit cooperatives), mining and transportation (motorcycles and minibuses) as well. Among those active cooperative entities about 2.400 are agricultural cooperatives.

2.5. Profitability

Profitability is the primary goal of all business ventures. Without profitability the business cannot survive in the long run. Profitability is measured with income and expenses. In a few words, profitability is measured with an income statement whereby a list of income and expenses during a period of time for the entire business is made. Furthermore, Jayathilaka (2020) stated that the Gross profit amount is obtained by subtracting the cost of sales (cost of goods sold) from revenues.

The Gross profit margin analysis uses the percentage calculation to provide a comprehensive measure of a company's profitability. It shows the Gross profit as a percentage of Revenue. A high percentage means that the business is making a healthy profit on the goods or financial products it sells, before administrative costs.

Profitability can also be calculated in such way:

Total Revenue = Production x price

Income= Total revenue- Total Cost

And

Profitability = (income/total production cost) ×100 (Dwi *et al.* 2018)

2.6. Profitability of agricultural cooperative members

It is used as a decision tool after computing all costs against benefits valued in local currency. The main indicators of farm profitability are price, income and gross margin. It is particularly dependent on sale price per unit and the cost of production (Ton, 2013). In agriculture domain, profitability in terms of money can be found out by considering the difference between the total revenue and the total production cost so that the researcher can find out a cooperative that is more profitable than another as cooperative can be advantageous to both members and the surrounding community socially, economically, politically and environmental. Cooperatives work for the sustainable development of their communities through policies approved by their members.

2.6.1. Theory of influential factors for the profitability of agricultural cooperative members

This indicates us how the theories will be coherent or not with the research findings. The major ideas rely in the fact that there are some influencing factors that lead

to the profitability of agricultural cooperative members, and cooperative members may find profitability in the success of their cooperatives in terms of social development, economic development, sustainable development and food security.

As stated by Samboko and Zulu (2012) they found that several factors influence agricultural profitability at farm level. These include; the farm gate price, government price policies, farm location, production costs, variety of seed used, yield, farm size, land tenure which also influences yield, experience in production of crop which impacts on yield, education level of the household head, age of household head, household size, and distance to market. In agricultural cooperative daily management, farmers tend to pursue activities that increase their income, reduce their financial, physical risk and reduce labor requirements.

As stated by Jason (2020) land is a factor of production; the access to land which is the main factor to agricultural production and its size affects the production and adoption of new technologies. The second is the nature of land tenant with property rights can help to invest in long term asset like inputs through credits. The third regards technology and technical assistance, and the fourth markets like market information, attaining certain quality and standards in production and handling.

By access to land, Tuzamurane Cyeza Cooperative members made them easy as key for development. This shows that they can get credits and other financial support for their cooperative activities. With credit, a cooperative member can access to technology and technical assistance, services and resources that can increase productivity of the cooperative and the profitability, World Bank (2018). Our focus on Muhanga District is particularly relevant because agricultural cooperatives are seen as an important

institutional vehicle to improve the performance of the smallholder farm sector and to achieve rural poverty reduction.

2.7. Financial Profitability and Performance of agricultural cooperatives in development of Muhanga District

The objective of cooperatives is simply to give members a better price or service. So, there are three measures used to determine profitability and performance such as: Gross sales or other measure of the size of the business, e.g. gross revenues, such as billings, loans, premiums; Gross expenses (the difference between sales and expenses is calculated as an indicator of profitability) and total administrative/operating cost (calculated as a percent of sales and as change over time) as stated by Mukamutesi (2014). Mukamutesi (2014) stated again that for a cooperative to be profitable it must be financially stable and efficient over the long term, have staying power, particularly to get through hard times, this may be shown by the total assets such as: the physical and financial building blocks of the business. Regarding to the total debts and total equity, debt subtracted from assets equals equity or the ownership capital of the members. Equity should be growing over time as a primary means of ensuring the cooperative's sustainability when it declines per member it can be a worrisome sign and the total reserves. Once a cooperative fulfills conditions that facilitate achieving profitability, objectives towards satisfying members‟ needs, the concept of the profitability and income.

Agricultural cooperatives are of great benefit to members in Muhanga District community. Farmers are able to benefit the money from their agricultural produce, they

can save, pay for their children's school fees, and they can even expand their farming activities. Muhanga District has few agricultural cooperatives and some are well-functioning, and helping to move from eighth place of the poorest District in the country and to achieve contract performance as planned.

In addition to the direct benefits they provide to members, cooperatives strengthen the communities in which they operate. Cooperatives provide jobs and pay local taxes because they operate in specific geographical regions. The economic role involves provision of opportunities for improved incomes to members. Besides playing an important role in the economies of Muhanga District and the whole countries, as evidenced by their market share of the GDP, cooperatives are used as a tool to help alleviate poverty. They play an important role in facilitating access to credit, in increasing income, distribution of input and marketing of products.

2.8. The Social Development Role of Agricultural Cooperatives

It is recognized that cooperatives in their various forms, promote the fullest participation they have in the economic and social development of all people. With regard to the social role of cooperatives, Otieno (2019) found that they play a role in the social protection of their members and their families, especially in getting health insurance. Although health insurance is mandatory for all Rwandans, cooperatives have made it easier for their members to pay premiums for health insurance schemes that are popularly referred to as mutuelle de santé.

Mutual assistance in Rwanda and in Muhanga District particularly culture can be maintained among cooperative members in various social activities that take place in

happiness or stressful ceremonies like wedding or burial. Agricultural cooperatives have become one of the tools that have been able to connect and unite the people of Muhanga District where they met to discuss the tragic history of our country which is a time to spread the word and lead to reconciliation based on telling the truth about the 1994 genocide against the Tutsi. Agricultural cooperatives also became the tool of exchanging health counseling on family planning.

Cooperatives are for a purpose of uplifting the social conditions of its members through principles of voluntary and open membership, democratic, control, participation of members, cooperative members‟ education, autonomy and solidarity among cooperatives themselves. In this regard, cooperatives not only base on the spirit of mutual support but also rely on achieving the benefits of economies of scale. In addition to that job creation, cooperatives may help to improve the living conditions of their members. Cooperatives could help members to build houses, pay school fees for their children, produce food for the family, and improve their clothing. Furthermore, Mendoza (2016) stated that agriculture operates as important social welfare infrastructure in remote locations, creating development opportunities and producing basic necessities for isolated communities. Agriculture provides basic subsistence occupations for millions and permits people to supply themselves with the three fundamental human needs: food, clothing and shelter. The members strive to optimize their economic, social and cultural needs Otieno (2019).

Social integration and the enfranchisement of marginalized groups through co-operative organizations and co-operative action are much needed counterweights to processes of exclusion and exploitation. So, there is no discrimination in agricultural

cooperative because there are different categories of people like widows, widowers, people affected by disease like HIV/AIDS working together which itself qualifies as a step towards a sustainable society.

2.9. The Economic Role of Agricultural Cooperative

The economic role played by agricultural cooperatives were emphasized by Nsingize (2013) as providing the farmers with production inputs, such as fertilizers, seeds and chemical substances, etc. In addition, it holds guide symposiums for the farmers to acquire them with the necessary knowledge and skills about the agricultural new methods that aim at increasing the agricultural production and, therefore, promoting the rural society.

Cooperatives are regarded as development tools that should promote social empowerment and economic goals. Nsingize (2013) argued that an agricultural cooperative is considered as one of the important economic and social organizations in rural societies through local ownership and control, and net profits distributed to those who use the cooperatives. The structure and objectives of cooperatives make them to behave differently in their communities than businesses with other organizational structures. In addition, cooperatives offer a way for a group of individuals to pool their limited resources to achieve a critical mass since they combine people, resources, and capital into larger, more viable and economically competitive units. Cooperatives as noted by Mukamutesi (2014) emphasize positive working relationships, and to social conditions such as mutual trust and good will. Cooperatives are likewise central to sustainable development in that they provide the necessary context for improving living

standards without depending exclusively on increased levels of private consumption. IFAD (2012) noted that agriculture – farming, forestry, fisheries and livestock – is the main source of employment and income in rural areas, where most of the world's poor and hungry people live. Agricultural cooperatives play an important role in supporting small agricultural producers and marginalized groups such as young people and women.

Cooperatives offer small agricultural producers opportunities and a wide range of services, including improved access to markets, natural resources such as land and water, information, communication, technologies, credit, training and warehouses. Co-operatives reduce inequality and promote equitable sharing of the costs and benefits of sustainable development this is the sustainable resource use Otieno (2019).

Dealing with the role of cooperatives in Rwandan economy, Mukarugwiza (2010) emphasized that cooperatives are instruments used to alleviate poverty and to accelerate agricultural production in Rwanda. They contribute to the achievement of the Millennium Development Goals, Vision 2020 and the Economic Development and Poverty Reduction Strategy (EDPRS) program that focus on rural economic transformation, human resource development, development and promotion of the private enterprises and poverty alleviation. Beside the above macro-economic role, cooperatives create decent employment for their members and staff. The Government of Rwanda has put in place different strategies that aim at fostering development such as Vision 2020 which seek to transform the economy by bringing about a rapid increase in growth and a significant reduction in poverty and EDPRS. In EDPRS I covering 2008- 2012, the agriculture sector contributed 32.7% of GDP and 28% of total growth. It grew at 5.4% sustained by higher than expected expansion of food production, Government of

Rwanda (2012). It is also regarded as a pathway out of poverty by improving productivity and increasing sales of produce is an important income earner for smallholders during the period of EDPRS II that covers 2013-2018. The Government of Rwanda (2012) considers now the cooperatives as full partners in efforts for alleviating poverty. To harmonize and coordinate the interventions in that sector, it has been decided to design a national policy for promoting the cooperatives and to gather in a single document the strategies chosen and the priority activities retained for the years 2006-2008.

2.9.1. Income comparison between agricultural cooperatives members and non-cooperative farmers

Research on cooperatives found rural household income of cooperative farmers to be higher than within households which are not part of a cooperative (Getnet and Anullo, 2012). Incomes were generated from annual and perennial crops sold to the cooperatives. The study also found a positive effect on savings, and found cooperatives were incomes to be higher compared to non--cooperatives (Getnet and Anullo, 2012).

However, a study on coffee farms in Ethiopia found overall no significant difference between cooperative members and non--members (Shumeta and D'Haese, 2016). The study found that members of cooperatives who were older, had higher education levels, or larger pieces of land earned more. Analysis of income differences in agricultural cooperatives in Rwanda found significant positive effects for maize cooperatives, but not horticultural cooperatives (Verhofstadt and Maertens, 2014). Possible explanations are that maize cooperatives have been established longer and

receive more government support. There is also a difference in the way cooperatives are managed for the different products, which may lead to different results. Maize producers share land and marketing, but produce individually. Horticulture cooperatives produce collectively, which can have a negative effect on incentives to work.

Studies showed cooperatives to be more technically efficient, due to support received. Technical efficiency in this study measured members' ability to access productive inputs and services, including training that enhances productive efficiency. Another empirical study looked at the impact of agricultural cooperatives on adoption of technology in Ethiopia (Abebaw and Haile, 2013). Cooperative members were found to have better access to extension services and greater fertilizer adoption than non--members.

A study of maize and horticultural cooperatives in Rwanda found significant differences in income levels between members and non--members (Verhofstadt and Maertens, 2014). Increases were identified in gross farm revenue, net farm income, and farm income per worker. When looking at maize and horticultural cooperatives separately, the positive findings were only identified in maize cooperatives. Findings were not significant for horticultural cooperatives. Modest estimates show maize cooperative incomes increase by around 30% per farm compared to non-cooperatives. Maize cooperatives are larger so can achieve greater economies of scale. They have also been established longer. Maize cooperatives also receive more government support. Another difference is that maize cooperatives share land and marketing, but produce individually; horticulture cooperatives share land and production, and cultivation is communal so may provide less incentive.

2.10. The Role of Rwanda Government in Promoting Cooperatives

For a long time, the Government never gave much attention to cooperatives in Rwanda. Cooperative development was subsequently hosted by different Ministries whose routine activities involved cooperatives in one way or the other. The Government of Rwanda recognizes the central role that cooperatives have to play in promoting inclusive, sustainable development and economic transformation (GoR, 2018). Cooperatives are a unique form of: self-help group, pooling members' resources to achieve economies of scale, while serving as a platform for policy dialogue and multi-dimensional promotion of the members' wellbeing. This Cooperative Policy is intended to further the development of cooperatives and the cooperative movement by providing the necessary coherent and clear policy and legislative environment for cooperatives to grow and prosper. Rwanda's cooperative sector has grown rapidly over the last ten years. This has been achieved through the support of Government of Rwanda, which has always given emphasis to the development and promotion of cooperatives to facilitate their activities and enhanced the structure of the cooperative movement in Rwanda. The government established Rwanda cooperative Agency to accelerate cooperative development in Rwanda. Precisely, RCA has three main mandates namely: Promotion, Registration and Regulation of Cooperatives (Harelimana and Mukarukaka, 2021). Rwanda cooperative Agency (RCA) is currently having mandate of developing cooperatives sector with back up of other government institution as National policy on cooperatives in declared the roles of stakeholders in cooperative movement. Rwandan cooperatives

structured into Primary cooperatives, union, federation and confederation at National level.

2.11. Maize Crop in Muhanga District

The Economy of Muhanga District is based on agriculture of coffee, rice, cassava, vegetables and cereals. Maize production in Muhanga District is grown on both hills and marshlands where it is usually associated with other food crops which are especially legumes such as beans. It is especially in monoculture (pure) on large farms generally held by farm cooperatives. As all marshes belong to the state, their operation is done under its permission through the local authority (MINAGRI, 2012). For the exploitation of wetlands, priority is given by the District to the farmers 'cooperatives and associations that can occur over large areas especially crops recommended by MINAGRI, including maize crops. These cooperatives generally work with agricultural support and supervision of various specialized organizations. Maize cultivation in swamps is developed mainly in areas of medium and low altitudes Mutoni (2013). However, the use of agricultural inputs are very low and according to the NISR (2012) only 11% of farm households use improved seeds, 32% of sheep manure, 16% pesticides, 31% compost and 16% mineral fertilizers.

Maize is the main crop cultivated in Muhanga District, where it is cultivated in Marshlands and also on land scape, the crops has a big importance in the development of Muhanga district population, where they consume it and it generates money to them. According to the population of Muhanga, maize is the first crop needed in their daily life. The total area cultivated is 4414.8ha (98.11%) for fiscal year 2018-2019.

Situation of production and productivity of Tuzamurane cooperative since 2012 to 2020 indicated in table below.

Table 1: Situation on the Production and Productivity of Tuzamurane Cooperative

Year	Production	Productivity
	--- kg ---	--- kg/ha ---
2020	93,070	156,000
2019	97,030	178,600
2018	100,070	130,050
2017	106,350	No data
2016	62,773.5	No data
2015	58,478	No data
2014	48,625	No data
2013	45,623	No data
2012	212,000	No data

Source: Tuzamurane Cyeza Cooperative Report, 2018

2.12. Maize Market in Muhanga District

Market of maize grain for cooperative members

Farmers grouped under cooperative of Tuzamurane in Muhanga District indicated that they are making profits from the sale of their maize produce. The farmers in Muhanga District acknowledged also the profit making to the role played by the cooperative in providing a ready market for their produce, even though there are challenges involved. Also, the farmers acknowledged that part of the profit making is attributed to a reduction in having to worry about the process of creating networks and other logistical arrangements required to transport the produce to other markets where prices may not be favourable. In light of this background, Tuzamurane Cyeza Cooperative has made a significant contribution to the profit making level for members/farmers thereby leading to positive development in their income status. This further confirms the statement of Nsingize (2013) that agricultural cooperatives have an

impact in the development of rural small farmers in terms of providing markets and enhancement of their incomes.

The contribution of the buying activity created by the cooperative has created an enabling environment for the farmers in terms of accessibility to the markets. The farmers indicated that the cooperative buys their produce at a favourable price compared to the local markets, and the result has been an improvement on farmers' income. This is in line with WFP (2011) which reported that agricultural cooperatives in Rwanda are aimed to boost agricultural production and improve the income of smallholder farmers through developing the markets for their produce.

Tuzamurane Cyeza cooperative became the negotiator of produce of their members. This process has enabled farmers to have a ready market for their produce and also reduced potential obstacles such as developing networks and logistical preparations which could prove costly to farmers if they are to initiate the marketing process on their own.

CHAPTER III

RESEARCH METHODOLOGY

3.1. Theoretical Framework

Cooperative members gain access to volume discounts and negotiate from a position of greater strength for better delivery terms, credit terms, and other arrangements. For instance, members of agricultural cooperative of Tuzamurane would benefit seeds, and fertilizers at a low cost comparing to others who get them from the market. The cooperative could be also a group of people who are unable to get sensible credit arrangements or who are unable to purchase or acquire housing at a reasonable price or for rent through the existing market system. For association to be practiced people must first and foremost be encouraged to act together. All successful cooperatives, therefore, unite and involve their members in an economic and social community. Cooperatives assist in strengthening local communities and economies since they are community or regionally based, investment in, and surplus revenue from the cooperative stays within the local economy.

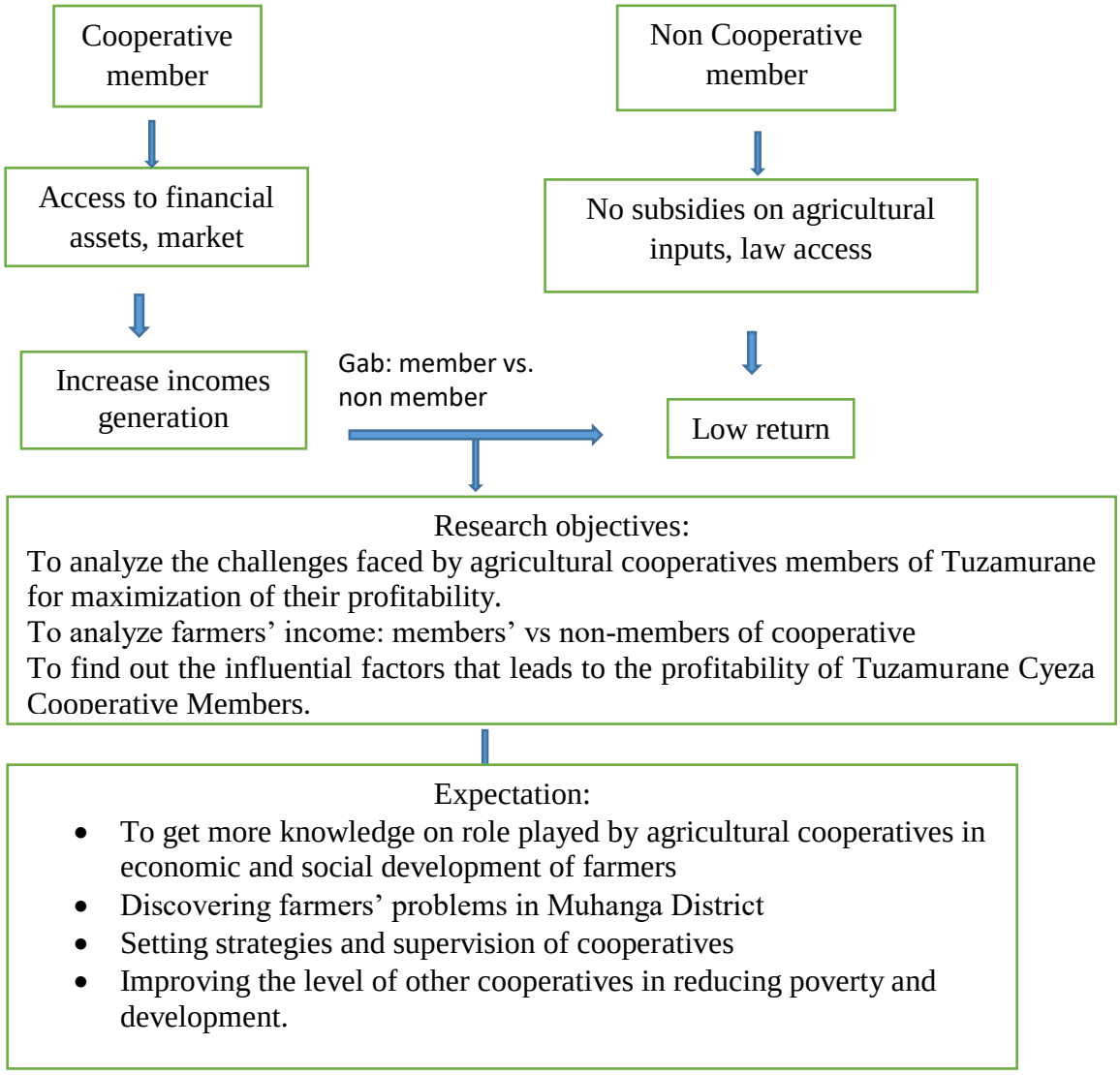

Figure 1: Comparison between cooperative and non-cooperative members

3.2. Research Design

In this section, researcher highlighted the steps that were followed during a research, from problem statement, methodology, data collection to results analysis. The

field data collection was conducted after getting clearance from the supervisor and the relevant authorities such as of Tuzamurane Cyeza Cooperative.

During this empirical research, the researcher collected quantitative data in Muhanga District, Cyeza sector; the first in maize production in Muhanga District from farmers which cultivates maize in cooperative and non-cooperative members. A prepared and verified questionnaire of 60 cooperative members and 60 non cooperative members was distributed to them with a set of questions in their mother tongue, that is, Kinyarwanda.

3.3. The Research Method

Survey method

This research used a survey method. According to Ajayi (2017), is chiefly spelt out as a method of collecting data from a sample of individuals. Survey enables researchers to gather demographic data so that the details of construction of the sample may be extracted. The purpose of the survey is to get a picture that represents the area correctly. Not all individuals in the population are observed, but only a part of the population is called sample. Therefore, in determining the sample must be precise and truly representative of a population. The respondents were asked questions on their demographic interest opinion. Data collection in the survey method was largely determined by a list of questions.

3.4. The sampling Method

Population

According to Ajayi (2017), study population is a study of a group of individuals taken from the general population who share a common characteristic. A population is defined as the total of persons or objects which are concerned to the study. Farmers in indulgence of agricultural development will be targeted for the study. In our case the target population was members of Tuzamurane Cooperative which is equal 856 and non-cooperative members' farmers which were big size located where Tuzamurane Cyeza cooperative operates.

3.5. Sample Sizing and Sampling Procedures

Sampling is the process of selecting respondents from the population. Purposive sampling (also known as judgment, selective or subjective sampling) could be a testing strategy in which a researcher depends on his or her claim judgment when choosing respondents among big size to take part within consideration of the study, Thornhill (2012). Simple random sampling method was used to determine the number of maize farmers to be interviewed. Tuzamurane Cyeza Cooperative memberes and non-cooperative Maize farmers plus 6 local leaders and staff of Tuzamurane were used as key informants. Therefore, a sample size is composed of 60 members of Tuzamurane Cyeza Cooperative, 60 non cooperative maize farmers, plus 6 local leaders and staff of Tuzamurane which means that the total sample size was 120 respondents. A researcher used ***Slovin's formula*** with a large sample but due to inclusive and exclusive criteria at the final respondents became 120 respondents.

Slovin's formula

$n = N / (1 + Ne^2)$

Where:

- n = Number of samples,
- N = Total population and

e = Error tolerance (level).Note:

- 60 cooperative members and 60 non-cooperative members which are maize farmers
- Location : 30 respondents per 4 cells (Kivumu, Sholi, Nyarunyinya and Kigarama)

Researcher selected 4 cells (Nyarunyinya, Kivumu, Sholi and Kigarama); 8 villages were selected from four cells (2 villages for each four cells) for the study. From each cell 30 respondents and total 120 respondents (50% cooperative members and 50% non-cooperative members) was selected purposively in the study and 6 local leaders and staff of Tuzamurane was used as key informants. The questionnaires was distributed to the selected members of the cooperative in order to confirm if Tuzamurane cooperative has really the significance contribution on member and the population around as it would be.

3.6. Data Type

Primary data

Ajayi (2017) defined primary sources of data as sources of original information that has never existed before and as the name suggests, primary data is one which is collected for the first time by the researcher. Under primary source, emphasis will be put on the collection of data directly from field surveys via the administration of questionnaire,

observation and interviews. Primary data were collected from maize farmers who are members of Tuzamurane Cooperative and non-members farmers located where Tuzamurane Cyeza Cooperative operating. The primary data provided reliable and accurate first-hand information relevant to the study about the profitability and incomes of agricultural cooperatives in Muhanga District.

Secondary data

According to Ajayi (2017) secondary sources of data as those ones from the published and documented sources that may aid in providing answers to the research problem and they was included documents comprising research works, textbooks, magazines, journals, newspapers, office records/statistics and the internet. The aim of the collection of secondary data was to gather essential information to guide the conduct of the study in order to confirm or reject the primary data.

3.7. Data collection Instruments

Questionnaires

According to Ajayi (2017), a questionnaire is a research instrument comprising of an arrangement of questions and other build prompts for the reason of gathering cleverly or insightful data from respondents. The questionnaires were delivered at the place of work and were collected at appointed time by the researcher. Before the actual handing in of the questionnaires, the researcher got into contact with his respondents and informs them about the day he was ready to bring the questionnaires and when to collect them.

Interview method

According to (Ajayi, 2017) interview is the verbal conversation between two people with the objective of collecting relevant information for the purpose of research. The interview was used widely to supplement and extend our knowledge about individual (s) thoughts, feelings and behaviors. This was used to capture data from illiteracy farmers where it is difficult to fill out a questionnaire.

Direct Observation method

Ajayi (2017) defines the observation method as a method of data collection in which the situation of interest is watched and the relevant facts, actions and behaviors are recorded. Direct observation was used to acquire nonverbal information that was important in justifying the controversial circumstances. This method was important to verify whether that data provided in the questionnaires and interviews were correct and valid.

3.8. Data Management

Data collected were edited and coded. It was edited to ensure the flow of questions and coded to assign members forward so as to drive statistical meaning of data. In this case the data were presented in the tables showing the frequencies and percentages.

3.9. Data Analysis

According to Belotto (2018) analysis of data is a process of inspecting, cleaning, transforming, and modeling data with the goal of highlighting useful information,

suggesting conclusions, and supporting decision making. The data obtained from the questionnaire and personal interviews were analyzed. Data were analyzed based on objectives where it was the answer of those objectives.

As the objective one was to analyze the challenges faced by agricultural cooperative members of Tuzamurane for maximization of their profitability; this objective was analyzed by using a profitability formula.

Hypothesis 1: Tuzamurane Cyeza cooperative member's performance is profitable

The statistical hypothesis for independent t -test are:

Ho : μ > i (Tuzamurane Cyeza cooperative members performance is unprofitable)

Hi : μ < i (Tuzamurane Cyeza cooperative members performance is profitable)

Since $p < .05$, the research can reject the null hypothesis, and conclude that Tuzamurane Cyeza cooperative member's performance is profitable

The objective two was to analyze farmers' income between members and non-members of cooperative which are maize farmers. It was calculated based on income analysis as follow:

Maize farmers' cooperative members' income analysis.

TC = TVC + TFC (Ekowati *et al.,* 2014)

Where

TC : Total cost (RWF)

TVC : Total variable cost (RWF)

TFC : Total fixed cost (RWF)

TR : Σ (Qi. Hqi)

TR : Total revenue (RWF)

Qi : Product quantity (kg)

Hqi : Price (RWF)

$\pi = TR - TC$

Where

Π : Income (RFW)

TR : Total Revenue (RFW)

TC : Total Cost (RFW)

Income analysis from Non-cooperative maize farmers:

$\pi lt = TR(1-n) - TC(1-n)$

Where

πlt : Total income (RWF)

TR (1-n) : Total revenue (RWF).

TC (1-n) : Total cost (RWF).

Equal variances assumed

When the two independent samples are assumed to be drawn from populations with identical population variances (i.e., $\sigma_1^2 = \sigma_2^2$), the test statistic *t* is computed as:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{sp\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

With $$sp = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2}}$$

Where

$\bar{x}_1$ =Mean of first sample

$\bar{x}_2$ = Mean of second sample

n_1 = Sample size (i.e., number of observations) of first sample

n_2 = Sample size (i.e., number of observations) of second sample

s_1 = Standard deviation of first sample

s_2 = Standard deviation of second sample

s_p = Pooled standard deviation

The calculated *t* value is then compared to the critical *t* value from the *t* distribution table with degrees of freedom $df = n_1 + n_2 - 2$ and chosen confidence level. If the calculated *t* value is greater than the critical *t* value, then we reject the null hypothesis. This form of the independent samples *t* test statistic assumes equal variances.

Hypothesis 2

There is a significance difference of income between member and non-member of cooperative.

The statistical hypotheses for independent t -test are:

$H_0: \mu_1 = \mu_2$ (There is no difference between the income of maize farmers who are members of the cooperative and the income of maize farmers who are not members of the cooperative in Muhanga District).

$H_1: \mu_1 \neq \mu_2$ (There is difference between the incomes of maize farmers who are members of the cooperative and the income of maize farmers who are not members of the cooperative in Muhanga District)

Since $p < .05$, the research can reject the null hypothesis, and conclude that there is significantly different between income of member cooperative and non-member cooperative.

For objective three; Regression analysis was a tool to analyze the influential factors that lead to the profitability of the Cooperative Members. Multiple regression analysis used to calculate the profitability of Tuzamurane Cyeza Cooperative Members which is a dependent variable and its independent variables (price of maize seeds, price of fertilizers, price of pesticides, wage of labors and maize production) through Statistical Package for Social Sciences.

The formulae for multiple regression analysis would be

$Y = a + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + b6X6$

Where

Y= profitability of members of Tuzamurane Cyeza Cooperative (%)

a = constant,

b1, b2, b3, b4, b5, = regression coefficients,

X1: price of maize seeds (FRW)

X2: price of fertilizer (FRW)

X3: price of pesticide (FRW)

X4: wage of labor (FRW)

X5: maize production (kg)

X6: land lease price (FRW)

Hypothesis 3

There is a significance influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members.

The statistical hypothesis for independent F-test was:

$H_0: \sigma_1^2 = \sigma_2^2$ (There is no significance influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members).

$H_1: \sigma_1^2 \neq \sigma_1^2$ (There is significance influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members).

Since $p < .05$, a researcher can reject the null hypothesis, and conclude that there are factors that influence the profitability of Tuzamurane Cyeza Cooperative Members.

CHAPTER IV

RESULT AND DISCUSSION

4.1. Area of Research

Muhanga is located in the southern province of Rwanda, West of city of Kigali; it's also one of the eight districts comprising the Southern Province. It is subdivided into twelve (12) sectors, sixty-three (63) cells and three hundred and thirty-one (331) villages (Imidugudu). The District covers an area of six hundred forty-seven point seven square kilometres (647.7 km2) and, it is neighbouring the Districts of Gakenke in the North, Kamonyi in the East, Ruhango in the South and Ngororero and Karongi in the West. Agriculture is by far the most common economic activity with 78 % of the workforce being involved in agricultural activities. Muhanga's agriculture composition is the second highest of any of the secondary cities, despite its relatively strong services sector. Muhanga specializes in a few crops which are bananas, cassava, maize and climbing beans.

4.1.1. Tuzamurane Cyeza Cooperative

Tuzamurane Cyeza Cooperative started in 1998 as group of persons cultivating maize, potatoes, soya beans and peas in Takwe marshland. And then start as cooperative on 2009 with doing activity mostly focusing on maize cultivation and supply the fertilizer and limes to cooperative members. The cooperative started thinking of markets for its harvest, while before each individual farmer was harvesting maize from his small piece of land most of which were in small quantities; Part of the harvest was used for

home consumption and the little portion remaining was taken to the local nearby markets and earned little money from it. The increased quantity triggered other needs like stores, market for maize and storing facilities before selling.

The government through Rural Sector Support Project (RSSP) built a store for the cooperative worthy 25millions RWF. The government through Rwanda Agriculture Board (RAB) and its agents provide improved seeds and fertilizers at a subsidized price. This encourages small farmers to apply fertilizers and use improved seeds which resulted in increased productivity unlike before where the harvest obtained was not sufficient to satisfy household consumption and market. This increase in productivity is also due to the training that the members of the cooperative have been provided for the care of the corn from the field until it is processed and is sold to the good markets at the right price.

Tuzamurane Cyeza Cooperative covers an area of about 100 ha in each of the swamps of Nzeyi, Nyagisenyi, Rubara marshland and subzones Bucyeye, Gahanga and NyagisenyiII marshland. From 2019 Tuzamurane-Cyeza cooperative has a number of 1356 members, it has 9 shelters 2 stores, has all books of cooperative financial books, financial reports. The members of the Tuzamurane Cyeza Cooperative elect their leaders through elections. The general meeting is attended by all members, the executive committee consists of the president, vice president, secretary, and two advisers, and the supervisory committee consists of the president, vice president, and secretary (appendix 7). Tuzamurane Cyeza Cooperative has a number of partners, including the government of Rwanda through the Rwanda agriculture board, which provides shelters assistance, as well as their maize production, in the case of a disease and pest infestation in the maize

fields, there is the Post – Harvest and Agribusiness Support Project (PASP) which helps Tuzamurane members to reduce post-harvest losses by providing covers. Muhanga District is also an important partner because it has helped this cooperative in building maize shelters. The Rwanda Development Organization (RDO) works with the cooperative to help members irrigate maize fields, demonstration of how to plant well seeds, and improving post-harvest handling to ensure quality products, lastly with the support of World Food Program, Tuzamurane cooperative receives support on good farming practices to enhance crop quality and quantity and how to reduce crop loss after harvest. World Food Program also links cooperative to formal financial services and agricultural techniques that allows them to scale-up and enhance their production. Once crops are harvested, Tuzamurane Cyeza Cooperative is linked directly to Rwandan private sector companies to sell quality harvests at premium market prices. Briefly, Tuzamurane Cyeza Cooperative works as agro dealer, assistance in maize growing, and marketing of maize production.

4.2. Characteristics of Respondents

4.2.1. Characteristics of cooperative members

This part presents data collected from the field and their presentation. The purpose of this part was to demonstrate that data collection was done on every point and led to the significant results. Table 2 describes the identity of Tuzamurane Cyeza Cooperative farmers to clarify that the information for research was collected from

different age groups, sex, gender, education, marital status, number of children, profession, land size and education backgrounds.

The results indicated that majority of cooperative member respondents were males (53.3%) while females were 46.7%. This implies that all categories of sex were involved in our study though differentiated thoughts. It shows that being in a cooperative was not based on sex. Majority of respondents were in age of above 50 years categories (53.3%) and 41-50 with 30%. 13.3% of the respondents were in range of 31-40 age category, 3.3% of the respondents were in range of 21-30 age. Indicating that agricultural production in the cooperative is mainly in the hand of the aged people. It is also important that young people find themselves in the cooperative for the sustainability of Tuzamurane Cyeza Cooperative. However, having mature respondents increases validity of our findings as well as respondents have more information about the issue in the question.

The researcher was interested in knowing marital status of respondents. At this point, the results indicated that majority of respondents were married (73.3%), 1.7% of the respondents were single, 1.7% of the respondents were divorced and another 23.3% of the respondents were widower. This showed that the cooperative is important to the family because they take away their livelihoods. Majority of respondents had primary level (66.7%), illiterate were 23.3%, 2% of respondents had an undergraduate level and others (2%) have secondary level. This implies that some respondents have a very good level of education and for this reason we obtained relevant findings. Agriculture sector consists of low level of education, this shows that they take agriculture as a source of income and mostly depend on agriculture for making a living and impact on level of

production. For the number of children, 35.0% of respondents are in category having 1-3 children, 53.3% of respondents are in category having 4-7children, and 6.7% of respondents are category of having more than 7 children while 5% of respondents of respondents are category of no child. The results indicated the profession of respondents (90%) were in farmer's category, 3.3% of respondents were in category of farmers and local traders, and remain were combined farming and handcraft category. Majority of the farmers owned farm size of between 1 hectare to 2 hectares were 38.3%, 33.3% of respondents their land were ranged 2-5hectares, 23.3% of respondents had the land size of under one hectare, and 5% of respondents their land were greater than 5 hectares. Majority of the farmers had a small farm size to expend maize farming were ranged between 1.1 to 2 ha/farmer.

Every maize farmer in Tuzamurane Cyeza Cooperative pays 300 RWF=0.29USD/are per season as the marshlands the Tuzamurane cooperative members exploit belong to government according to the new land tenure. The wetlands they cultivate are often said to be small enough to for extending their farming. However, if there is no risk of drought, heavy rainfall, disease and pests, production would remain high.

Table 2: Characteristics of Tuzamurane Cyeza Cooperative farmers

Characteristics	Frequency (person)	Percentage (%)
Sex		
Female	32	53.3
Male	28	46.7
Total	60	100.0
Age		
Valid 21-30 years old	4	6.7
31-40 years old	13	21.7
41-50 years old	24	40.0
>50 years old	19	31.7
Total	60	100.0
Status		
Married	44	73.3
Single	1	1.7
Divorced	1	1.7
Widower	14	23.3
Total	60	100.0
Education		
Illiterate	14	23.3
Primary	40	66.7
Undergraduate	2	3.3
Secondary	4	6.7
Total	60	100.0
Number of children		
1-3	21	35.0
4-7	32	53.3
Above7	4	6.7
No child	3	5.0
Total	60	100.0
Cooperative Profession		
Farmers	54	90.0
Farmer & local trader	2	3.3
Farmer & handcrafter	2	3.3
Local trader	2	3.3
Total	60	100.0
cooperative Land size(ha)		
<1	14	23.3
1.1-2	23	38.3
2.1-5	20	33.3
>5	3	5.0
Total	60	100.0

4.2.2. Identification for non-cooperative member's respondents

The table 3 indicates identification of non- cooperative members to clarify that the information for research was collected from different age groups, sex, gender, education, marital status, number of children, cooperative profession, land size and education backgrounds.

Table 3 indicates that majority of respondents were males (75%) and females were 25%. This implies that all categories of sex were involved in our study though differentiated thoughts, on the point of age, majority of the farmers were in categories 41-50 years, greater to 50 years with the percentage of 40.0 and 31.7 respectively, 21.7% of the respondents were in the range of 31-40 years category while 6.7% of the respondents were in 21-30 years range. Having mature respondents increases validity of our findings as well as respondents have more information about the issue in the question. Based on the results above, strategies are needed to ensure that even young people in agriculture are able to survive, such as: land acquisition in marshlands, facilitation of access to agricultural loans, participation in cooperative decisions. The researcher was interested in knowing marital status of respondents. (40%) of farmers were married, 1.7% of the respondents were single, 10% of the respondents were divorced and another 18.3% of the respondents were widower.

For education level, 13.3% of the respondents are illiterate, 76.7% of respondents had primary level, 1.7% of respondents had an undergraduate level and others (8.3%) have secondary level. The farmers had a very good level of education and for this reason we obtained relevant findings. However, it is a problem to see agriculture done by

people who have a low level of education because it affects productivity in quality and quantity. Moreover, the results indicated the size of family where 36.7% of respondents had 1-3 children, 45% of respondents were in category of having between 4 and 7 children, 5% of respondents had more than 7 children while 13.3% of respondents of respondents were in category of having no child. 83.3% the profession of respondents of respondents were farmers, 8.3% of respondents were in category of farmers and local traders at the same time and 6.7% of respondents were in category farmers and handcrafters 1.7% of respondents are in category of farmers and other profession such: being a farmer and teacher at the same time. The results in table 3indicated that majority of respondents are farmers in their daily lives. Majority of the farmers had a small farm size to expend maize farming with less than one hectare with 43.3%, 1.1-2ha with 35%, 2.1-5ha were 15% and the farmers who had more than 5 hectares were 6.7%. 75 % of non-cooperative members want to join others, but 25% of non-cooperative maize farmer their mentality is still the same (they don't need to join cooperative) due to their thought that agricultural cooperative are not profitable, no transparence in cooperative, mindsets of poor management of cooperative, and their thought can change if government and other partners initiate that issue as well as they miss chance to access easily on agricultural inputs, market information, some extension services, easily access to access to services, and access to finance.

Table 3: Characteristics of non-cooperative members

Characteristics	Frequency (Person)	Percentage (%)
Sex		
Female	15	25.0
Male	45	75.0
Total	60	100.0
Age group		
21-30 years old	4	6.7
31-40 years old	13	21.7
41-50 years old	24	40.0
>50 years old	19	31.7
Total	60	100.0
Status		
Divorce	2	3.3
Married	46	76.7
Single	1	1.7
Widower	11	18.3
Total	60	100.0
Education level		
Undergraduate	1	1.7
Illiterate	8	13.3
Primary	46	76.7
Secondary	5	8.3
Total	60	100.0
Children number		
1-3	22	36.7
4-7	27	45.0
>7	3	5.0
No child	8	13.3
Total	60	100.0
Profession		
Farmers	50	83.3
Farmers& local traders	5	8.3
Farmers &handcrafters	4	6.7
Farmers & other profession	1	1.7
Total	60	100.0
Tendency to join cooperative		
No	15	25.0
Yes	45	75.0
Land size(ha)		
<1	26	43.3
1.1-2	21	35
2.1-5	9	15
>5	4	6.7
Total	60	100.0

Total Production cost, total maize production, total revenue and total income were important tools in Table 4 and 5 to analyze the profitability of Tuzamurane Cyeza Cooperative Members and non-cooperative members.

Table 4: Calculation of maize production, revenue, production cost and profitability for cooperative members

Item	Value
Production cost(RWF)	
Organic Fertilizer cost	405400
Inorganic fertilizer cost	944670
Seeds cost	55860
Cultivator's cost	469700
Harvesters	219500
Pesticides Cost	96500
Watchmen &other labors cost	292050
Crop Insurance cost	67450
Land lease cost	93150
Total production cost(RWF)	2644280
Total maize production(kg)	16992
Average price of maize/kg (RWF/kg)	180.8
Total revenue from maize (RWF)	3010700
Income(RWF)	366420
Profitability (%)	13.8

Table 5: Calculation of maize production, revenue, production cost and profitability for Non-cooperative members

Item	Value
Production cost(RWF)	
Organic Fertilizer cost	493940
Inorganic fertilizer cost	1035409
Seeds cost	66000
Cultivator's cost	455500
Harvesters	212850
Pesticides Cost	181000
Watchmen &other labors cost	326720
Land lease cost	16800
Total production cost(RWF)	2788219
Average price of maize/kg (RWF/kg)	160.3
Total maize production(kg)	15695
Total revenue from maize (RWF)	2925370
Income (RWF)	137151
Profitability (%)	4.9

4.2.3. Perceptions on Cost of production between Tuzamurane Cyeza Cooperative members and non-cooperative members

The cost of production for the cooperative of Tuzamurane Cyeza members was (2644280RWF) compared to the maize farmers who are not cooperative members (2788219RWF). Tuzamurane Cyeza Cooperative member's production cost was low comparing to non-cooperative because in Tuzamurane cooperative some inputs were given to farmers at low price, secondly cooperative members use properly inputs where there are no over using or abusing of agricultural inputs as they well were trained on good agricultural practices. Tuzamurane as cooperative takes responsibility of buying inorganic fertilizers and maize seeds and distribute to members without others charges while non-cooperative maize farmers, there were a high cost on agricultural inputs and on land leasing; they applied agricultural input in undistributed manner, which affect the yield in both quantity and quality. It is in line with (Gadi and Rosenthal, 2013) stated that in agricultural cooperatives, there is a lowering production costs for farmers, which can be converted into lower prices for agricultural produce. Also cooperatives can operate more efficiently-at lower costs per unit-than farmers can individually.

4.2.3. Perceptions on productivity between cooperative members and non-cooperative members

The productivity of Tuzamurane Cyeza Cooperative for the agricultural year of 2020-2021 was positive. The average yield from one member of the cooperative was 6.2T/ha and for the non-members of the cooperative was 4.4T/ha, which showed that working in agricultural cooperative there is a higher profit than individual farming due

to the fact that in the cooperative they received training and other skills that helped them to cultivate on time, efficient use of maize seeds, reliable maize planting, disease and pest control, application of good agricultural practices, proper care of the crop so that it cannot be damaged both in the field and in the dryers. Non-members of the cooperative were not able to produce the same amount as those who were members of the cooperative because they had not received full training on the maize crop; fertilizers have not been used properly due to the high cost compared to those in Tuzamurane. This is in accordance with Chiyoge (2012) who stated that the purpose of agricultural cooperatives is to help farmers increase their yields and incomes. Agricultural co-operatives are agricultural-producer-owned coops whose primary purpose is increase member producers' production and incomes. However, this productivity didn't reach the national level where in Rwanda productivity would be 9.8T/ha (FAO, 2020).

4.2.4. Perceptions on economic profitability between cooperative members and non-cooperative members

Based on the results of this study on the benefits of the cooperative, the members of the Tuzamurane Cyeza Maize Agricultural Cooperative made a profit in the term of money and use it in their daily lives and the economy is growing more than the non-members of the cooperative. Findings showed that profitability of sixty Tuzamurane Cyeza Cooperative members were (13.8%) compared to sixty non cooperative maize farmers (4.9%). Due to their professional farming practices, agricultural subsidies, appropriate application of agricultural inputs which produce higher yields than non-cooperatives, the maize crops are insured so that when disasters damage the crops the

members of the Tuzamurane cooperative are reimbursed, as well as a reliable source of produce. Other benefits; food security, farmers in the cooperative have been able to build or repair houses, buy bicycles for some, and even pay school fees for their children. This research is in accordance with Verhofstadt and Maertens (2014) emphasized that cooperatives are instruments used to alleviate poverty and to accelerate agricultural production in Rwanda; also this research is in accordance with the Government of Rwanda (2012) considered the cooperatives as full partners in efforts for alleviating poverty. It is also regarded as a pathway out of poverty by improving productivity and increasing sales of produce is an important income earner for smallholders.

4.2.5. Perception on why farmers reluctant to join maize farmers' cooperative in Muhanga

Maize cooperatives are of great value to members of the community, however, some corn farmers in Muhanga district have not yet joined the cooperative due to

1. Poor management has marked the past of cooperatives in Rwanda
2. Some want to do their thing the way they feel
3. Mindset that cooperatives are not profitable
4. Awareness is still low on the importance of cooperatives
5. Land limitation of some farmers
6. Maintain independence
7. No information about cooperatives
8. Distrust management
9. Distrust members

10. Afraid of charges

It is in line with Lerman (2013) who stated that some farmers would join agricultural cooperatives but due to the experience gained from the past or from cooperative members it become a challenge.

4.3. Analysis of farmers' income between members and non-members of cooperative

Research done in Muhanga District for Tuzamurane Cyeza Cooperative members and maize farmers which are not included in agricultural cooperatives showed that maize production for Tuzamurane famers (6.2T/kg/ farmer) is greater than non-cooperative maize farmers (4.4T/kg/farmer). The findings also indicated that Tuzamurane cooperative members sold at a good price compared to unfixed prices which are below to the members of Tuzamurane. Income for Tuzamurane Cyeza Cooperative members was (366420RWF=358.18USD) compared to maize farmers who are not affiliated with the cooperative (137151RWF=134.07USD). This shows that cooperative agriculture earns more than those who are not in cooperative. This is due to the good agricultural practices with the help of Tuzamurane agronomists. But compared to the investment the farmers have made in maize, profit, is still small where it requires all the concerned stakeholders required to get large markets for agricultural cooperatives to increase the income of the member of the cooperative. Those who are not members of the Cooperative should also be assisted in the purchase of produce so that the maize farmers can continue to expand it.

The results are in line with Ito *et al.* (2012) who showed that membership in a cooperative has a strong positive effect on the income; the household income of cooperative members is greater than that of non- members (Verhofstadt and Maertens, 2013). Our findings related to the fact that maize cooperatives receive more government support, e.g. through subsided input programs. Successful cooperatives also have substantial payrolls and their employees' patronage of local businesses adds to the economic well-being of the community.

Table 6: Independent Samples Test for Analysis of farmers' income between members and non-members of cooperative

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	Df	Sig. (2-tailed)
Incomes	Equal variances assumed	4.018	.047	-1.309	119	.000
	Equal variances not assumed			-1.309	97.438	.000

The result of independent t-test in table 6 showed that the value of Sig. (0.047) which less than 0.05 is a good indicator that the variance in incomes of maize farmers who are members of the cooperative and the income of maize farmers who are not members of the cooperative is significantly different. This is also confirmed by the t-test of Equality of means which indicated that the Sig. (.000) that is less than 0.05. This allowed to reject the Null hypothesis (H0) and the alternative hypothesis has been accepted, which states that there is difference between the income of maize farmers who are members of the cooperative and the income of maize farmers who are not members of the cooperative in Muhanga District.

From the above table 4 and 5, the results indicated that cooperative members gain more income (366420RWF) compare to non-cooperative members (137151RWF) because they gained more opportunities than non-cooperative members. This implied that total income of cooperative members is greater than total income from non-cooperative members which proved that there is more advantage of being cooperative member or joining cooperative because it increases income/generating activities.

By calculation of the income, the income of maize farmers who are not members of the cooperative in Muhanga District (366420RWF=358.18USD/ 60 members) is greater than the income of maize farmers who are not members of the cooperative in Muhanga District (137151RWF134.07USD/60 farmers). It was not by hazardous there are some points such: crop insurance for cooperative members, agricultural inputs was cheap compared to non-cooperative maize farmers, proper agricultural practices and postharvest method led to the diminution of the loss of maize produce. This research is in accordance with (Getnet and Anullo, 2012), where they found rural household income of cooperative farmers to be higher than within households which are not part of a cooperative. This is in agreement with findings by (Abate et al. 2014) who found that cooperative members gained a significantly higher price for their outputs compared to similar famers who were not members. This concur with (Verhofstadt and Maertens, 2014) who found that agricultural cooperatives in Rwanda had significant positive effects for maize cooperatives, but not horticultural cooperatives.

4.4. Profitability of Tuzamurane Cyeza Cooperative Members

The result of the study revealed that members of Tuzamurane Cyeza Cooperative face some challenges for maximization of their profitability. From table 7, the results of the t-test of Equality of means indicated that the Sig. (.004) is less than 0.05.

This allowed rejecting the null hypothesis (H0) which states that Tuzamurane Cyeza cooperative member's performance is unprofitable. For Tuzamurane Cyeza Cooperative, the price of agricultural inputs was low; members receive training on agricultural production, post-harvest and disaster-stricken farmers reimbursed for their assistance in crop insurance. In addition, there is facilitation in collaboration with financial institutions. All of these led to high profitability of Tuzamurane Cooperative members.

The author analyzed the challenges faced by agricultural cooperative members of Tuzamurane for maximization of their profitability. This was confirmed by the t-test of Equality of means which indicated that the Sig. (.004) is less than 0.05.

Hypothesis 1: Tuzamurane Cyeza cooperative member's performance is profitable

The statistical hypothesis for independent t -test are:

Ho : $\mu > i$ (Tuzamurane Cyeza cooperative members performance is unprofitable)

Hi : $\mu < i$ (Tuzamurane Cyeza cooperative members performance is profitable)

Since $p < .05$, researcher can reject the null hypothesis, and conclude that Tuzamurane Cyeza cooperative member's performance is profitable.

Table 7: Independent sample t Test for Tuzamurane cooperative members

Test for Equality of Variances		t-test for Equality of Means		
F	Sig.	T	Df	Sig. (2-tailed)
5.997	.015	2.915	238	.004

The profitability of Tuzamurane Cyeza cooperative members was positive as indicated by table 4.

The beneficial of being in cooperatives

This was caused by the cooperative members obtained subsided inputs especially seeds were free because of Tuzamurane Cooperative stakeholders, hence all cooperative members use selected seeds; as well as they obtained trainings related to modern agriculture of maize and conservation of harvest.

However, members of Tuzamurane Cyeza Cooperative are profitable; there are challenges that cooperative members of Tuzamurane meet for maximization of their profitability which are:

- Climate change leads to land degradation and soil erosion
- Fall Army Worm infection
- Lack of awareness for farmers
- Price of maize from production was still low compare to investment.
- No selected seeds compared with climate; for example in season 2018 there was many seeds which are not flowered

- Insufficient materiel using in post harvesting handling like packaging, transport, warehouses, Drying shelters, storage Facilities, Big Balances and small balance, Shelter machine, plastics sheets,
- Marshlands were not drained
- Marketing information, reliable source of low materials, lack of appropriate infrastructure, limited skills of employers, money infraction compare yield value and fluctuation of price.

Those challenges also has been found by Gray and Kraenzle (2020), the agricultural economy, low commodity prices, operational problems, and increasing costs were the most frequently mentioned problems members see facing their cooperative. Producers were faced with low commodity prices, with increasing costs of fertilizers, energy sources, and labor in some instances. Poor earnings forced some farmers to discontinue operations as stated by Nkhoma (2011). Cooperative management mentioned low commodity prices, the agricultural economy, operational issues, and increasing costs as the major problems facing their cooperatives over the past year and that they will continue to face in the near future.

4.4.1. The socio profitability of Tuzamurane Cyeza cooperative members

After Rwanda was devastated by the horrors of the 1994 Genocide against the Tutsi, it was necessary for Rwandans in general to build unity and reconciliation; In particular, the farmers of the Tuzamurane Cyeza cooperative sought solutions that included the creation of unity and reconciliation groups where they were trained on what

happened and decided not to repeat it because it had set them back in their lives and development. In addition, the cooperative members contribute to the annual donation of cows to the needy survivors of the Tuzamurane Cyeza members every year, another important thing is to go and give the genocide survivor's farming credentials so that they crop on time.Tuzamurane Cyeza Cooperative has helped its members in the social and economic spheres as they emphasize that their livelihoods are getting better, they have afforded to health insurance, food security, better housing, access to clothing, own livestock, and work with banks in a sustainable way. The existence of the Tuzamurane Cyeza Cooperative has helped members rebuild trust in the aftermath of the 1994 Genocide against the Tutsi through dialogue on unity and reconciliation between genocide survivors and the families of those who committed the atrocities. Economically, Tuzamurane Cyeza cooperative has helped build financial capacity, and they have been able to develop, some cooperative members buy land, buy livestock, build houses, pay school fees and save money in financial institutions. Agricultural cooperatives play an important role in supporting men and women small agricultural producers and marginalized groups by creating sustainable rural employment. The most important feature of a cooperative is that farmers try to solve their problem or take advantage of an opportunity together, instead of trying to do this individually. Producer cooperatives offer men and women smallholders market opportunities, and provide them with services such as better training in natural resource management, and better access to information, technologies, innovations and extension services (FAO, 2012).

There is no discrimination in agricultural cooperative because there are different categories of people like widows, widowers, people affected by disease like HIV/AIDS

working together which itself qualifies as a step towards a sustainable society. According to Musahara (2012) ILO identifies that cooperatives advocate for the disadvantaged including the old and children, provision of vital financial services, offer insurance for health hazards and life and by pooling risk together.

4.4.2. Economic profitability between cooperative members and non-cooperative members

Based on the results of this study on the benefits of the cooperative, the members of the Tuzamurane Cyeza Maize Cooperative made a profit in the term of money and use it in their daily lives and the economy is growing more than the non-members of the cooperative. Findings show that profitability of sixty Tuzamurane Cyeza Cooperative members were (13.8%) compared to sixty non cooperative maize farmers (4.9%). Due to their professional farming practices, appropriate application of agricultural inputs which produce higher yields than non-cooperatives, the maize crops are insured so that when disasters damage the crops the members of the Tuzamurane cooperative are reimbursed, as well as a reliable source of produce. Other benefits; food security, farmers in the cooperative have been able to build or repair houses, buy bicycles for some, and even pay school fees for those with secondary school children. Members receive benefits from dividends, information, and extension services that are embedded in new technologies and have prior access to inputs, which are directly linked with technical efficiency gains. This research is in accordance with Chiyoge (2012) emphasized that cooperatives are instruments used to alleviate poverty and to accelerate agricultural production in Rwanda; also this research is in accordance with the Government of

Rwanda (2012) considered the cooperatives as full partners in efforts for alleviating poverty. It is also regarded as a pathway out of poverty by improving productivity and increasing sales of produce is an important income earner for smallholders.

4.5. Statistical Analysis to find out the influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members.

The results indicated that there is influential factors that lead to the profitability of Tuzamurane Cyeza Cooperative Members: The result from the Table 11 indicated that price of maize seeds has an inverse relationship and significant relationship with profitability of Tuzamurane cyeza cooperative maize farmers (β 1=-2.568); for 1RWF decrease in price of maize seeds will lead to 2.568 RWF increases the profitability of Tuzamurane Cyeza Cooperative members. The result also indicated that price of fertilizers has a positive relationship and significant relationship with the profitability of Cooperative members (β2=.000); fertilizers were free for Tuzamurane Cyeza maize farmers and has influenced them on profitability increasing. Wage of labor has an inverse relationship and significant relationship with profitability of cooperative (β 4=-0.345); for 1unit decrease in wage of labor will lead to the increase of 0.345RWF in the profitability of Tuzamurane Cyeza Cooperative members. The result indicated that the maize production (Kg) and profitability has a positive association (β5=148.348). Maize production has positive relationship with the profitability of Tuzamurane Cooperative Members. Indicating that as the maize production increase by one kg, the profitability of Tuzamurane Cooperative Members will be increased by 148.348RWF. Land lease price has an inverse relationship and significant relationship with profitability (β6=-

6.234); this means that for 1unit decrease in land lease price increase of 6.234RWF in the profitability of Tuzamurane Cyeza Cooperative members.

As matter of the fact, it was very true to confirm that all independent variables had an impact on profitability of Tuzamurane Cyeza cooperative. The findings allowed to accept the alternative hypothesis (H1) which stated that there were significant influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members.

Hypothesis3

There is a significance influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members.

The statistical hypothesis for independent F-test was:

$H_0: \sigma_1^2 = \sigma_2^2$ (There is no significance influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members).

$H_1: \sigma_1^2 \neq \sigma_1^2$ (There is significance influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members).

Table 8: Variables of the Study

Model	Variables Entered	Variables Removed	Method
1	Wage of labor (FRW), Price of maize seeds (FRW), Price of pesticides (FRW), land lease price (FRW), Price of fertilizers (FRW), maize production (kg).		Enter

a. Dependent Variable: Profitability (%), b. All requested variables entered.

The table 8 indicated that the independent variables are wage of labor (RWF), price of maize seeds (RWF), price of pesticides (RWF), (RWF), land lease price, price of fertilizers (RWF) and maize production (kg).

A model summary has been automatically created when running a regression modeling or a classification modeling. The following part describes the model summary of the study where the coefficient of determination (Adjusted R-Square) has been pointed out. This indicates the level at which independent variables cause variation in dependent variable. The model summary is illustrated within the below part in Table 9.

Table 9: Model Summary of factors influencing profitability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.987[a]	.975	.973	6.277

a. Predictors: (Constant), wage of labor (FRW), Price of maize seeds (FRW), Price of pesticides (FRW), land lease price, Price of fertilizers (FRW), maize production (kg), Dummy variables.

The major ideas rely in the fact that there are some influencing factors that lead to the profitability of agricultural cooperatives, and cooperative members may find profitability in the success of their cooperatives in terms of social development, economic development, sustainable development and food security. Adjusted R Square which is .973 implying that 97.3% of the Profitability could be explained by independents variables named wage of labor (RWF), price of maize seeds (RWF), Price of pesticides (RWF), price of fertilizers (RWF) and maize production (kg) The value of Adjusted R Square confirms that all the independent variables together cause variation

in profitability at the level of 97.3%. This higher value of Adjusted R Square justifies the better it for the model.

In determining whether the model was good fit for data, the study adopted the use of analysis of variance. The R-Squared was used to show the variation of the dependent variable that could be explained by the independent variables. The Adjusted R Square is 0.973 implying that 97.3% of the Profitability could be explained by independents variables. The value of Adjusted R Square confirmed that all the independent variables together caused variation in profitability at the level of 97.3%. This higher value of Adjusted R Square justifies the better for the model. Table below shows the analysis of Variance (ANOVA)

Table 10: Analysis of Variance (ANOVA)

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	8424.231	1	8424.231	7.200	.009[b]
Residual	67860.798	58	1170.014		
Total	76285.029	59			

a. Dependent Variable: Profitability (%)

b. Predictors: (Constant), wage of labor (RWF), Price of maize seeds (RWF), Price of pesticides (RWF), land lease price, Price of fertilizers (RWF), maize production (kg).

In determining whether the model was good fit for data, the study adopted the use of analysis of variance. The value of the F-Critical (2.26) was less than the F-calculated (7.200) and the P-Value (0.009) was below the significant level, implying that the model could be used in predicting the contribution of independent variables on the

profitability of Tuzamurane Cyeza Cooperative. Table 11 shows the coefficients of independent variables of Tuzamurane Cyeza Cooperative member's profitability.

Table 11: Coefficients of influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members.

Model		β	Std.Error	T	Sig.
1	(Constant)	1166.018	2175.439	.536	.593
	Price of fertilizers (RWF)	-.618	.237	2.61	.010
	Price of maize seeds (RWF)	-2.568	1.076	-2.38	.000
	Price of pesticides (RWF)	-.244	.643	-.379	.234
	wage of labor (RWF)	-.345	.385	-.232	.037
	Land lease price	-6.234	.456	-13.67	.000
	Maize production (kg)	148.348	9.211	16.10	.000

a. Dependent Variable: Profitability (%)

From the data in above table, the established regression equation was:

Y = 1166.018 -.618 X1 -2.568X2-.244X3-.345X4 +148.348X5-6.234X6

Where,

Y= Profitability of Tuzamurane Cyeza Cooperative members (%)

X1: Price of maize seeds (RWF)

X2: Price of fertilizer (RWF)

X3: Price of pesticide (RWF)

X4: Wage of labor (RWF)

X5: Maize production (kg)

X6: Land lease price (RWF)

4.5.1. Regression results

To investigate the influential factors that lead to the profitability of Tuzamurane Cyeza Cooperative Members, a researcher found that all coefficients of the variables ((Price of fertilizers, price six coefficients(wage of labor Price of maize seeds, Price of pesticides , land lease price, Price of fertilizers, maize production) included in the model are significant. Two of the coefficients have positive relationship with the Tuzamurane Cyeza cooperative farmers while four of the coefficients (price of maize seeds, price of pesticides, wages of labors, land lease price) have inverse relationship with Tuzamurane Cyeza cooperative farmers. The F-statistics of 7.200 which shows the marginal contribution of the coefficients was significant at 0.009 level of significance. The precision of the model that evaluates the influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members was presented in Table 11.

4.5. 2. The relationship between Price of maize seeds (RWF) and profitability of Tuzamurane Cyeza Cooperative Members

The result indicated that price of fertilizers has a positive association between the maize seeds costs and profitability of Tuzamurane Cyeza Cooperative Members (β 1=-2.568). This means that for 1RWF decrease in price of maize seedss will lead to 2.568 RWF increases the profitability of Tuzamurane Cyeza Cooperative members. If the cost of agricultural inputs decreases, the farmers gain more and get a high profit. In general, the price of maize seeds is low due Rwanda policies of agricultural inputs subsidies. Tuzamurane Cyeza Cooperative always tries to get for farmers selected seeds with no addition costs. Access and use of improved varieties and agriculture inputs on subsidies

cost is one of the critical barriers to increase yield, improve productivity and increased profitability (Sibande, 2016).

4.5.3. The relationship between the Price of fertilizer (RWF) and profitability of Tuzamurane Cyeza Cooperative Members

The result indicated that Price of fertilizers has an inverse relationship and significant relationship with profitability of cooperative (β2=-.618); for 1unit decrease in price of fertilizers will lead to 0.618RWF increase in the profitability of Tuzamurane Cyeza Cooperative members; fertilizers were cheap due to agricultural subsidies on inputs and has influenced Tuzamurane Cyeza maize farmers on profitability increasing. Rwanda government tries to balance the prices of fertilizers by agricultural inputs subsidies so that agricultural production increased. And it is in accordance with (Sibanda, 2016) where he stated that the move by most governments to turn into subsidies is aimed at securing food, gaining high profitability and income generating arising from agriculture.

4.5.4. The relationship between Price of pesticide (RWF) and profitability of Tuzamurane Cyeza Cooperative Members

Price of pesticides has an inverse relationship and significant relationship with profitability of cooperative (β3=-0.244); for 1unit decrease in Price of pesticides will lead to 0.244 RWF increase in the profitability of Tuzamurane Cyeza Cooperative members; in addition to the fact that fewer pesticides were used due to the way they tried to take care of maize against pests. The relationship between relationship between the costs of pesticides and profitability was very weak. In general, the price of pesticides

is cheaper in Rwanda; as the price of pesticides a farmer get high profitability. The know-how of applying farm inputs enhances the effectiveness and efficiency of human labour which in turn increases productivity (Sahel, 2016). Access and use of improved varieties and agriculture inputs on subsidies cost is one of the critical barriers to increase yields, improve productivity and increased profitability (Sibande, 2016).

4.5.5. The relationship between Wage of labor (RWF) and profitability of Tuzamurane Cyeza Cooperative Members

Wage of labor has an inverse relationship with profitability of cooperative members of Tuzamurane (β4=-0.345). This means that for 1unit decrease in wage of labor will lead to the increase of 0.345RWF in the profitability of Tuzamurane Cyeza Cooperative members. The contribution of agriculture to the economic development of a nation happen in a number of ways including; and provision of employment to the uneducated and unskilled labor force (Ippmedia.com, 2016). The cost of labor in Rwanda is cheap; many people are involved in the sector of agriculture so everyone needs a job in this domain, in fact there is a competition for getting job where it is easy for a farmer to pay labour at low cost and make the advantages of t the profitability of Tuzamurane Cyeza Cooperative.

4.5.6. The relationship between Maize production (kg) and profitability of Tuzamurane Cyeza Cooperative Members

The result indicated that the maize production (Kg) and profitability of Tuzamurane maize farmers has positive relationship (β5=148.348). Maize production has positive relationship with the profitability of Tuzamurane Cooperative Members.

Indicating that as the maize production increase by one kg, the profitability of Tuzamurane Cooperative Members has increased by 148.348RWF. This implies that the increase in outputs leads to increase in profitability. As maize production (Kg) increased, profitability also increased. The results are in agreement with Abate (2014) who noted that agricultural cooperatives maintain higher levels of income and make small farmers to increase profits. Our findings are related to Verhofstadt and Maertens (2014) noted that the aim of agricultural cooperatives in Rwanda is to boost agricultural production and improve the income of smallholder farmers through developing the markets for their produce and at the same time lead to the increase of profits.

4.5.7. The relationship between Land lease price and profitability of Tuzamurane Cyeza Cooperative Members

Land lease price has inverse relationship with the profitability of Tuzamurane Cyeza Cooperative Members (β6=-6.234). This means that that as the Land lease price decrease by one FRW, profitability of Tuzamurane Cyeza Cooperative farmers increased by 6.234 RWF. The rent price for Tuzamurane Cyeza Cooperative members was 300 RWF per are per season, which has not affected more the profitability of cooperative's members. So the government of Rwanda tried not to tax the marshland so that the price of rent will not goes up. The price of agricultural land and its value are of importance when forming the production potential of agricultural cooperatives Nkhoma (2011).

4.5.8. Classical Assumption of Regression Analysis

Normality test

Normality test is performed on residuals to see if they are normally distributed. The two hypotheses of this test were:

Null hypothesis: Ho: The residuals are normally distributed

Alternative Hypothesis: H1: The residuals are not normally distributed.

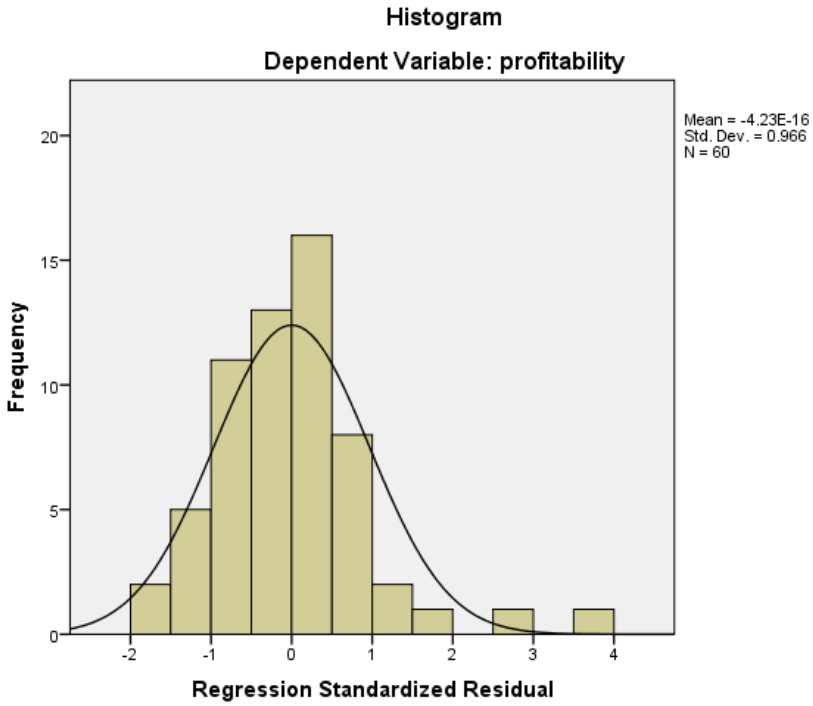

Figure 2: Normality test

The Bell-shaped figure indicated that residuals were normally distributed. This allowed the researcher to accept the Null hypothesis (H0) that the residuals were normally distributed. The normality of residuals also confirmed by the following Normal P-P Plot. The following figure illustrates the Normal P-P Plot.

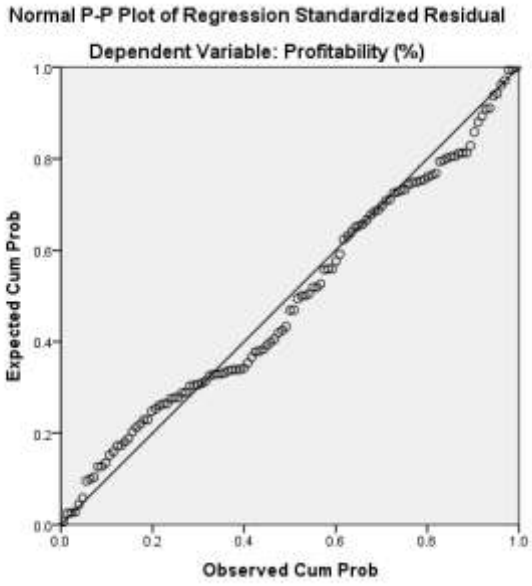

Figure 3: Normal P-P Plot of Regression Standardized Residual

According to the above figure, Normal P-P Plot indicated that residuals were normal distributed as well as the dots fall on the line. This implied the validity, accuracy and correctness of the model.

Multicollinearity test

The researcher has conducted Multicollinearity test as multicollinearity can lead to skewed or misleading results when a researcher or analyst attempts to determine how well each independent variable can be used most effectively to predict or understand the dependent variable in a statistical model. The following table describes the test of multicollinearity.

Table 12: Variance Inflation Factor (VIF)

Model		Collinearity Statistics	
		Tolerance	VIF
1	cost of fertilizer	.597	1.674
	cost of maize seeds	.402	2.485
	cost of pesticides	.833	1.201
	cost of land	.162	6.191
	maize production	.218	4.587
	wages of labors	.231	4.320

a. Dependent Variable: profitability

The results from the Table indicated that cost of fertilizer, cost of maize seeds, cost of pesticides, cost of land, and wages of labors were moderately correlation while cost of land was highly correlated with profitability of Tuzamurane Cyeza Cooperative members. As matter of the fact, it very clear that the model is valid and correct.

Heteroscedasticity

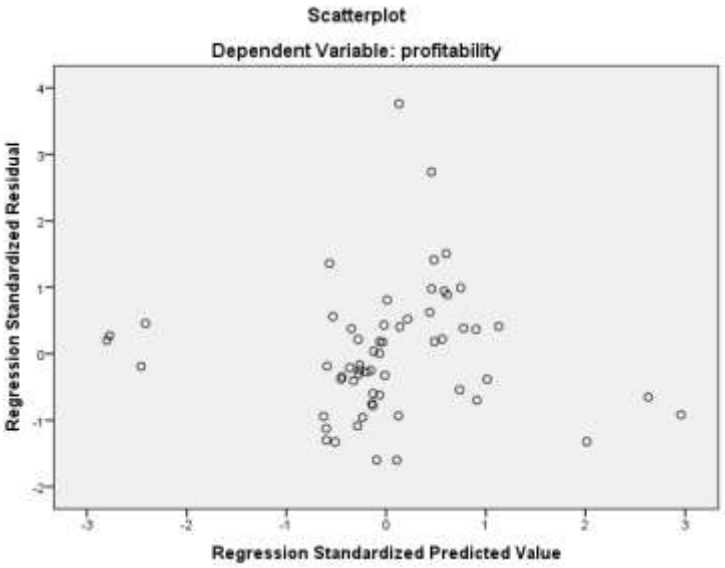

Figure 4: Heteroscedasticity

In regression analysis, heteroscedasticity has been trusted so, the residuals had a constant variance and the model was correct.

4.6. Highlights of Influential factors that leads to the profitability of Tuzamurane Cyeza Cooperative Members

In general, the low cost of organic manure, as well as the availability of free inorganic fertilizers, have increased the profitability of Tuzamurane Cyeza Cooperative members. For maize seeds, their prices were lower than those of non-cooperatives and the Tuzamurane agronomists were the ones who chose the best maize seeds, their quality led to an increase in yield and then profitability was high. Regarding the price of pesticides, Tuzamurane has helped its members find pesticides that are effective and helping farmers use pesticides for the right time application and right rate use, which reduces the risk of waste and increases the profitability of the farmers. Land lease price, low rent for arable land in cooperatives (300RWF=0.29USD / are per season which makes it easier for farmers not to lose but to make a profit. Lastly, for maize production, the production of Tuzamurane Cyeza Cooperative members was higher compared to maize farmers who are not in the cooperative, adding that the market for maize production is reliable and high which makes profitability for Tuzamurane Cyeza Cooperative members.

Profitability of Tuzamurane Cyeza Cooperative was influenced by price of maize seeds, price of fertilizers, price of pesticides, wage of labors, land lease price, and price of maize production. As stated by Mukamutesi (2014) several factors influence agricultural profitability at farm level. These include; the farm gate price, government price policies, farm location, production costs, variety of seed used, yield, farm size, land tenure which also influences yield, experience in production of crop which impacts on yield, education level of the household head, age of household head, household size,

and distance to market. In agricultural cooperative daily management, farmers tend to pursue activities that increase their income, reduce their financial, physical risk and reduce labor requirements.

4.7. Market of non-cooperative maize farmers

They generally sell during harvest and rarely store any produce due to immediate cash needs. They usually sell small quantities and enjoy little bargaining power. They have limited market information and as a result they are essentially price-takers. They do not use weighing balances for selling their products; using the “Mironko” basket instead. Transactions are either carried out on farms, at household level or at local markets. The market, individual farmers interact with individual consumers and rural collectors (rural traders). Individual farmers buy back maize later for use as seed and food.

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

The general objective of this study was to assess the profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District, Rwanda. Specific objectives were to analyze the challenges faced by agricultural cooperatives members of Tuzamurane for maximization of their profitability, to analyze farmers' income between members and non-members of cooperative and to find out the influential factors that lead to the profitability of Tuzamurane Cyeza Cooperative Members.

The results of this study supported the statement in farmer organization literature that producer cooperatives are institutional tools to improve smallholder production performance and thus improving farm income and profitability. It is in line of Rwanda government and millennium development goals (MDG'S) of eradicating extreme poverty and hunger.

The results of this study found that members of the cooperative benefit more financially and socially than non-members of the cooperative. Market of produce was easy than individual farmer because a buyer can deal with the group as whole rather than with individual farmer.

Results also revealed that majority in cooperatives are aged farmers. Therefore, in addition to promoting and supporting maize cooperatives, special attention should be put on getting youth participation and involvement in maize cooperatives, since the long

term sustainability of these cooperatives will build on such potential members. This should go hand in hand with facilitating them to acquire required land and capital, since the study indicated capital constraint such as credits and land as key predictors of membership

Although Tuzamurane Cooperative impacted positively, the level of agricultural profitability in Rwanda and Muhanga in particular is still low. All relevant authorities should adhere to the same target in order to increase the profits of farmers living in agricultural cooperatives.

5.2. RECOMMENDATIONS

Based on results, from local leaders, Tuzamurane Cyeza Cooperative staff, members and non –members of cooperative; there are recommendations can be given to maize farmers to increase their profits

- Small farmers should be treated as rational business people who require improvement to be able to negotiate a higher economic return
- In manner of Tuzamurane Cyeza Cooperative to be sustainable and profitable, it is better to understand the market respond to its many, constant changes in a timely and effective way. Indeed, market strategy is needed to ensure the increase of cooperative member's income.
- Profits must be divided in rational way between the farmers and the cooperative they are members
- Encourage young people to join agricultural cooperatives as it is clear that the number of young people in cooperatives is still low.

- Maize production markets should be expanded to maximize profits for maize farmers, for example, making collaboration with others stakeholders, such as: industry to accept maize from cooperative, or other government agencies such Rwanda National Collection Services for prisons.
- The government is urged to continue to sensitize farmers, especially maize farmers, to join the cooperative and show them the benefits of working together.

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APPENDICES

Appendix1: Survey Questionnaire

Cooperatives members

I, NZAMURAMBAHO FELICIEN, a Master student at DIPONEGORO UNIVERSITY, Faculty of animal and agricultural sciences, Department of Agribusiness. I am carrying out a study on the Profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District. Data collection will be confidential and used for academic purposes only.

Date …../……/…….

Identification of farmers

Name: …….

District: ……..

Sector: ……

Cell: ……

Village: ……...

I.1 Sex:

Male ☐

Female ☐

I.2 what is your age group?

a) 21-30 ☐

b) 31-40 ☐

c) 41-50 ☐

d) Above 50 ☐

I.3 Materials status:

a) Single ☐

b) Married ☐

c) Widow(er) ☐

d) Separated ☐

I.4 Educational level:

a) University level ☐

b) Secondary level ☐

c) Primary level ☐

d) Illiteracy ☐

I.5 Number of children

a) 1-3 ☐ b) 4-7 ☐

c) Above 7 ☐ d) no child ☐

I.6 what your occupation?

a) Farming and animal growing ☐

b) Local trade ☐

c) Handcraft ☐

I.7 what is your household size for land?

a) Less than 1 ha ☐

b) Between 1-2ha ☐

c) Between 2-2.5ha ☐

d) Above 5ha ☐

I.8. Do you grow Maize as a main crop? Yes ☐

No ☐

Information about cooperative members

II.1.a. Are you a cooperative member? Yes ☐ No ☐

b. How long have you belonged to this cooperative? …….

II.2. why did choose to join the cooperative?

To join other ☐

Access to credit ☐

To increase family income ☐

To get easily inputs ☐

To get health insurance ☐

Other ☐

II.3. what are the benefits did you obtain from being cooperative members?

Paying school fees ☐

Getting enough food ☐

Access to credits ☐

Health care ☐

Practice modern agriculture ☐

Building a house ☐

Saving increasing domestic assets ☐

Other benefits ☐

i Are you satisfied with being cooperative member? Yes ☐ No ☐

If no, why? …….

II.4. What are Social advantages gained from agricultural cooperatives?

Medical insurance ☐

Sharing responsibilities ☐

Training ☐

Education of children Count ☐

Food security ☐

Mutual assistance ☐

II.5. What are Economic advantages gained from agricultural cooperatives?

Saving ☐

Access to credit ☐

Food security ☐

Purchasing power ☐

Acquisition of new technology ☐

Increase in income ☐

II.6. Who has the major responsibility for maize and vegetables production?

A) Men ☐ B) Women ☐

C) Both ☐

II.7. what are the constraints still you meet as maize farmer ?

Disease and climatic condition ☐

Lack of production skills ☐

Low price at the market ☐

High cost of inputs ☐

Lack of financial support ☐

No clear impact on social development ☐

II.8. what are the solutions to solve constraints you meet?

Training and meeting ☐

Financial support ☐

Access to market ☐

II.9. what are the government support to the cooperative?

Training cooperative members ☐

Providing subsidies ☐

Providing equipment's ☐

Other ☐

II.10.a. Do you find any social advantage in joining agricultural cooperatives?

……
……

II.11.b. Explain how Tuzamurane Cyeza Cooperative had helped its members in unity and reconciliation after genocide of Tutsi 1994.

……
……

II.12. what are other types of crops do you grow apart of maize?

Beans ☐

legumes ☐

Sweet potato ☐

Banana ☐

Coffee ☐

Others ☐

II.13. Why did you choose to grow these crops among the others grown in the sector?

a) Cheap to grow ☐ b) more productive ☐ c) market available ☐

VII. What source of materials use in second crop?

From my self ☐

From Tuzamurane ☐

From donors ☐

II.14. what kind of chemicals do you get from TUZAMURANE?

a) NPK17.17.17 ☐

b) DAP ☐

c) Urea ☐

d) Lime ☐

e) Others ☐

II.15. what are your plan to sustain your farm?

…….

……

……..

II.16. where do you get a market for your production?

……..

…….

II.17. Do you plan to remain as a cooperative member?

Yes ☐ No ☐

II.18. Explain the reason……..

……..

III. Choose and grade the level of importance of the challenges you faced while growing these crops?

Challenge	Less important	Important	Very important
Irregularity of rain			
Lack of good variety			
Expensive inputs			
Low member participation			
Lack of capital			
Poor management			

IV. Referring to the agricultural year of 2020-2021, complete the table below

How much money did you invest in agriculture? (inputs)

Item	Unit cost(Rwf)	Total cost(Rwf)
Organic fertilizers(kg)		
Inorganic fertilizers(kg)		
Seeds (kg)		
Cultivators		
Harvesters		
Pesticides		
Watchmen and other labor?		

V. What was the production did you have last year? (Output)

Name of crop	Quantity produced(kg)	Unit price (Rwf)	Revenue(Rwf)
Maize			

IX. What is your annual income before joining the cooperative (estimate your average annual income per year in Rwanda francs)?

50,000-100,000 ☐

100,001-500,000 ☐

500,001-1,000,000 ☐

1,000,001-2,000,000 ☐

Above 2,000,000 ☐

X. What is your annual income after joining the cooperative (estimate your average annual income per year in Rwanda francs)?

50,000-100,000 ☐

100,001-500,000 ☐

500,001-1,000,000 ☐

1,000,001-2,000,000 ☐

Above 2,000,000 ☐

XI. Have you had seminars or training with agronomist or other NGOs technicians about maize production?

Yes ☐ No ☐

If yes, at which topics were you trained?

Maize production ☐

Crop rotation ☐

Fertilizer application ☐

Diseases prevention and treatment ☐

Cooperative management ☐

Small scale projects elaboration ☐

Others ☐

XII. What are the challenges that a farmer still has?

a/ access to land ☐ b/ access to finance ☐

c/ access to service ☐ d/transportation facilities ☐

e) Inputs ☐ f) market information ☐

g) Extension service ☐

h) Others (please explain)……

XIII. How do you use the land?

a) By rent in ☐ b) by rent out ☐

c) Others (specify)……

XIV. How many kilograms of maize do you produce per are? .....……

XV. Are women‘s and men‘s farm activities divided by task and place?

a) Yes ☐ b) No ☐

SURVEY QUESTIONNAIRE

Non -Cooperatives member maize farmers

I, NZAMURAMBAHO FELICIEN, a Master student at DIPONEGORO UNIVERSITY, Faculty of animal and agricultural sciences, Department of Agribusiness. I am carrying out a study on the Profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District. Data collection will be confidential and used for academic purposes only.

Date …../……/…….

Identification of farmers

Name :……..

District : ……

Sector : ……

Cell : ……

Village : …….....

I.1 Sex:

Male ☐

Female ☐

I.2 what is your age group?

a) 21-30 ☐

b) 31-40 ☐

c) 41-50 ☐

d) Above 50 ☐

I.3 Materials status:

a) Single ☐

b) Married ☐

c) Widow(er) ☐

d) Separated ☐

I.4 Educational level:

a) University level ☐

b) Secondary level ☐

c) Primary level ☐

d) Illiteracy ☐

I.5 Number of children

a) 1-3 ☐ b) 4-7 ☐

c) Above 7 ☐ d) no child ☐

I.6 what your dairy occupation?

a) Farming and animal growing ☐

b) Local trade ☐

c) Handcraft ☐

I.7 what is your household size for land?

a) Less than 1 ha ☐

b) Between 1-2ha ☐

c) Between 2-2.5ha ☐

d) Above 5ha ☐

I.8. Do you grow Maize as a main crop?

a) Yes ☐ b) No ☐

Information about cooperative

II.1 Are you a cooperative member? Yes ☐ No ☐

If no, why? …….

II.2 .Why didn't you choose to join cooperatives

No access on marshland ☐

Not profitable ☐

No transparence in cooperative organization ☐

Other ☐

II.3. Who has the major responsibility for maize and vegetables production?

a) Men ☐ b) Women ☐

c) Both ☐

II.4. where do you get a market for your production?

……..

II.5 Do you plan to join a cooperative? Yes ☐ No ☐

If not, explain the reason……

……..

Choose and grade the level of importance of the challenges you faced while growing these crops?

Challenge	Less important	Important	Very important
Irregularity of rain			
Lack of good variety			
Expensive inputs			
Low member participation			
Lack of capital			
Poor management			

Referring to the agricultural year of 2020-2021, complete the table below

How much money did you invest in agriculture? (Inputs)

Item	Unit cost (Rwf)	Total cost (Rwf)
Organic fertilizers(kg)		
Inorganic fertilizers(kg)		
Seeds (kg)		
Cultivators		
Harvesters		
Pesticides		
Watchmen and other labor		

What was the production did you have last year? (output)

Name of crop	Quantity produced(kg)	Unit price (Rwf)	Revenue(Rwf)
Maize			
Vegetables			

What are other types of crops do you grow apart of maize?

Beans ☐

legumes ☐

Sweet potato ☐

Banana ☐

Coffee ☐

Others ☐

What source of materials use in second crop?

From my self ☐

From donors ☐

What is your annual income coming from maize production (estimate your average annual income per year in Rwanda francs)?

50,000-100,000 ☐

100,001-500,000 ☐

500,001-1,000,000 ☐

1,000,001-2,000,000 ☐

Above 2,000,000 ☐

Have you had seminars or training with agronomist or other NGOs technicians about maize production?

Yes ☐

No ☐

If yes, at which topics were you trained?

Maize production ☐

Crop rotation ☐

Fertilizer application ☐

Diseases prevention and treatment ☐

Cooperative management ☐

Small scale projects elaboration ☐

Others ☐

IX.. What are the challenges that a farmer still has?

a/ access to land ☐ b/ access to finance ☐

c/ access to service ☐ d/ transportation facilities ☐

e) Inputs ☐ f) market information ☐

g) Extension service ☐

h) Others (please explain) ……..

X. How do you use the land?

a) By rent in ☐ b) by rent out ☐

c) Others (specify) ……...

XI. How many kilograms of maize do you produce per are? .....…….

XII. Are women‘s and men‘s farm activities divided by task and place?

a) Yes ☐ b) No ☐

Questionnaire for cooperative representatives

I, NZAMURAMBAHO FELICIEN, a Master student at DIPONEGORO UNIVERSITY, Faculty of animal and agricultural sciences, Department of Agribusiness. I am carrying out a study on the Profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District, Rwanda. Data collection will be confidential and used for academic purposes only.

What is the profitability from agricultural cooperatives of TUZAMURANE on socio economic living condition to the members?
……
……
……

What are the difficulties you face in managing Tuzamurane Cyeza Cooperative?

……
……
……

Explain how Tuzamurane Cyeza Cooperative had helped its members in unity and reconciliation after genocide of Tutsi 1994.

II.12.a.what is government support to Tuzamurane cyeza cooperative for the development of good governance of your cooperative?
……
…….

b. what are the government' support related to improve income a maize' farmers?

Questionnaire for Local Leaders

I, NZAMURAMBAHO FELICIEN, a Master student at DIPONEGORO UNIVERSITY, Faculty of animal and agricultural sciences, Department of Agribusiness. I am carrying out a study on the Profitability of Tuzamurane Cyeza Cooperative Members in Muhanga District, Rwanda. Data collection will be confidential and used for academic purposes only.

How is the situation of maize sub sector in this local area?.....
.....
.....

What are the challenges encountered by agricultural cooperatives in this area?
……
……
……..

What are the strategies put in place?

……
……
……..

Appendix2: Identification of cooperative member's respondents

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	32	53.3	53.3	53.3
	M	28	46.7	46.7	100.0
	Total	60	100.0	100.0	

Age group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a	2	3.3	3.3	3.3
	b	8	13.3	13.3	16.7
	c	18	30.0	30.0	46.7
	d	32	53.3	53.3	100.0
	Total	60	100.0	100.0	

Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	M	44	73.3	73.3	73.3
	S	1	1.7	1.7	75.0
	w	1	1.7	1.7	76.7
	W	14	23.3	23.3	100.0
	Total	60	100.0	100.0	

Education Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I	14	23.3	23.3	23.3
	P	40	66.7	66.7	90.0
	V	2	3.3	3.3	93.3
	S	4	6.7	6.7	100.0
	Total	60	100.0	100.0	

No of children

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	21	35.0	35.0	35.0

	B	32	53.3	53.3	88.3
	C	4	6.7	6.7	95.0
	D	3	5.0	5.0	100.0
	Total	60	100.0	100.0	

Profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	54	90.0	90.0	90.0
	a&b	2	3.3	3.3	93.3
	a&c	2	3.3	3.3	96.7
	B	2	3.3	3.3	100.0
	Total	60	100.0	100.0	

Land size

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	14	23.3	23.3	23.3
	B	23	38.3	38.3	61.7
	C	20	33.3	33.3	95.0
	D	3	5.0	5.0	100.0
	Total	60	100.0	100.0	

Appendix3: Identification of non-cooperative member's respondents

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	15	25.0	25.0	25.0
	M	45	75.0	75.0	100.0
	Total	60	100.0	100.0	

Age group Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a	4	6.7	6.7	6.7
	b	13	21.7	21.7	28.3
	c	24	40.0	40.0	68.3
	d	19	31.7	31.7	100.0
	Total	60	100.0	100.0	

Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	D	2	3.3	3.3	3.3
	M	40	66.7	66.7	70.0
	s	1	1.7	1.7	71.7
	S	6	10.0	10.0	81.7
	W	11	18.3	18.3	100.0
	Total	60	100.0	100.0	

Education Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a	1	1.7	1.7	1.7
	i	8	13.3	13.3	15.0
	p	46	76.7	76.7	91.7
	s	5	8.3	8.3	100.0
	Total	60	100.0	100.0	

No of children

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	a	22	36.7	36.7	36.7
	b	27	45.0	45.0	81.7
	c	3	5.0	5.0	86.7
	d	8	13.3	13.3	100.0
	Total	60	100.0	100.0	

Profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a	50	83.3	83.3	83.3
	a&b	5	8.3	8.3	91.7
	a&c	4	6.7	6.7	98.3
	c	1	1.7	1.7	100.0
	Total	60	100.0	100.0	

Land size

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a	8	13.3	13.3	13.3
	b	37	61.7	61.7	75.0
	c	14	23.3	23.3	98.3
	d	1	1.7	1.7	100.0
	Total	60	100.0	100.0	

Main crop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	y	60	100.0	100.0	100.0

Cooperative membership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	59	98.3	98.3	98.3
	y	1	1.7	1.7	100.0
	Total	60	100.0	100.0	

no marshaland

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	23	38.3	38.3	38.3
	y	37	61.7	61.7	100.0
	Total	60	100.0	100.0	

not profitable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	30	50.0	50.0	50.0
	y	30	50.0	50.0	100.0
	Total	60	100.0	100.0	

no transparence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	33	55.0	55.0	55.0
	y	27	45.0	45.0	100.0
	Total	60	100.0	100.0	

Responsible

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a	16	26.7	26.7	26.7
	b	8	13.3	13.3	40.0
	c	35	58.3	58.3	98.3
	n	1	1.7	1.7	100.0
	Total	60	100.0	100.0	

tendance to join

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	15	25.0	25.0	25.0
	y	45	75.0	75.0	100.0
	Total	60	100.0	100.0	

government forces

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	54	90.0	90.0	90.0
	y	6	10.0	10.0	100.0
	Total	60	100.0	100.0	

if I have marshaland

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	24	40.0	40.0	40.0
	y	36	60.0	60.0	100.0

	Total	60	100.0	100.0	

if changes in coop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	30	50.0	50.0	50.0
	y	30	50.0	50.0	100.0
	Total	60	100.0	100.0	

irregularity of rain

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	i	15	25.0	25.0	25.0
	li	1	1.7	1.7	26.7
	vi	44	73.3	73.3	100.0
	Total	60	100.0	100.0	

lack of good variety

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	i	23	38.3	38.3	38.3
	li	33	55.0	55.0	93.3
	vi	4	6.7	6.7	100.0
	Total	60	100.0	100.0	

expensive inputs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	i	21	35.0	35.0	35.0
	li	4	6.7	6.7	41.7
	vi	35	58.3	58.3	100.0
	Total	60	100.0	100.0	

lack of capital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	i	14	23.3	23.3	23.3
	li	44	73.3	73.3	96.7
	vi	2	3.3	3.3	100.0
	Total	60	100.0	100.0	

Beans

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	i	1	1.7	1.7	1.7

	n	3	5.0	5.0	6.7
	y	56	93.3	93.3	100.0
	Total	60	100.0	100.0	

Legumes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	16	26.7	26.7	26.7
	y	44	73.3	73.3	100.0
	Total	60	100.0	100.0	

sweet potato

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	5	8.3	8.3	8.3
	y	55	91.7	91.7	100.0
	Total	60	100.0	100.0	

Banana

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	19	31.7	31.7	31.7
	y	41	68.3	68.3	100.0
	Total	60	100.0	100.0	

Coffee

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	25	41.7	41.7	41.7
	y	35	58.3	58.3	100.0
	Total	60	100.0	100.0	

Myself

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	y	60	100.0	100.0	100.0

Donors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	58	96.7	96.7	96.7
	u	2	3.3	3.3	100.0
	Total	60	100.0	100.0	

annual incomes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a	36	60.0	60.0	60.0
	b	7	11.7	11.7	71.7
	c	1	1.7	1.7	73.3
	u	16	26.7	26.7	100.0
	Total	60	100.0	100.0	

trainig on maize

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	30	50.0	50.0	50.0
	y	30	50.0	50.0	100.0
	Total	60	100.0	100.0	

maize production

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	31	51.7	51.7	51.7
	y	29	48.3	48.3	100.0
	Total	60	100.0	100.0	

crop rotation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	32	53.3	53.3	53.3
	u	1	1.7	1.7	55.0
	y	27	45.0	45.0	100.0
	Total	60	100.0	100.0	

inputs application

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	29	48.3	48.3	48.3
	y	31	51.7	51.7	100.0
	Total	60	100.0	100.0	

pests& diseases control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	29	48.3	48.3	48.3
	y	31	51.7	51.7	100.0
	Total	60	100.0	100.0	

cooperative management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	59	98.3	98.3	98.3
	y	1	1.7	1.7	100.0
	Total	60	100.0	100.0	

small scare project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	37	61.7	61.7	61.7
	y	23	38.3	38.3	100.0
	Total	60	100.0	100.0	

lack of land

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	11	18.3	18.3	18.3
	y	49	81.7	81.7	100.0
	Total	60	100.0	100.0	

access to finance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	18	30.0	30.0	30.0
	y	42	70.0	70.0	100.0
	Total	60	100.0	100.0	

access to services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	c	1	1.7	1.7	1.7
	n	24	40.0	40.0	41.7
	y	35	58.3	58.3	100.0
	Total	60	100.0	100.0	

Transport

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	n	52	86.7	86.7	86.7
	y	8	13.3	13.3	100.0
	Total	60	100.0	100.0	

agricultural inputs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	N	6	10.0	10.0	10.0

	y	54	90.0	90.0	100.0
	Total	60	100.0	100.0	

market information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	N	5	8.3	8.3	8.3
	Y	55	91.7	91.7	100.0
	Total	60	100.0	100.0	

extension services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	N	15	25.0	25.0	25.0
	y	45	75.0	75.0	100.0
	Total	60	100.0	100.0	

land lord

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	N	3	5.0	5.0	5.0
	y	57	95.0	95.0	100.0
	Total	60	100.0	100.0	

Landlease

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	N	56	93.3	93.3	93.3
	y	4	6.7	6.7	100.0
	Total	60	100.0	100.0	

gender task division

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	1.7	1.7	1.7
	N	59	98.3	98.3	100.0
	Total	60	100.0	100.0	

Appendix 4: Quantity produced, unit price, total revenue and Revenue apart from cooperative for cooperative members

Respondents	Quantity produced(Kg)	Unit price(RWF)	Total revenues(RWF)	Revenues apart from cooperative
1	163	195	31785	260000
2	118	195	23010	200000
3	70	195	13650	81000
4	365	195	71175	10000
5	216	195	42120	100000
6	80	195	15600	90000
7	100	195	19500	95000
8	350	195	68250	200000
9	380	150	57000	205000
10	410	150	61500	224000
11	400	190	76000	200000
12	476	190	90440	320000
13	314	150	47100	380000
14	460	190	87400	312000
15	227	195	44265	290000
16	230	195	44850	410000
17	280	180	50400	400000
18	300	190	57000	250000
19	240	190	45600	370000
20	94	150	14100	100000
21	89	160	14240	80000
22	370	195	72150	300000
23	280	195	54600	350000
24	245	150	36750	400000
25	300	195	58500	240000
26	230	195	44850	210000
27	270	195	52650	200000
28	250	195	48750	400000
29	204	195	39780	420000
30	89	195	17355	270000
31	130	190	24700	250000
32	131	195	25545	300000
33	100	195	19500	200000

34	107	195	20865	350000
35	125	195	24375	300000
36	560	150	84000	350000
37	450	150	67500	280000
38	400	195	78000	400000
39	160	150	24000	310000
40	320	190	60800	400000
41	321	150	48150	300000
42	900	150	135000	320000
43	400	150	60000	350000
44	120	195	23400	250000
45	180	150	27000	300000
46	220	195	42900	315000
47	100	195	19500	270000
48	1020	195	198900	250000
49	588	195	114660	600000
50	132	195	25740	200000
51	375	200	69000	500000
52	290	190	55100	400000
53	133	195	25935	300000
54	121	195	23595	240000
55	210	195	42315	300000
56	390	150	58500	280000
57	190	150	28500	305000
58	690	150	103500	330000
59	320	150	48000	240000
60	209	150	31350	250000

Appendix 5: Quantity produced, unit price and Total revenues for non-cooperative members

Respondents	Quantity produced(Kg)	unit price(RWF)	Total revenues(RWF)
1	175	160	28000
2	385	160	61600
3	248	150	37200
4	137	160	21920
5	57	155	8835
6	134	160	21440
7	121	160	19360
8	96	155	14880
9	456	165	75240
10	76	170	12920
11	316	165	52140
12	203	170	34510
13	93	150	13950
14	148	170	25160
15	71	170	12070
16	84	160	13440
17	620	160	99200
18	435	170	73950
19	295	160	47200
20	245	160	39200
21	235	160	37600
22	185	170	31450
23	83	170	14110
24	42	160	6720
25	308	170	52360
26	300	170	51000
27	204	175	35700
28	500	160	80000
29	600	170	96000
30	239	150	35850
31	171	170	29070
32	217	150	32550
33	306	150	45900
34	128	175	22400
35	142	170	24140

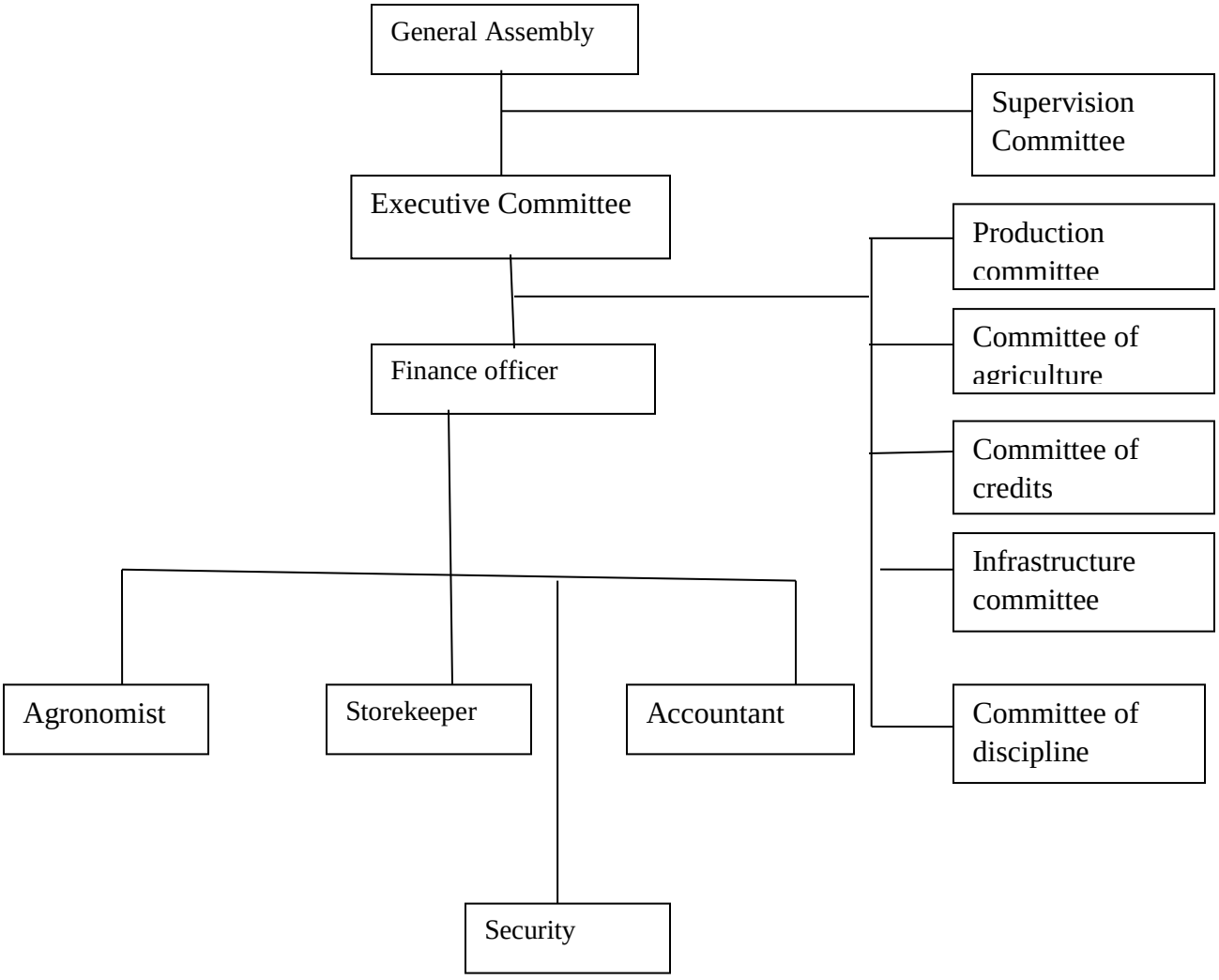
36	67	170	11390
37	292	170	490640
38	31	150	4650
39	231	170	39270
40	205	170	34850
41	120	155	18600
42	505	150	75750
43	300	140	42000
44	234	155	36270
45	217	150	32550
46	220	140	30800
47	120	160	19200
48	600	150	90000
49	303	150	45450
50	98	150	14700
51	232	160	37120
52	305	150	45750
53	76	170	12920
54	177	165	29205
55	675	160	108000
56	215	160	34400
57	406	150	60900
58	1500	150	225000
59	374	145	54230
60	137	180	24660

Appendix 6: Maize production per are

Respondents	Cooperative members production	Non-cooperative production
1	40.5	58.3
2	59	42.8
3	35	49.6
4	38.5	45.6
5	54	28.5
6	53.3	44.6
7	50	40.3
8	43.7	43
9	633	50.6
10	51.2	30.4
11	66.6	52.6
12	59.5	40.6
13	62.8	46.5
14	65	49
15	45.4	35
16	57.5	41
17	56	41.3
18	50	39.5
19	60	49
20	47	49
21	44.5	58.75
22	61.6	37
23	50.9	41.5
24	44.5	42
25	60	51
26	57.5	42.8
27	45	40.8
28	50	41.6
29	51	60
30	44.5	39.8
31	52	42.75
32	52.4	43.4
33	50	43.7
34	53.5	42.66
35	41.6	31.5
36	70	33

37	64	48.6
38	66	31
39	53.3	57.7
40	64	41
41	64	40
42	50	50.5
43	50	42.8
44	48	39
45	45	45.4
46	48.8	44
47	50	34
48	63.75	54.5
49	49	42.3
50	66	32.6
51	53.5	46.4
52	58	43.57
53	44.3	38
54	40.3	59
55	43.4	45
56	48.7	43
57	47.5	57.8
58	43.1	50
59	53.3	62.3
60	52.25	45.66

Appendix 7: Organogram of Tuzamurane Cyeza Cooperative



Appendix 8: Muhanga District Map

Appendix 9: Photo of Field Research

10