NATURE OF MAIZE VALUE CHAIN IN RWANDA AND ITS IMPLICATION ON AGRIBUSINESS PERFORMANCE

A CASE STUDY OF COOPERATIVE DE MAIZE DU RUKOMO (COMARU)

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A Thesis Submitted in Partial Fulfillment for the Requirements for the Award of Degree of Masters of Business Administration in

Project Management

SEPTEMBER 2019

DECLARATION

This Project study is my original work and has not been present to any other Institution. No part of this research should be reproduced without the author's consent or that of University of Rwanda.

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DEDICATION

To almighty God

ACKNOWLEDGEMENT

Above all, the Almighty God receives the highest appreciation and acknowledgement for sparing my life and for providing me with sufficient energy, time and wisdom to write up this project. The completion of this work is a result of efforts by different people. It is in this regard that I wish to express my appreciation to all those who directly or indirectly contributed in any way, materially, financially and morally. I especially thank University of Rwanda, my supervisor Dr Eugene RUTUNGWA for his indispensable commitment and guidance to make this work a success.

I heartedly recognize special concern of my family for their endless love, moral and psychological support which made my research possible and enjoyable. I wish to express my gratitude to my relatives, friends for their support, mentally, morally but most importantly their prayers for my success.

Thank you all

ABSTRACT

Rwanda introduced a Farm Input Subsidy Program as a pilot test with the aim to increase maize production and reduce import dependency. The research has shown that the most important issue that retarded Rwanda's agriculture development was not land size, but low productivity which was associated with traditional peasant-based subsistence farming. The formulation and adaptation of policies such as Crop Intensification Program (CIP) was intended to raise productivity of priority crops, increase the revenue in small holder farms and thereby ensure food security through sustainable intensification process and eventually improve the agriculture performance. One of the key strategies underlying the implementation of these policies was to promote commodity chains and agribusiness development. Since the implementation of these policies, there is a knowledge gap on whether this ultimate goal is being achieved and what would be the implication for smallholder farmers who constitute the majority of the farming community in Rwanda. The objective of piloting this research was to analyze the effect of maize value chain on agribusiness performance in Eastern Province in Nyagatare District. It wanted to examine the effect of maize value chain on production increment, investigate the effect of maize value chain on quality of output, determine the effect of maize value chain on profitability of COMARU and evaluate the joint effect of maize value chain on agribusiness performance in COMARU. The study used descriptive statistics including frequency and percentage for the profile of the respondents, mean and standard deviation to measure the perceptions of the respondents on each component of the study, while multiple regressions analyzes were performed to test each null hypothesis. The study population was composed of 10 cooperatives (KABOKU, RUDEMACO, KOHIIKA, CODAR, COPAMA, KOTEBARU, COAMN, KOTUKA, COMARU, CODEMACO) with 1000 members (farmers) supported by other actors including the government, Clinton Health Access Initiative (CHAI) and Africa Improved Foods (AIF). The results showed that maize value chain (input, production process, postharvest handling, and distribution process) had positive effect on production increment in agribusiness in COMARU. Production process also had positive and significant effect on quality output in COMARU agribusiness ($\beta 2 = 0.334$; $t = 2.959$; p-value= 0.004). This means that 1 unit increase in production process led to 0.334 increase in profitability of COMARU agribusiness. Postharvest handling also had a positive and significant effect on profitability of COMARU agribusiness. Finally, the results in table 4.24 indicated that maize value chain as a whole had positive and significant effect on the whole performance of COMARU agribusiness ($\beta 1 = 0.619$; $t=6.867.083$; p-value= 0.000). This means that 1 unit increase in maize value chain lead to 0.619 increase in the whole performance of COMARU agribusiness. The research conclude that the consolidation of the land by farmers, training on new farming skills, use of proper inputs with support from other actors including Government, CHAI and AIF contributed significantly to shift from substance to business oriented agriculture. The research recommended that training of farmers be emphasized, land consolidation be encouraged and markets search be enhanced.

Key Words: Agribusiness, Chain, Maize, Performance, Value.

Word Count: 49

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LIST OF ACRONYMS AND ABREVIATIONS

ADC:	Agribusiness Development Centers
AIF:	Africa Improved Food
CHAI:	Clinton Health Access Initiative
CIP:	Crop Intensification Program
CIP:	International Potato Center
COMARU:	Cooperative de Maize du Rukomo
GTZ:	German Technical Cooperation
GVC:	Global Value Chain
MINAGRI:	Ministry of Agriculture
MINECOFIN:	Ministry of Finance and Economic Planning
MINICOM:	Ministry of Commerce
RAB:	Rwanda Agriculture Board
SPSS:	Statistical Package of Social Sciences
UNIDO:	United National Industrial Organization
USAID:	United States Agency for International Development

CHAPTER ONE

INTRODUCTION

Maize is among the major staple food crops in most sub-Saharan African countries. In Rwanda the major food staples are maize, rice and cassava. These are followed by wheat, sorghum and potatoes MINAGRI report, (2010). The smallholders subsector cultivates most of the land and produces most of the food crops. This subsector is characterized by small land holdings. Maize is also the most informally traded staple commodity in Rwanda and outside, and in particular between Uganda and Tanzania, (World Food Program report, 2007). Approximately, half of the maize in Rwanda is produced in the East Province and about 60 percent of the maize is sold through manufacturing industries in Rwanda. MINICOM report (2014) indicated that informal trade accounted for at least 80% of the maize traded in the country. Smallholders agriculture in Rwanda has been characterized by low productivity attributed to loss of soil fertility, low application of inorganic fertilizers and traditional low-technology rain-fed farming systems, (Chirwa, 2007). In response to the decline in smallholders agricultural production, the Rwandan government embarked on Rwanda Agriculture Board (RAB) to support farmers. The RAB's ultimate goal was to increase the farming land, fertilizers and offer technical advice to increase production of maize and other crops. The abundance generation of maize past family nourishment necessities brought about in farmers offering of the produce on the market. It is imagined that expanded deals of maize ought to have expanded smallholders cultivate door salaries, (Rubey 2004). In 2009 Rwanda presented a Farm Input Appropriation Program as a pilot test with the point to extend maize generation and diminish import dependence.

1.1. Background to the Study

Agriculture is of paramount importance to the economies of the East African Community (EAC) countries, accounting for over 80% of total employment in 2014. However, agricultural exports are quite limited and constrained by a large informal sector. This is also the case for maize: between 70-80% of EAC maize is accessed through untaxed and unregulated channels. Globally, maize generates $219.5 billion in revenue, making it the world's third most dominant crop, next to rice and wheat. End uses depend on geographical location and food security considerations. While developed countries focus on animal feed and ethanol production, maize is mainly used for home

consumption in developing countries. The four leading grain traders (the "ABCDs") control 70-90% of globally traded grain, 1 buying and selling grain to food manufacturers, biofuel companies, and animal feed corporations. Africa's share in global maize trade was 1.5-3.5% by volume and 20% by revenue in 2013, (Jack Daly, 2017).

From 2004 to 2013, the biggest maize importers in Sub-Saharan Africa were Zimbabwe and Kenya. Kenya is a big maize consumer with a production deficit. Its processors thus have the power to lead regional chains and demand high quality commensurate with EAC or Kenyan standards. Uganda has favorable production conditions and is not a major consumer. The specificity of the Ugandan diet implies that maize is grown mostly as a cash crop. These conditions imply Uganda's potential role as a maize supplier to Kenya and other markets. Uganda and Rwanda both have a sizeable market shares in maize flour exports, but price fluctuations impair competitiveness. This has left trade to be predominantly between countries of geographical proximity. Uganda has a larger share of formal processors and traders, and surplus maize flour from Uganda is exported to the DRC and South Sudan, while Rwanda exports lower-quality flour to the DR (Jack, 2017).

According to the report of MINECOFIN report, (2000), one of the Rwandan vision 2020 pillars is "Productive high value and Market oriented agriculture". The idea came after it was realized that economic policies since independence were said to have targeted agriculture as the main engine of economic growth. However, the agriculture sector continued to perform poorly with consistently declining productivity. It is with this in intellect that it was essential to define and execute practical formative approaches that move past daydreams of practical subsistence-based agriculture (MINECOFIN Report 2000).

Though Rwanda is a small country and one of the highly populated in Arica, the research has shown that the biggest problems that retarded Rwanda's agriculture development was not the size of land but less productivity which was based on agriculture of subsistence only. The formulation and adaptation of policies such as Crop Intensification Program (CIP) was intended to raise efficiency of needed crops, increment of the income in little holder ranches and in this manner guarantee nourishment security through maintainable escalated process and eventually improve the agriculture performance. Consequently the productivity increased as different areas were

specializing in producing one particular crop that is appropriate to the area (MINECOFIN Report 2000).

Baruah (2015), of Assam Agricultural University pointed out that agriculture has evolved into agribusiness which is relatively a larger system that includes not only those involved in farming but also firms and people involved in supplying inputs (seeds, fertilizers), processing outputs, manufacturing food and food products as well as distributors and sellers who deliver to the consumers.

A study by Kedrock and Kenneth (2000) shows the efforts by Rwanda Government to create agribusiness development aimed at increasing rural household income and food security. The important phase to start with was the establishment of agribusiness development centers (ADCs) that could among other things; Progress get to the market, data gathering, innovation and capital; Help within the creation of agribusiness; Increment attractive surpluses; Lower unit costs of production, transport and marketing; and at long last Energize and encourage advancement.

The reports by both MINECOFIN and USAID suggest that agribusiness in Rwanda is still at a low level of development but with a hope to grow and develop into a more organized and developed agribusiness as it is indicated by efforts put by the Government in trying to support the project and individual Rwandan agribusiness entrepreneurs who are said to be largely risk averse with low managerial skills, a short term outlook and preference for an import substitution; though there is hope as many are bringing in new attitudes, equity and better skills.

1.2. Problem Statement

The Government of Rwanda has expressed its commitment to improve agriculture performance and is determined to transform it from traditional peasant-based subsistence farming to production of high quality and market oriented agriculture as it is one of the pillars in the national strategic plan “vision 2020”. Many agricultural policy reforms (PSTA, CIP, and NAP) have been initiated to enable the realization of this objective. One of the key strategies underlying the implementation of these policies is to promote commodity chains and agribusiness development. Since the implementation of these policies, there is a knowledge gap on whether this ultimate goal is being achieved and what would be the implication for smallholder farmers who constitute the majority of the farming community in Rwanda. But many difficulties were shown like in the case of

Musanze district where farmers claimed that getting the improved seeds and market for potatoes on time was a big issue. In this research, the researcher intends to establish whether the existing maize value chain in Nyagatare has implication on agribusiness performance, using maize cooperative (COMARU) located in Nyagatare as a case study. The research also seeks to understand whether the increased maize production really benefits small farmers in the cooperatives.

1.3. Research objectives

It is composed of the general objective and specific objectives as follow:

1.3.1. General Objective

The objective piloting this research is to analyze the effect of maize value chain on agribusiness performance in COMARU in Nyagatare District.

1.3.2. Specific Objectives

The specific objectives of this study are to:

i. Examine the effect of maize value chain (input, production process, postharvest handling, and distribution process) on production increment in agribusiness cooperative in Eastern Provide of Rwanda.
ii. Investigate the effect of maize value chain (input, production process, postharvest handling, and distribution process) on quality of outputs in agribusiness cooperative in Eastern Provide of Rwanda.
iii. Determine the effect of maize value chain (input, production process, postharvest handling, and distribution process) on profitability of the agribusiness cooperative in Eastern Provide of Rwanda.
iv. Evaluate the joint effect of maize value chain on agribusiness performance in agribusiness cooperative in Eastern Provide of Rwanda.

1.4. Research Questions

i. What is the effect of maize value chain (input, production process, postharvest handling, and distribution process) on production increment in agribusiness cooperative in Eastern Provide of Rwanda?
ii. Is there any significant effect of maize value chain (input, production process, postharvest handling, and distribution process) on quality of outputs in agribusiness cooperative in Eastern Provide of Rwanda?
iii. To what extent maize value chain (input, production process, postharvest handling, and distribution process) affect profitability of the agribusiness cooperative in Eastern Provide of Rwanda?
iv. Is there any significant joint effect of maize value chain on agribusiness performance in agribusiness cooperative in Eastern Provide of Rwanda?

1.5 Hypotheses

Based on the research objectives and questions the following null hypotheses have been formulated and tested along the study.

$H_0$1. There is no significant effect of maize value chain (input, production process, postharvest handling, and distribution process) on production increment in agribusiness cooperative in Eastern Provide of Rwanda.

$H_0$2. Maize value chain (input, production process, postharvest handling, distribution process) does not significant have effect on quality of outputs in agribusiness cooperative in Eastern Provide of Rwanda.

$H_0$3. There is no significant effect of maize value chain (input, production process, postharvest handling, and distribution process) on profitability of the agribusiness cooperative in Eastern Provide of Rwanda.

$H_0$4. There is not joint effect of Maize value chain on agribusiness performance in agribusiness cooperative in Eastern Provide of Rwanda.

1.5. Significance of the Study

Maize is one of the priority crops that the Government of Rwanda thought would be grown based on its importance in food security and the possibility to be a source of revenue to many small farmers through maize farming cooperatives. The results of this research will benefit the policy makers, farmers and subsequent researchers.

1.6 Justification of the study

The researcher chose COMARU for the following main reasons;

The Government of Rwanda identified Nyagatare District among the priority places in Rwanda where maize can be grown. This is based on the fact that the climate and soil of Nyagatare District where COMARU is located favors the growth and production of maize.

The strategic location of Nyagatare District is also important for market reasons ; in addition to local market, it would make it easy to export to other East African countries especially Uganda and Tanzania that border with this District and where a big number of their population use maize as their staple food.

1.7. Limitations of the research

The research had some limitations such as distance between the home of researcher and area of research. The researcher stays in Kigali while the research was conducted in Nyagatare District. It was demanding in terms of time and resources. The second limitation was that the transition process from traditional subsistence-oriented agriculture to market-oriented agriculture in COMARU is still at young stage and this implies that even the cooperative's documentation is not reach enough to provide all the information needed. To some extent the researcher was compelled to supplement the existing data by the information provided by the cooperative's leaders, partners through interviews as well as what was observed on ground.

1.8. Organization of the Study

The research is composed of the following chapters:

Chapter one presented the background to the study which showed the intention and efforts of the Government of Rwanda to produce high value and market oriented agriculture, the statement of

the problem, research objectives, research questions, hypotheses, justification of the study and limitations that the researcher encountered during the research.

Chapter two focused on theoretical review with reference to various sources ranging from text books, journals, reports and electronic sources relevant to the topic. It mainly focused on fundamental concepts of maize or other serials value chains and agribusiness.

Chapter three dealt with research methodology and design and the sources of data, sample size, sampling techniques. It described data collection methods; how it was collected, coded, interpreted, analyzed and presented.

Chapter four concentrated on the interpretation and analysis of collected data and presents them in relation to the research objectives.

Chapter five presented a summary of major findings of research; gave general conclusions and recommendations related to nature of maize value chain and implication on agribusiness in Rwanda using COMARU located in Nyagatare district as a case study.

CHAPTER TWO

LITERATURE REVIEW

An increase in competition in the business world has necessitated the producers to keep adding value to the commodities they produce to meet the consumers satisfactions (Levitin 2018). This on the other hand has created an opportunity for other players in business to specialize in providing the needed materials and skills necessary for value addition. The same practice is increasingly advocated in agriculture sector where many farmers today produce food not only for consumption but also for the market to earn a living. For underdeveloped countries, this practice is being encouraged as one of the strategies of poverty eradication. Companies as well as individuals have invested in the business to provide to farmers and other players involved in the food commodity distribution business, the needed materials and skills that help to add value to the agricultural products along the activity chain from farming up to delivery of agricultural products to the consumers.

In this chapter the researcher presents the theoretical review, empirical review, critical review and research gap identification and conceptual framework.

2.1. Conceptual Review

2.1.1. Value Chain

As highlighted by Ehrman (2019), a value chain is the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production, delivery to final consumers, and final disposal after use. The value chain concept also acknowledges that production must be linked to demand and the critical role of organizing the flow from farmer to consumer opportunities (Roza, 2010). Value chain comprise of companies (or individuals) that interact to supply goods and services are variously referred to as productive chains, value chains, marketing chains, supply chains, or distribution chains

Van Schalkwyk (2017), urged the value chain as "a linear map of the way in which value is added by means of a process from raw materials to finished delivered products (including services after delivery)". The value chain analysis is done with the purpose to deeply examine all activities

involved in producing a product along the chain. The activities carried out should seek to achieve the maximum value delivery at the least possible cost.

Value chain describes the full range of value-adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs, assembly, physical transformation, acquisition of required services such as transport or cooling, and ultimately response to consumer demand, (Morris, 2002). According to UNIDO (2009), value chain describes the entire range of activities undertaken to bring a product from the initial input-supply stage, through various phases of processing, to its final market destination, and it includes its disposal after use. To them, value chains encompass activities that take place at the farm or rural level, including input supply, and continue through handling, processing, storage, packaging, and distribution Owen (2018). According to Miller and Silva (2007) value chain, is the set of actors (private, public, and including service providers) and the sequence of value-adding activities involved in bringing a product from production to the final consumer. In agriculture they can be thought of as a 'farm to fork' set of processes and flows.

The value chain is a concept which can be simply described as the entire range of activities required to bring a product from the initial input-supply stage, through various phases of production, to its final market destination. Value is any activity that increases the market form or function of the product or service; and in today's business climate, there is a need to maximize the value of every process in a business (Kebea 2016). According to Jones, (2001) the term "value chain" refers to the concept that a company's chain of activities for transforming inputs into outputs with purpose to deliver value to the customers.

According to Meier (2012), value chain is a series of activities that are carried out through different phases of production aimed at producing a product or service. The activities involve physical transformation of the inputs to finished goods and services provided by various producer services, to meet consumer satisfaction. The value chains therefore link the interdependent processes that generate value for the consumer. Value chain slightly differs from the term supply chain used internationally to include every activity involved in producing and delivering a final product or service from supplier to the consumer. As such, the supply chain focuses on cost and efficiencies in the supply of goods and services from supplier to consumer while value chains puts its focus on innovation, value creation, product improvement and marketing.

2.1.2 Value Chain Concepts and Approaches

A value chain consists of all value-generating activities, sequential or otherwise, required to produce, deliver and dispose of a commodity (Schmitz, 2005). More specifically, it describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformations and the input of various producer services), to delivery to the final consumer and final disposal after use Morris, (2000). A typical chain includes all of a product's stages of development, from its design to its sourced raw materials and intermediate inputs, its distribution, and its support to the final consumer (Schmitz, 2002).

2.1.3 Value chain history and concepts

The concept of the Value Chain was made popular by Harvard University's Professor Michael Porter, (2011). The Porter Value Chain has been widely adopted by the business community as a mechanism to understand and comprehend complexity in business environments, with the ultimate goal of structuring the business to maximize its competitive advantage (Rensburg 2006).

The early analysis emphasized local economic multiplier effects of input output relations between firms and focused on efficiency gains. The later work gave the modern version of analysis an additional political economy dimension (Schmitz, 2005). A value chain is an alliance or strategic network between independent enterprises, within a (vertical) chain of activities that compete on a specific market (defined by consumers and retail outlets) and to satisfy market demands.

In more practical terms, an agricultural value chain covers all activities from input supply, production, processing, wholesale and retail to the final consumers. An organization's competitive advantage is based on their product's value chain. The goal of the company is to deliver maximum value to the end user for the least possible total cost to the company, thereby maximizing profit. Porter (1985) defined value chain as, specific type of supply chain where the actors actively seek to support each other so they can increase their efficiency and competitiveness. They invest time, effort and money, and build relationships with other actors to reach a common goal of satisfying consumer needs so they can increase their profits.

According to Morris (2001), a value chain describes the full range of activities that are required to bring a product or service from conception, through the intermediary phases of production

(involving a combination of physical transformation and the input of various producer services), delivery to final consumers and final disposal after use. Dempsey (2006) defined value chain approach as "a value chain is a supply chain "consisting of the input suppliers, producers, processors and buyers that bring a product from its conception to its end use. An effective value chain approach to development seeks to address the major constraints at each level of the supply chain rather than concentrating on just one group (e.g. producers) or on one geographical location.

Hoobs (2000), defined value chain as a vertical alliance or strategic network between a number of independent business organizations within a supply chain. The supply chain refers to the entire vertical chain of activities: from production of farm, through processing, distribution, and retailing to the consumer.

ILO (2006) defined value chain as a sequence of target oriented combinations of production factors that create a marketable product or service from its conception to the final consumption. This includes activities as design, production marketing distribution and support services up to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms, as well as a single geographical location or spread over wider areas.

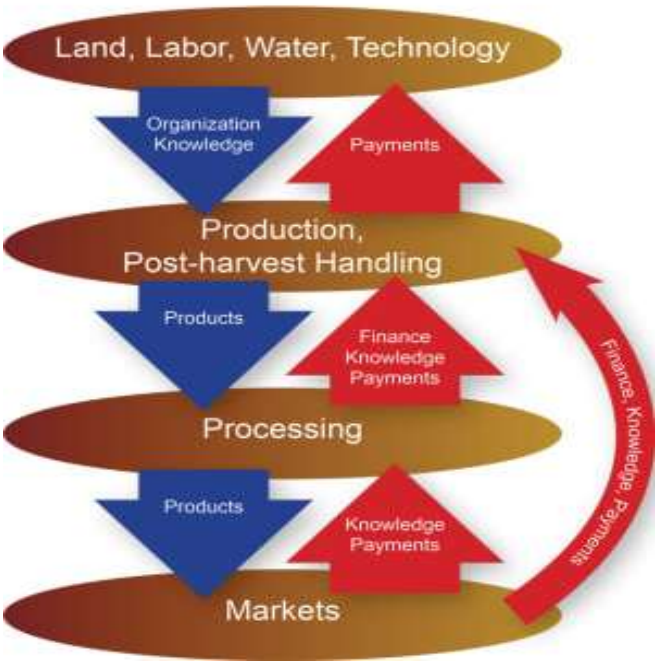
2.1.4. Agricultural Value Chains Analysis

The approach use concepts and analytical tools for analyzing the functioning of agricultural value chains are, therefore, important to understand the impact of chain development interventions on smallholders and the rural poor. Similar to the agricultural innovation systems perspective, value chain approaches help orient agricultural development thinking more towards a systems perspective (Rich 2008).

Value chain has been used to analyze the dynamics of markets and to investigate the interactions and relationships between the chain actors. The agricultural value chain approach is utilized by many development interventions that intend to engage smallholders either individually or collectively into the production of market oriented high value crops (Berhanu 2009). It is a dynamic approach that examines how markets and industries respond to changes in the domestic and international demand and supply for a commodity, technological change in production and marketing, and developments in organizational models, institutional arrangements or management techniques.

The analysis look at the value chain as a set of institutions and rules; a set of activities involved in producing, processing, and distributing commodities; and as a set of actors involved in performing the value adding activities. Value chain analysis focuses on changes over time in the structure, conduct and performance of value chains, particularly in response to changes in market conditions, technologies and policies (Morris, 2001)

Figure 1: Value Chain Overview



Source: *(Morris, 2001) Value chain chart.*

2.1.5. Value Chain Management

Value chain management is the instrument of strategic business analysis and planning that is used for coordination of the value chain components and resources (Söderholm 2015). Effective management of value chain directly affects profitability of the involved actors and satisfaction of consumers. It demonstrates the main challenges hindering development and effectiveness of agribusiness management, including land fragmentation, low availability of advanced technologies, lack of business management awareness and skills, poor organization of logistics and supply process, low opportunities of negotiating and performing agrarian marketing etc.

2.1.6 Value chain actors

These are those involved in producing, processing, trading or consuming a particular agricultural product. They include direct chain actors who are involved commercially in the chain (producers, traders, retailers, consumers) and indirect actors who provide financial or nonfinancial support service, such as bank and credit agencies, business service providers, government, researchers, and extensions (Kit, 2006).

According to the report published by GTZ report (2007), the term value chain actor summarizes all individuals, enterprises and public agencies related to a value chain, in particular the value chain operators, providers of operational services and the providers of support services. In a wider sense, certain government agencies at the macro level can also be seen as value chain actors if they perform crucial functions in the business environment of the value chain in question.

As discussed by Getnet (2009), value chain actors are those involved in supplying inputs, producing, marketing, and consuming agricultural products. They can be those that directly involved in the value chain (rural and urban farmers, cooperatives, processors, traders, retailers, cafes and consumers) or indirect actors who provide financial or non-financial support services, such as credit agencies, business service and government, researchers and extension agents.

2.1.7. Maize Value Chain in Rwanda

The report by USAID (2016), agriculture remains the centre of development program in Rwanda. The economic growth and poverty reduction lie in agricultural development. The report shows that for in the last few years there has been increase in food production largely as a result of the expansion of maize farming and to the lesser extent wheat farming and cassava recovery.

The Government of Rwanda is already implementing a set of reforms encouraging the movement of agriculture production from subsistence toward market-oriented agriculture. The next stage of development is ensuring increases in production are sustainable and that challenges relating to post-harvest handling, processing and marketing are met. Improving access to finance through the use of Maize Stocks as collateral by Supporting cooperatives become better organized and provide financial literacy training, Strengthening farmer/ processor relationship by encouraging the adoption of contract farming, Strengthening cooperatives, traders and miller cooperation to encourage bulk purchasing of maize; designing and implementing a variable stock warehouse

receipt and inventory credit system a pilot of which is already underway in Nyagatare District; among others, (MINICOM report, 2013).

2.1.8. Agribusiness

According to Söderholm (2015), agribusiness is the coordination of all activities that contribute to the production, processing, marketing, distribution, financing and development of agricultural commodities and resources. This includes food, fiber, wood products, natural resources, horticulture, and other plant and animal products and services, a business that earns most or all of its revenues from agriculture. An agribusiness tends to be a large-scale business operation and may dabble in farming, processing and manufacturing and/or the packaging and distribution of products. Agribusiness is the combination of various businesses that produce, sell, and distribute farm products, especially on a large scale.

Tegegne (2017), indicated that agribusiness include not only those that farm the land but also the people and firms that provide the inputs (for ex. Seed, chemicals, credit etc.), process the output (for ex. Milk, grain, meat etc.), manufacture the food products (for ex. ice cream, bread, breakfast cereals etc.), and transport and sell the food products to consumers (for ex. restaurants, supermarkets).

2.1.9. Components of Agribusiness

Agribusiness is made up of three components mainly: the agricultural input sector, the production sector and the processing-manufacturing sector. It is worthy to note the interrelatedness of each component because they are highly dependent on each other. Agribusiness is a broad concept that covers input suppliers, agro-processors, traders, exporters and retailers. Reiter (2019), argues that agribusiness provides inputs to farmers and connects them to consumers through the financing, handling, processing, storage, transportation, marketing and distribution of agro-industry products and can be decomposed further into four main groups:

Agribusiness inputs: Torvikey (2018), indicates that the agribusiness input sector includes all resources involved in producing farm commodities. Examples include seed, fertilizer, machinery, fuel, and credit.

Production efficiency can also be linked to improvements in these agricultural inputs. Agricultural input sector along with other management practices improves productivity of production sector while processing-manufacturing sector is insurance to production sector reducing production wastages and offering value to consumers.

The quality of seed used in farming is almost as important as the farmland being cultivated. Poor quality seeds bring poor yields, or even crops that are detrimental to animal and human health (Codeço 2017). Fertilizers are another critical input for farms. They can significantly improve soil quality, yet they remain expensive for farmers in emerging markets. Agricultural input industry for increasing agricultural productivity such as agricultural machinery, equipment and tools, fertilizers, pesticides, insecticides, irrigation systems and related equipment (Bertrand 2013).

Agribusiness outputs: Tegegne (2017), argue that the agribusiness output sector includes any agribusiness that effects on agricultural commodity between production and the consumer. Examples include transporting, selling, storing, and inspecting. Approximately 20 million people are employed in this sector of agri-business.

2.1.10. Rwanda Strategy on Agriculture Transformation

Rwandan national strategy "Vision 2020" aims at transform of Rwanda's economy into a middle income country (per capita income of about 900 USD per year). This will be achieved if the country's economy grows at a rate of 7% per year. For this growth to happen, Rwanda finds solution in "agricultural transformation from subsistence farming to market oriented modern farming" MINAGRI (2018).

MINAGRI report (2007) started "Crop Intensification Program" (CIP) that mainly targeted six priority crops, namely, maize, wheat, rice, Irish potatoes, beans and cassava. Under this program, the fragmented land has been consolidated and rearranged under "land use consolidation program" where farmers have been sensitized and joined their small portions of land to make one big land that belongs to their cooperatives that were formed by themselves. These cooperatives benefit the program by getting the improved inputs, seeds which are given free and Fertilizers that they obtain at a subsidized price (50%).

The seeds and fertilizers are imported and distributed through public-private partnership but the Government through RAB has also started preparing seeds though the quantity is still insufficient. Regular trainings of farmers on fertilizers application and modern farming is a normal practice carried out by the MINAGRI.

The implementation of the program resulted into increased production in maize and wheat where the productivity has increased six times as much. Together with this, the program is also working on linking farmers and input suppliers and markets for their harvest.

2.1.11. Agribusiness Performance

Agribusiness is an integral component of rural development and forms a part of strategy to improve regional economic development and ensure a safe food supply. Its definitions as all market and private business-oriented entities involved in production, storage, processing and distribution of agro-based products in the supply of production inputs and in the provision of services such as the extension, research, finance and agricultural policies Davis (2000), provides the link between agribusiness productivity and performance.

The global coalition for Africa conference held in Nairobi in 1999 cited that while transition processes from subsistence-oriented to market-oriented agriculture are extending economic success of those agriculture enterprises in increasingly determined by the performance and the capacity of upstream and downstream sectors after all, profound changes in the economies of almost all developing countries such as market liberalization have led to increasing levels in international competition of the local market in the recent years (Daniel 1999).

2.2 Theoretical Review

2.2.1. Value Configuration Theory

Value configuration theory builds on, extends and transforms Porter's value chain framework (1985) for the analysis and development of organization. The theory was initially motivated by problems in applying the value chain activity template to firms selling services. The theory is now also linked not only to firm-level analysis of organizational performance, but also to the analysis of industries and competitive strategies. Value configuration theory rests on the same ideas that motivated the value chain framework (Porter 1985). The basic premise is that competitive

advantage cannot be understood by looking at the firm as a whole. Performance stems from the many discrete activities that a firm performs in generating and delivering value to its customers. Activity category templates are used to analyze activities and develop means to reposition the firm. However, while Porter's initial formulation assumed that the value chain activity was applicable in all industries and all firms; value configuration theory proposes that the value chain is a good representation of one of three basic value creations. The chain represents manufacturing of physical goods with its focus on the transformation and assembly of inputs into finished goods. The other two value configurations are for problem-solving services and mediation services.

2.2.2 Social Network Theory

The social network theory views companies as embedded in a complex of horizontal, vertical and business value chain relationships with other companies and other organizations supporting inputs and services (such as advisory services, credit facilitators and transportation companies). According to network theory, relationships are not only shaped by economic considerations; other concepts like trust, reputation and power also have a key impact on the structure and duration of inter-company relationships (Uzzi 1997).

2.2.3 Governance Theory

Value chains have been seen as a conductor enhancing information flows between various actors in the chain, which has resulted to quite a number of governance debates. These governance issues have everything to do with the complexities of power relations within the chain, which determines how financial, material and human resources are allocated and flow within the chain (Laven 2011). Schmitz (2001), has outlined four key parameters that define the production process of a product. These are: What is produced, how it is produced, when it is produced and how much is to be produced.

2.2.4 Global Value Chain (GVC) Theory

GVC analysis originates from the commodity chain approach (Gereffi 1994) and investigates relationships between multi-national companies, the "lead firms", and other participants in international value chains. In this theoretical stream power relationships and information asymmetry are key concepts in the analysis of global value chains. Therefore, the focus is on

governance and upgrading opportunities in developing country value chains (Gibbon & Bair 2008).

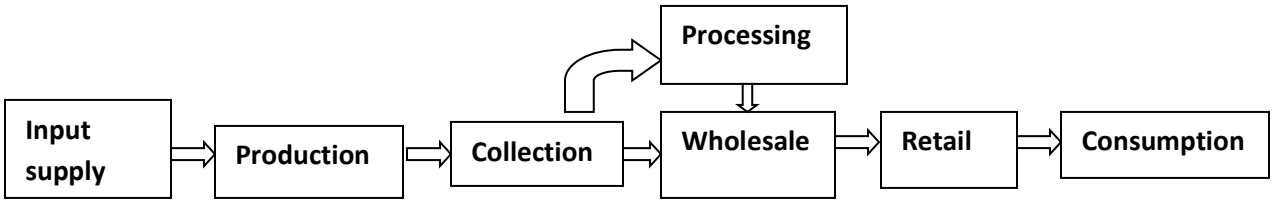
2.2.5 Upgrading Theory

According to Kaplinsky and Morris (2001), the value chain describes the full range of activities that are required to bring a product from its conception to its end use and beyond. This includes activities such as design, production, marketing, distribution and support to the final consumer. These activities can take place within a firm or among different firms in one or several geographical locations. This characteristic of physically transforming products over time and their distribution over geographical locations is known as input-output relations.

2.3. Theoretical Framework

In this study all the reviewed theories support it. Thus, the theoretical framework is composed of all these theories since the play a significant support to the findings of the study.

Figure 2: Mapping the Value Chain



***Source**: Jim Woodhill, Chain –Wide learning for inclusive Agrifood Market Development, 2010*

The map comprehensively shows the various player and undertakings as much as the external influencers that will determine the nature of business conducted at the technology transfer, business farming and other operational platforms.

2.4. Empirical Review

A study by Gwara (2011) has tried to analyze the factors influencing maize production, productivity and profitability in Zimbabwe. The study comprehensively evaluated the responsiveness of maize supply chain to price and non-price determinants. Analysis was applied to time series maize data from 1980 to 2007. Results of his analysis proved that prices were not significant in explaining maize productivity variability. The result implied that the pricing system alone is and could not be the single critical instrument to influence maize price supply and

profitability in Zimbabwe. It suggested that other factors could be important in explaining variation in productivity and production of maize. Other non-price factors such as credit allocation and access, rainfall, consumption and area put under maize were found to significantly affect maize supply response. Given the findings from the comprehensive study in Zimbabwe, the study recommended policies that focus more on non-price factors as a means of doing away with strong emphasis on maize pricing as ways of stabilizing maize production especially from the smallholder sector in Zimbabwe.

In Kenya, a study by Onono (2013), on response of maize production to economic incentives that include; higher producer prices, subsidization of inputs, provision of agricultural credit, research and extension services, construction and maintenance of roads, development of irrigation and water systems and other legislative, institutional and macroeconomic reforms found that maize production responds positively to both price and non-price factors.

A similar study from neighboring country, Malawi by Chaweza (1996) carried out a study on factors influencing agricultural output response using coffee as the target crop. In his study he hypothesized that coffee price from the previous season, wage rates abroad in the previous year, and price levels of cash goods in the previous year; determine the level of coffee production. Results of his study made him to conclude that coffee price and price of cash goods are significant determinants of coffee supply response.

In a similar country Malawi, a study by Tchereni (2013), both price and non-price factors were found to influence maize supply response. The results indicated that farmers allocate land to export crops mainly basing on their previous allocation pattern rather than relative crop prices and foreign income only.

A similar study in Ohio State Nigeria analyzed the factors affecting quantity of maize supplied. Using a randomly selected sample of 400 maize farmers, results of the analysis showed that marketing costs contributed significantly to agricultural household supply decisions.

2.5. Gap in Literature

The study done by International Fund for Agricultural Development IFAD report, (2015) on consortium approach in value chain development the results of the approach catalyze the

involvement of actors in a more integrated manner which generate better competitiveness, enhanced efficiency, capture more value and improve growth which address the challenges of meeting end-users interest, increased investment in skills and knowledge, working capital requirements, technology, warehouse system to which the attainment of these investments are not only costly for individual farmer(s) in a value chain, but can be undertaken if there is assurance for supply of quality inputs, produce and provision of support services as well as market. This creates the need to strengthen the commitment amongst actors in value chain and contract seeks to be a valuable option. The approach integrates actors in a collaborative manner to increase competitiveness, increase efficiencies, capture more value, gain transaction cost savings.

The research done by Tiriongo (2004), on value chain effect on agribusiness performance found out that it evidently emerged that agribusiness cooperative in Mt Elgon face a number of infrastructural constraints which hamper growth of their industry despite the high potential of the area. Poor record keeping reported as the most pressing problem by 143 of the 150 respondents who lack basic training in what may be considered the lifeline of most businesses. Other problems in order of magnitude are poor management arising from traditional farming and methods which lack efficiency, lack of marketing information and too much competition arising from duplication of production and distribution channels.

Back on the case study of Rwanda, the study done by MINAGRI report, (2010) conducted in Northern Province on potatoes value chain in Musanze found out that even if the Government of Rwanda helped the farmers to get the improved potatoes seeds through RAB, it was noted that RAB delayed to supply those improved seeds to the farmers. This created controversy between the farmers in the cooperative and the buyers, where the most problem was the real price from the farmers.

So, after analyzing some of those issues in commodity value chain that affect the Agribusiness sector on potatoes, and find out that there is no other research done on maize value chain, the researcher came out with the research gap to find out the nature of existing maize value chain and see whether it benefits small farmers and also assess the impact of private actors in maize value chain in cooperatives like COMARU such as Africa Improved Food (AIF) and Clinton Health Access Initiative to help the farmers and Government to achieve on the cooperatives targets on

value chain management which will have an impact to step forward from agriculture of subsistence to the Agribusiness.

2.6. Conceptual Framework

The study intends to adopt the mapping value chain that reflects Rwanda's maize value chain. This mapping of value chain was chosen to be used for the research as it demonstrates all the activities carried out along the chain. Each activity starting with input supplies up to delivery to the consumer, involves many players ranging from input providers to processors of maize flour and other maize products and finally the distributors and sellers who bring the output to consumers. The interaction of players in the activities facilitated the analysis and demonstrated by the nature of maize value chain in COMARU and its implication for agribusiness in Rwanda.

The research was conducted COMARU located in Nyagatare District and the survey targeted the selected actors in maize value chain.

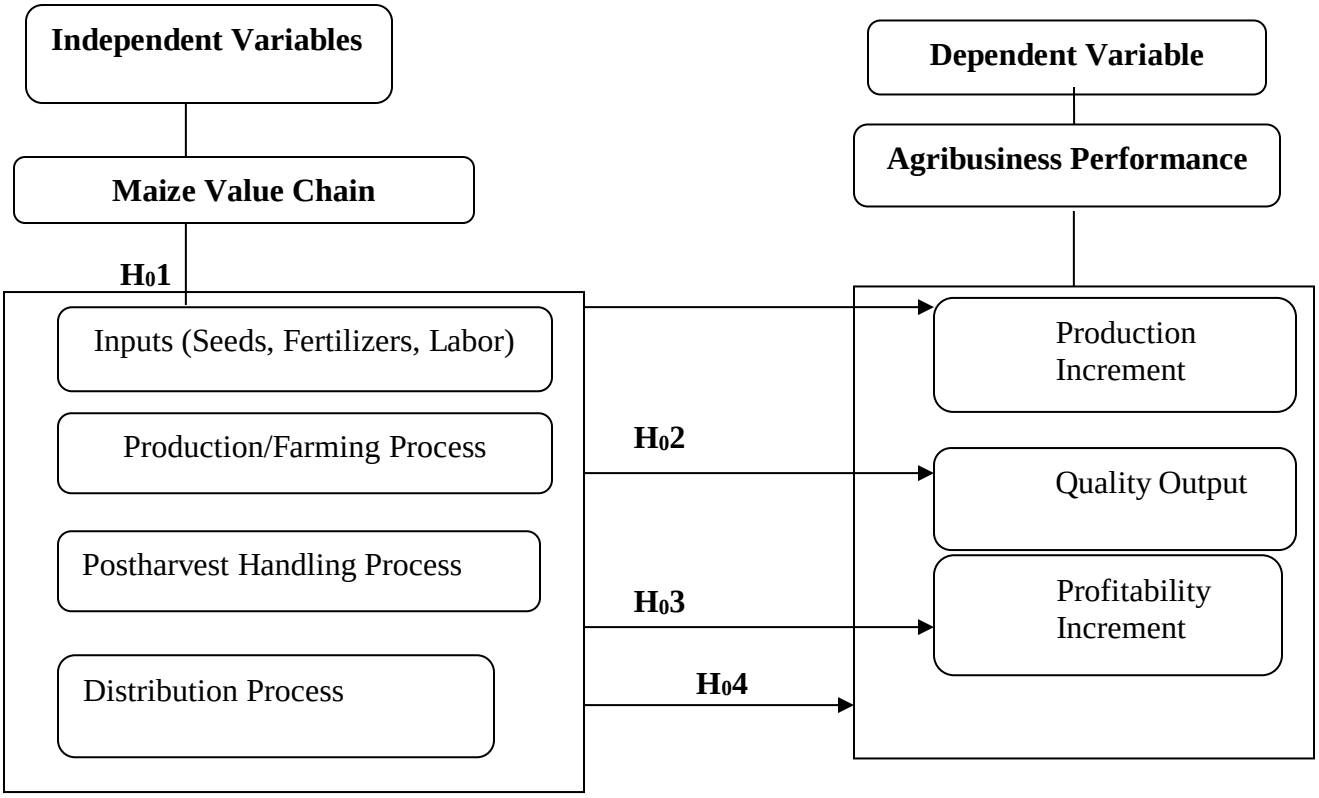


Figure 3: Conceptual Framework

Source: Researcher (2019)

Inputs (Improved seeds, fertilizers, labor): The acquisition of input materials used like seeds, fertilizers, labor was facilitated by the actors (CHAI and AIF) where CHAI provided trainings in good agriculture practices including maize growing, field cooperative management, post harvest handling, as well as organizing study tours and workshops.

Production: Farming is carried out by the small farmers who organized themselves into a cooperative. Clinton Health Access Initiative (CHAI) assists this cooperative in improving the quantity and quality of their production by providing capacity building through workshops, field practices and study tours.

Postharvest handling: Apart from capacity building, CHAI also assisted the cooperative by providing post harvest materials like sheets and tarpaulins. In addition to this, CHAI also assists in mobilizing markets for COMARU harvest (maize grains) by connecting the cooperative to African improved Foods Company (the buyer). The cooperative also got assistance of storage facility, a store built by Rural Sector Support Project (RSSP). The cooperative meets all the costs involved in running their business including inputs, post handling and distribution costs.

Distribution: The distribution channel of the maize production of COMARU is covered by buyer and the processor (AIF) which transports the maize grains in a professional manner to ensure that the quality of maize to be processed is maintained.

CHAPTER THREE

METHODOLOGY

Bailey (1978) defined the term methodology as the philosophy of the research process. This incorporates suspicions and values that serve as method of reasoning and the measures of the inquired about employments for data collection, translating and researching conclusions. According to Kevin (2000), the scientific method is the method that seeks to test thoughts against reality in disciplined manner with each step in the process made explicit. This study covered the research design, the target population, the sample size, the sampling strategies, the data collection instruments and administration, the data management, the data analysis, the validity and the reliability of the research instruments and ethical considerations.

3.1. Research Design

The researcher employed survey data collection methods to analyze the effect on maize value chain variables on agribusiness performance using COMARU as a case study. The Interview guide was used to collect qualitative data for further analysis which validated the results from the questionnaire. In this process, the researcher collected information from leaders of the selected cooperative and the players in the maize value chain and agribusiness in the cooperative. This intended to have the approaches that complement each other in eliciting the truth. The study used descriptive statistics including frequency and percentage for the profile of the respondents and mean and standard deviation to measure the perceptions of the respondents on each component of the study, while multiple regression analyzes were performed to test each null hypothesis.

3.2. Target Population of the study

Grinnell (1990), characterized population as totality of people or objects, which the research is concerned with. It may be a bunch of person or a body of individuals or any collection of things beneath thought from which tests are taken for estimation. The study population was composed of 10 cooperatives (KABOKU, RUDEMACO, KOHIIKA, CODAR, COPAMA, KOTEBARU, COAMN, KOTUKA, COMARU, CODEMACO) with 1000 members (farmers) supported by CHAI and AIF.

3.3. Sampling Techniques and Sampling size

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). The method was found suitable for the study since our population was classified in different players. COMARU and other 10 players were selected purposively to demonstrate the genuine results. Therefore, a sample size is composed of 78 members of COMARU, 5 staff from Clinton Health Access Initiative (CHAI) and 5 staff from Africa Improved Food (AIF), which means that the total sample size was 88 respondents.

3.4. Data Collection Instruments

3.4.1 Questionnaire

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, (Zikmund, 2003). For academic and non-academic purposes, surveys are the foremost common and well known apparatuses to assemble information from an expansive number of individuals. A well-constructed and organized survey can be an effective device to educate the quality of research assessment. The questionnaire comprises of a constrained number of questions that inquire members their discernment or rate the adequacy of different perspectives of exercises (Cooper, 2006).

In order to realize this research work, the researcher used a questionnaire. The questionnaire was in three sections, A, B and C. Section A inspected the profile of respondents, sec B concentrated on maize value chain, section C investigated the performance and partners contribution. Close questions were used to get the direct information from respondents. Secondary data were obtained from documents and reports and interviews were also conducted.

The research investigate was a perceptual-based study; consequently a questionnaire was embraced and balanced for this inquire about work. The questionnaire used in this study was adapted from previous studies.

3.4.1.1. Validity and Reliability

Reliability and Validity as sighted by Asemah, *et al.,* (2012) is the exactness or truthiness of estimation in average to approve instrument in connection to the goals and inquire about questions.

3.4.1.2. Validity

Validity as said by Robinson (2002) is the degree to which result gotten from the analysis of the data really speaks to the phenomenon under the study. It is utilized to guarantee that the researcher measures what was intended to be measured. The questionnaire used was validated by research experts such as the Supervisor of this study, Dr. Eugene Rutungwa who validated the content validity and other lecturers of UR- CBE, while the face validity was performed by the researcher.

3.4.1.3. Reliability

Reliability refers to measures of the degree to which the responses to the survey are steady and thus demonstrating reliable outcomes. The questionnaire was tested for reliability using the Cronbach Alpha Coefficients after the pilot study done Duterimbere cooperative of Nyamagabe Farmers and the results of Cronback Alpha Coefficients were between 0.78-.901 for the variables used in this study.

3.4.2. Administration of Data Collection Instruments

3.4.2.1 Administration of Questionnaire

The researcher utilized the techniques of presenting the questionnaire to those who were chosen to respond to the questions and choose it after filling. The questionnaires were presented to them in difficult duplicate; respondents responded to the questions and wrote the answers in the space given. The research sometimes used Kinyarwanda (local language) to ensure that respondents who do not use English are brought on board. This procedure was used since it gives respondents the time to reply correctly. It also gives the researcher to gather more information in a short time.

3.4.2.2. Personal Interview

According to Campion (1994), an interview is a discussion between two individuals (the interviewer and the interviewee) where questions are inquired by the interviewer to get data from the interviewee. The main task in interviewing is to get the meaning of what is the interviewee's connection to the issue beneath examination (Kvale, 1996). A personal interview was included

into the study since it is accommodating to induce the story behind the cooperative's leaders experience. This strategy was supportive in seeking in-depth data around the subject. The strategy included holding face-to-face verbal communications whereby the researcher inquired from the respondent's information planed to inspire data or conclusions.

3.5. Data Analysis Procedures

Wanyama (1982) states that analyzing and handling information; the researcher made a bunch of information and handled them in an assortment of ways in arrange to appear what they were significant and to encourage their elucidation. The data which gotten from the field through the questionnaire analyzed utilizing the (SPSS) and were displayed within the frame of tables and figures. Particularly, the research was conducted by the use of the frequency and percentages of the reactions on the questionnaire items, while multiple regression models or econometric models where used to provide empirical findings of this study.

3.6 Econometric Models Specification

This section concerns the formulation of the econometric models that are used in testing the null hypotheses of this study.

$PRI = \beta 0 + \beta 1INP + \beta 2PRP + \beta 3PHH + \beta 4DSP + \varepsilon$ Estimated Model 1

$QUP = \beta 0 + \beta 1INP + \beta 2PRP + \beta 3PHH + \beta 4DSP + \varepsilon$ Estimated Model 2.

$PROF = \beta 0 + \beta 1INP + \beta 2PRP + \beta 3PHH + \beta 4DSP + \varepsilon$ Estimated Model 3.

$PERF = \beta 0 + \beta 1\ MVC + \varepsilon$ Estimated Model 4.

Where, the dependent variables are set as follows:

PRI= Production Incremental

QUO= Quality of Outputs

PROF = Profitability

PERF = Performance

And the independent variables are also set as follows:

MVC= Maize Value Chain

INP= Input Process

PRP= Production Process

PHH= Postharvest Handling

DSP= Distribution Process

and $\beta 0$= Constant, $\beta 1$- $\beta 4$ are coefficients of determinations which indicate individual effect of each independent variable to each component of agribusiness performance and ε= error term representing the value of other variables that affect agribusiness performance.

3.7 Ethical Considerations

Malhotra (2006) observed that moral thought incorporate cultured assent, intentional cooperation, doing no hurt to the respondents, secrecy and selecting the respondents reasonably. The researcher clarified the reasons of the study and sought formal authorization. After getting the clearance from appropriate authorities, the researcher sought the assent from the respondents by the use of the letter that introduced the study. The letter was accommodating in guaranteeing respondents that the data collected from them was intended to be used for scholastic purposes. Further, the respondents were guaranteed the secrecy of any information given and they were informed not to indicate their names.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION OF FINDINGS

This chapter presents data collected from the field and their presentation. The data were also obtained from interviews and reports of COMARU.

4.1. Section A: Presentation of Profiles of the Respondents

The purpose of this is showing the identity of respondents intended to clarify that the information for research was collected from different age groups; marital status and gender and education backgrounds.

4.1.1 Distribution of Respondent's Responses According to Gender

This sub section analyzes the gender of the respondents that participated in this study.

Table 4.1: Distribution of Respondent's Responses According to Gender

		Frequency	Percent (%)
Valid	Female	53	68
	Male	25	32
	Total	**78**	**100.0**

Source Primary data June, 2019

Table 4.1, indicates that female make 53% of the respondents while 25% is composed of males. This indicates that in COMARU females make a bigger percentage which implies that females make a big percentage of those involved in farming in Rwandan villages, identified as small farmers.

4.1.2 Distribution of Respondent's Responses According to Age

This sub section analyzes the age of the respondents that participated in this study.

Table 4.2: Distribution of Respondent's Responses According to Age

		Frequency	Percent (%)
Valid	20-30	9	11.5
	31-40	40	51.2
	41-50	25	32
	51 and above	4	5
	Total	**78**	**100.0**

Source Primary data June, 2019

From the table 4.2 the majority of small farmers in COMARU are found among 31-40 age which means that it is a group of people who are stable and take agriculture as priority. The second large group involved in maize farming is that between 41-50, this shows the group this considers agriculture their career. Age between 20-30 ranks the third because most youth in that age are still trying life elsewhere while others are still at school. The last group involved in agriculture is 51 and above, this is because most of people in this group are not energetic to get involved in agriculture which needs people with energy to work in firms.

4.1.3 Distribution of the Respondents by Education Level

This sub section analyzes the level of education of the respondents that participated in this study.

Table 4.3: Distribution of the respondent's responses according to Education level

		Frequency	Percent (%)
Valid	PhD	0	0
	Master degree	0	0
	Bachelor Degree	2	2.5
	Secondary Certificate	11	14.1
	Primary Certificate	57	73.1
	None education	8	10.2
	Total	**78**	**100.0**

Source Primary data June, 2019

Table 4.3, indicates that as far as education of respondents is concerned, those with primary school education make 73.1%, the biggest percentage of farmers in COMARU. This is followed by those with secondary education, 14.1%; those with no education, ranks the third with 10.2% and the last is those with university education with 2.5% of farmers. These results indicate that some of those with university education in the cooperative are the leaders of the cooperative and they have a vision to transform agriculture from subsistence farming to business oriented farming. As the level education reduces the number of small farmers increases, this shows that they take agriculture as a source of income and mostly depend on agriculture for making a living.

4.1.4 Respondents' Experience Working in Cooperatives

This sub section analyzes the working experience of the respondents that participated in this study.

Table 4.4: Respondents' experience working in/with cooperatives

		Frequency	Percent (%)
Valid	One year	8	10.2
	Two years	17	21.7
	Three years	28	35.8
	Four years and above	25	32.1
	Total	**78**	**100.0**

Source Primary data June, 2019

Table 4.4 Indicates that the highest percentage, 35.8% of those involved in agriculture have three years experience; it is followed by those of four year experience, 32.1%; it is followed by those of 21.7% which is two years; one year of experience is the lowest with 10.2%. This shows that the number of those interested in agriculture is increasing every year which means that the profit made by those in agriculture attracts more people every year. This is an indicator that more people are likely to join agriculture sector as it transforms from traditional to business oriented agriculture.

4.2. Section 2. Maize value chain

This section analyses the perceptions of Respondents on maize value chain which include Inputs, Production/ Farming, Post-harvest Handling and Distribution processes in COMARU.

4.2.1 Perceptions of the Respondents on Inputs

Maize value chain starts with the evaluation of the used inputs in process of farming. Therefore, this section shows the results on each statement evaluated by the respondents.

Table 4.5: Perceptions of the Respondents on Inputs

Statements	N	Mean	Std. Deviation
The cooperative gets seeds on time	78	4.95	.222
The cost of seeds is affordable.	78	4.92	.268
The labor cost is affordable/cheap since cooperative members are more involved.	78	4.24	.928
The cooperative gets good quality of fertilizers.	78	4.42	.655
The fertilizers are affordable to the cooperative.	78	4.72	.622
Overall Mean		**4.65**	

Source: Primary Data (2019)

The results from Table 4.5 indicated that the respondents agreed with a mean of 4.95 with standard deviation of 0.222 indicating that the respondents had the same views on use of inputs in farming process. The second statement was “The cost of seeds is affordable" where the respondents also agreed with a mean of 4.92 and standard deviation of 0.268 where they also have common answers on the statement. The third statement evaluated was " The labor cost is affordable/cheap since cooperative members are more involved" had a mean of 4.24 indicating that the respondents agreed with the statement but had heterogeneous answers as indicated by a standard deviation of 0.928. The fourth statement evaluated was “The cooperative gets good quality of fertilizers", where the respondents agreed with a mean of 4.42 and standard deviation of 0.655 which indicated that the respondents had different views on this statement. The fifth statement evaluated was “The fertilizers are affordable to the cooperative" where the respondents agreed with a mean of 4.72 and standard deviation of 0.622 indicating that the respondents had different views on the statement. Generally, the COMARU members have strongly agreed with an overall mean of 4.65 indicating that there is a high use of inputs in farming of the cooperative.

4.2.2 Perceptions of the Respondents on Production/Farming Process

This section shows the answers of the respondents on production/farming process of the COMARU.

Table 4.6: Perceptions of the Respondents on Production/Farming Process

Statements	N	Mean	Std. Deviation
The cooperative has qualified famers.	78	4.46	.697
The cooperative trained its workers in farming.	78	4.53	.503
The cooperative has been consolidated and well prepared for planting.	78	4.29	.839
Seeds planting are done in time after seasonal studies.	78	4.42	.694
Harvest is properly done and farmers are trained to handle harvesting process.	78	4.67	.474
Overall Mean		**4.474**	

The results from Table 4.6 indicated that the respondents agreed with a mean of 4.46 with standard deviation of 0.697 indicating that the respondents had the same views on The cooperative has qualified famers. The second statement was “The cooperative trained its workers in farming “where the respondents also agreed with a mean of 4.53 and standard deviation of 0.503 where they also have common answers on the statement. The third statement evaluated was “The cooperative has been consolidated and well prepared for planting" had a mean of 4.29 indicating that the respondents agreed with the statement but had heterogeneous answers as indicated by a standard deviation of 0.839.

The fourth statement evaluated was “Seeds planting are done in time after seasonal studies", where the respondents agreed with a mean of 4.42 and standard deviation of 0.694 which indicated that the respondents had different views on this statement. The fifth statement evaluated was "Harvest is properly done and farmers are trained to handle harvesting process" where the respondents agreed with a mean of 4.67 and standard deviation of 0.474 indicating that the respondents had different views on the statement.

Generally, the COMARU members have strongly agreed with an overall mean of 4.474 indicating that there is a high organized level of farming process in COMARU.

4.2.3 Perceptions of the Respondents on Postharvest Handling Process

This section shows the perceptions of the respondents on postharvest handling process in COMARU.

Table 4.7: Perceptions of the Respondents on Postharvest Handling Process

Statement	N	Mean	Std. Deviation
The cooperative has equipped warehouse/stock.	78	4.87	.336
The cooperative has drying equipment/materials that take care of the harvest.	78	4.81	.457
The workers in the cooperative are trained in handling the harvest (Maize).	78	4.55	.526
Overall Mean		4.74	

The results from Table 4.7 indicated that the respondents agreed with a mean of 4.87 with standard deviation of 0.336 indicating that the respondents had the same views on statement which says "the cooperative has equipped warehouse/stock". The second statement was "The cooperative has drying equipment/materials that take care of the harvest" where the respondents also agreed with a mean of 4.81 and standard deviation of .457 where they also have common answers on the statement. The third statement evaluated was "The workers in the cooperative are trained in handling the harvest (Maize)" had a mean of 4.55 indicating that the respondents agreed with the statement but had heterogeneous answers as indicated by a standard deviation of 0.526.

Generally, the COMARU members have strongly agreed with an overall mean of 4.74 indicating that there is a high understanding level of production process or farming in this cooperative.

4.2.4 Perceptions of the Respondents on Distribution Process

This section shows the perceptions of the respondents on distribution process in COMARU. The following table indicates the results.

Table 4.8: Perceptions of the Respondents on Distribution Process

Statements	N	Mean	Std. Deviation
The cooperative has the capacity of packaging its products.	78	4.68	.497
The product stored is highly protected in the cooperative warehouse.	78	4.77	.623
Overall Mean		**4.73**	

The results from Table 4.8 indicated that the respondents agreed with a mean of 4.68 with standard deviation of 0.497 indicating that the respondents had the same views on the cooperative capacity

of packaging its products. The second statement was “The product stored is highly protected in the cooperative warehouse" where the respondents also agreed with a mean of 4.77 and standard deviation of 0.623 where they also have common answers on the statement.

Generally, the COMARU members have strongly agreed with an overall mean of 4.73 indicating that there is a good distribution process in the cooperative.

4.2.5 Perceptions of the Respondents on Production Increment

This section shows the respondents views on the production incremental as a result of maize value chain.

Table 4.9: Perceptions of the Respondents on Production Increment

Statements	N	Mean	Std. Deviation
From the year 2016 till to date the production of the cooperative has increased.	78	4.86	.350
The cooperative partners have also increased and funded its production process through training in farming.	78	4.28	.788
The products are in highly demand by the manufactures of maize products.	78	4.62	.825
Overall Mean		**4.59**	

Source: Primary Data (2019)

The results in table 4.9 shows that the respondents strongly agreed with the first statement that says " From the year 2016 till to date the production of the cooperative has increased", this is evaluated by a mean of 4.86 and standard deviation of .350 where the respondents had the same views. The second statement was " The cooperative partners have also increased and funded its production process through training in farming", this is indicated by a mean of 4.28 and standard deviation of .788 which indicated the heterogeneous answers. The last statement was " The products are in highly demand by the manufactures of maize products" where the respondents agreed with a mean of 4.62 and standard deviation of 0.825.

Generally, the respondents agreed with a mean of 4.59 that COMARU is very profitable.

4.2.6 Perceptions of the Respondents on Quality of Output

This section shows the respondents perceptions on quality of production outputs as a result of maize value chain. The following table provides empirical descriptive results.

Table 4.10: Perceptions of the Respondents on Quality of Output

Statements	N	Mean	Std. Deviation
The cooperative's quality maize has improved.	78	4.82	.477
The cooperative has trained staff in planting.	78	4.73	.475
There's high quality in production process of maize in cooperative.	78	4.03	.852
There's quality in procedures of maize handling.	78	4.18	.575
There's quality in storing the products.	78	4.55	.677
Products reach customers (manufactures) in good transport means.	78	4.65	.479
Overall Mean		**4.50**	

Source: Primary Data (2019)

The results from Table 4.10 indicated that the respondents agreed with a mean of 4.82 with standard deviation of 0.477 indicating that the respondents had the same views on statement which says "The cooperative's quality maize has improved". The second statement was "The cooperative has trained staff in planting" where the respondents also agreed with a mean of 4.73 and standard deviation of 0.475 where they also have common answers on the statement. The third statement evaluated was " There's high quality in production process of maize in cooperative" had a mean of 4.03 indicating that the respondents agreed with the statement but had heterogeneous answers as indicated by a standard deviation of 0.852. The fourth statement was "There is quality in procedures of maize handling" where the respondents agreed with a mean of 4.18 and standard deviation of 0.575 where the respondents had heterogeneous answers on the statement.

The fifth statement was "There's quality in storing the products", this was accepted by the respondents with a mean of 4.55 and standard deviation of .677 indicating that the respondents had different views on the statement. The last statement was "Products reach customers (manufactures) in good transport means", this was agreed by the respondents with a mean of 4.65 and standard deviation of 0.479 indicating the same understanding.

Generally, the COMARU members have strongly agreed with an overall mean of 4.50 indicating that there is a high production process or farming in this cooperative.

4.2.7 Perceptions of the Respondents on Profitability of COMARU

This section shows the results on the respondents' perceptions on COMARU profitability. The following table shows the empirical evidence.

Table 4.11:Perceptions of the Respondents on Profitability of COMARU

Statements	N	Mean	Std. Deviation
The sales revenue of the cooperative product (maize) has increased in last five (5) years.	78	4.08	1.365
The costs of cooperative are cheaper than selling price.	78	4.47	.801
Cooperative members send their children to school and get school fees from the income they generate from cooperative.	78	4.31	.588
Cooperative members are able to pay medical insurance for their families using income they get from their cooperative.	78	4.06	.651
Cooperative members have constructed or acquired shelter using income from their cooperative.	78	4.47	.528
Cooperative members are equipped with saving culture in microfinance institutions (SACCO).	78	4.29	.512
Cooperative members have invested in other income generating projects.	78	4.18	.503
Overall Mean		**4.27**	

Source: Primary Data (2019)

The results from Table 4.11 indicated that the respondents agreed with a mean of 4.08 with standard deviation of 1.365 indicating that the respondents had different views on statement which says “The sales revenue of the cooperative product (maize) has increased in last five (5) years". The second statement was “The costs of cooperative are cheaper than selling price" where the respondents agreed with a mean of 4.47 and standard deviation of .801 where they also have common different views on the statement. The third statement evaluated was " Cooperative members send their children to school and get school fees from the income they generate from cooperative" had a mean of 4.31 indicating that the respondents agreed with the statement but had heterogeneous answers as indicated by a standard deviation of .588. The fourth statement evaluated was “Cooperative members are able to pay medical insurance for their families using income they

get from their cooperative", this was accepted by respondents with a mean of 4.06 and standard deviation of .651 which indicated that there is heterogeneous answers.

The fourth statement was "Cooperative members have constructed or acquired shelter using income from their cooperative." where the respondents agreed with a mean of 4.47 and standard deviation of .528 where the respondents had heterogeneous answers on the statement. The fifth statement was "Cooperative members are equipped with saving culture in microfinance institutions (SACCO)", this was accepted by the respondents with a mean of 4.29 and standard deviation of .512 indicating that the respondents had different views on the statement. The last statement was "Cooperative members have invested in other income generating projects", this was agreed by the respondents with a mean of 4.18 and standard deviation of .503 indicating the same understanding. Generally, the COMARU members have strongly agreed with an overall mean of 4.27 indicating that there is a high level of profitability in farming of this cooperative.

4.2.8 Perceptions of the Respondents on Partners' Contribution

This section shows the perceptions of the respondents on COMARU partners' contribution. The following table indicates the findings on this section as follows:

Table 4.12: Perceptions of the Respondents on Partners' Contribution

	N	Mean	Std. Deviation
The cooperative has received different government intervention (physically and financially).	78	4.29	.758
The cooperative has benefited training from Clinton Health Access initiative (CHAI).	78	4.14	.679
The cooperative has received workshops, tours that enabled capacity building from CHAI	78	4.03	.683
The partners negotiated market for the cooperative.	78	3.53	1.214
Cooperative buyers have partnered in quality insurance of maize.	78	3.86	1.374
Overall Mean		**3.97**	

Source: Primary Data (2019)

The results from Table 4.12 indicated that the respondents agreed with a mean of 4.29 with standard deviation of 0.758 indicating that the respondents had different views on statement which says " The cooperative has received different government intervention (physically and

financially)". The second statement was "The cooperative has benefited training from Clinton Health Access initiative (CHAI)." where the respondents agreed with a mean of 4.14 and standard deviation of 0.679 where they also have common different views on the statement. The third statement evaluated was "The cooperative has received workshops, tours that enabled capacity building from CHAI" had a mean of 4.03 indicating that the respondents agreed with the statement but had heterogeneous answers as indicated by a standard deviation of .683. The fourth statement evaluated was " The partners negotiated market for the cooperative", this was accepted by respondents with a mean of 3.53 and standard deviation of 1.214 which indicated that there is heterogeneous answers.

The last statement was "Cooperative members have invested in other income generating projects", this was agreed by the respondents with a mean of 3.86 and standard deviation of 1.374 indicating the same understanding.

Generally, the COMARU members have strongly agreed with an overall mean of 3.97 indicating that there is a high level of partners contribution to farming of COMARU.

From the interview the Clinton Health Access Initiative (CHAI) is one of the players that supported COMARU to transform from traditional maize farming to market oriented farming. This organization assisted COMARU in different areas including capacity building through trainings on farming skills like planting maize on line, spacing maize, applying fertilizers, using improved seeds; it also conducted workshops, field practices tours.

Apart from capacity building, CHAI offered to COMARU post harvest handling materials like drying sheets and tarpaulins. CHAI further negotiated the market and influenced the signing of the contract between COMARU and the buyer of it products, Africa Improved Foods (AIF). This requires more efforts for the cooperative to supply maize constantly to AIF as per contract.

Africa Improved Foods buys maize from different farmers including COMARU but despite being the buyer, AIF makes sure it makes follows up of the maize production from the field until it is delivered for processing. This is in line with efforts to ensure the quality of maize from the field, past harvest handling, packaging until it is ready for transportation and processing. This is to make sure that maize produced meets the required standards which must be monitored throughout the chain.

4.3 Testing Hypotheses

This section aims at providing statistical evidence about the test of null hypotheses that have been set in introduction.

4.3.1. Testing Null Hypothesis One

$H_0$1. There is no significant effect of maize value chain (input, production process, postharvest handling, distribution process) on production increment in agribusiness cooperative in Eastern Provide of Rwanda.

Table 4.13: Model Summary One

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.468[a]	.219	0.176	.48799

a. *Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process*

The results in Table 4.13 indicated that the maize value chain variables contribute 0.176 representing 17.6% change in production increment of agribusiness cooperative COMARU. This indicated that 82.4% change in production increment comes from other variables that are not studied. This is indicated by the Adjusted $R^2 = 0.176$.

Table 4.14: ANOVAa for Model One

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4.879	4	1.220	5.122	.001[b]
	Residual	17.384	73	.238		
	Total	22.264	77			

a. Dependent Variable: Production_increment

b. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

The results in Table 4.14 indicated that the F-test= 5.122 which positive and p-value= 0.001 which less than 5% therefore we cannot accept the first null hypothesis which stated that There is no

significant effect of maize value chain (input, production process, postharvest handling, distribution process) on production increment in agribusiness cooperative in Eastern Provide of Rwanda.

Table 4.15: Coefficientsa for Model One

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.022	1.187		.019	.985
Input_Process	.429	.222	.231	1.937	.057
Production_Process	-.211	.139	-.187	-1.518	.133
Posthavest_handling	.507	.236	.263	2.145	.035
Distribution_Process	.234	.133	.203	1.758	.083

a. Dependent Variable: Production_increment

The results in Table 4.15 indicated that input process has postive and significant effect on production increment in COMARU agribusiness (β1=0.231; t=1.937; p-value= .057). This means that for 1 unit increase in input process will lead to 0.231 increases in production increase of COMARU production. Production process has negative and insignificant effect on production increment ((β2= - 0.187; t= -1.518; p-value= 0.133). This means that for 1 unit increase in production process will lead to 0.187 decreases in production increase of COMARU. Postharvest handling has a positive and significant effect on production increment of Agribusiness cooperative (COMARU). This is indicated by (β3=0.263; t=2.145; p-value= 0.035). This means that 1 unit increase in postharvest handling will lead to 0.263 increases in production increment of COMARU. Lastly, distribution process has also a positive and significant effect on production increment of agribusiness cooperative of this study (COMARU). This is indicated by (β4=0.203; t=1.758; p-value= 0.083). This means that 1 unit increase in distribution process will lead to 0.203 increase in production incremental of COMARU production.

PRI= β0+β1INP+β2PRP+β3PHH+β4DSP+ε Estimated Model 1.

Based in the results in table 4.8 the econometric model is set actually as follows:

PRI= 0.022+.231INP -.187PRP .263PHH+.203DSP + 1.187 Actualized Model 1.

Where PRI= Production Incremental

INP= Input Process

PRP= Production Process

PHH= Postharvest Handling

DSP= Distribution Process

4.3.2. Testing Null Hypothesis Two

$H_0$2. Maize value chain (input, production process, postharvest handling, distribution process) does not significant have effect on quality of outputs in agribusiness cooperative in Eastern Provide of Rwanda.

Table 4.16: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.727[a]	.528	.503	.24144

a. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

The results in Table 4.16 indicated that the maize value chain variables contribute 0.503 representing 50.3% change in quality of outputs of agribusiness cooperative COMARU. This indicated that 49.7% change in quality of outputs comes from other variables that are not studied. This is indicated by the Adjusted $R^2 = 0.503$.

Table 4.17: ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4.769	4	1.192	20.453	.000[b]
	Residual	4.255	73	.058		
	Total	9.025	77			

a. Dependent Variable: Quality_Ouput

b. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

The results in Table 4.17 indicated that the F-test= 20.453 which positive and p-value= 0.000 which less than 5% therefore we cannot accept the second null hypothesis which stated that Maize value chain (input, production process, postharvest handling, distribution process) does not

significant have effect on quality of outputs in agribusiness cooperative in Eastern Provide of Rwanda.

Table 4.18: Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.105	.587		-.178	.859
	Input_Process	.153	.110	.129	1.395	.167
	Production_Process	.119	.069	.165	1.724	.089
	Posthavest_handling	.309	.117	.252	2.645	.010
	Distribution_Process	.400	.066	.546	6.073	.000

a. Dependent Variable: Quality_Ouput

The results in Table 4.18 indicated that input process has positive and insignificant effect on quality of output in COMARU agribusiness (β1= 0.129; t=1.395; p-value= .167). This means that for 1 unit increase in input process will lead to 0.129 increase in quality of output in COMARU agribusiness. Production process has positive and significant effect on quality of output in COMARU agribusiness (β2= 0.165; t= 1.724; p-value= .089). This means that for 1 unit increase in production process will lead to 0.165 increase in quality of output in COMARU agribusiness. Postharvest handling has a positive and significant effect on quality output in COMARU agribusiness. This is indicated by (β3=0.252; t=2.645; p-value= 0.010). This means that 1 unit increase in postharvest handling will lead to 0.252 increase in quality of output in COMARU agribusiness. Lastly, distribution process has also a positive and significant effect on quality of output of agribusiness cooperative of this study (COMARU). This is indicated by (β4=0.546; t=6.073; p-value= 0.000). This means that 1 unit increase in distribution process will lead to 0.546 increase in quality of output in COMARU agribusiness.

QUP= β0+β1INP+β2PRP+β3PHH+β4DSP+ε Estimated Model 1.

Based in the results in table 4.8 the econometric model is set actually as follows:

QUP= -.105 +0.129INP -0.165 PRP + 0.252 PHH+0.546 DSP + .587 Actualized Model 1.

Where QUO= Quality of Outputs

PRI= Production Incremental

INP= Input Process

PRP= Production Process

PHH= Postharvest Handling

DSP= Distribution Process

4.3.3. Testing Null Hypothesis Three

$H_0$3. There is no significant effect of maize value chain (input, production process, postharvest handling, distribution process) on profitability of the agribusiness cooperative in Eastern Provide of Rwanda.

Table 4.19: Model Summary Three

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.588[a]	.346	.310	.28193

a. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

The results in Table 4.19 indicated that the maize value chain variables contribute 0.310 representing 31% change in profitability of agribusiness cooperative COMARU. This indicated that 69% change in profitability comes from other variables that are not studied. This is indicated by the Adjusted $R^2 = 0.310$.

Table 4.20: ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.070	4	.767	9.655	.000[b]
	Residual	5.802	73	.079		
	Total	8.872	77			

a. Dependent Variable: Profitability

b. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

The results in Table 4.20 indicated that the F-test= 9.655 which positive and p-value= 0.000 which less than 5% therefore we cannot accept the second null hypothesis which stated that There is no significant effect of maize value chain (input, production process, postharvest handling, distribution process) on profitability of the agribusiness cooperative in Eastern Provide of Rwanda.

Table 4.21: Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.739	.686		2.536	.013
	Input_Process	-.011	.128	-.009	-.083	.934
	Production_Process	.238	.080	.334	2.959	.004
	Posthavest_handling	-.114	.137	-.093	-.832	.408
	Distribution_Process	.435	.077	.599	5.652	.000

a. Dependent Variable: Profitability

The results in Table 4.21 indicated that input process has positive and insignificant effect on quality output in COMARU agribusiness (β1= -0.009.129; t=-.083; p-value= .934). This means that for 1 unit increase in input process will lead to 0.009 decrease in profitability of COMARU agribusiness. Production process has positive and significant effect on quality output in COMARU agribusiness (β2= 0.334; t= 2.959; p-value= .004). This means that for 1 unit increase in production process will lead to 0.334 increase in profitability of COMARU agribusiness. Postharvest handling has a positive and significant effect on profitability of COMARU agribusiness. This is indicated by (β3= -0.093; t= -.832; p-value= 0.408). This means that 1 unit increase in postharvest handling will lead to 0.093 decrease in profitability of COMARU agribusiness. Lastly, distribution process has also a positive and significant effect on quality output of agribusiness cooperative of this study (COMARU). This is indicated by (β4=0.599; t=5.652; p-value= 0.000). This means that 1 unit

increase in distribution process will lead to 0.599increase in quality output in COMARU agribusiness.

PROF = β0+β1INP+β2PRP+β3PHH+β4DSP+ε Estimated Model 1.

Based in the results in table 4.8 the econometric model is set actually as follows:

PROF= 1.739 - 0.009 INP + 0.334PRP - 0.093 PHH -0.599 DSP + .686 Actualized Model 1.

Where PROF = Profitability

PRI= Production Incremental

INP= Input Process

PRP= Production Process

PHH= Post-Harvest Handling

DSP= Distribution Process

4.3.4. Testing Null Hypothesis Four

$H_0$4. There is no joint effect of maize value chain on agribusiness performance in agribusiness cooperative in Eastern Provide of Rwanda.

Table 4.22: Model Summary Four

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.619[a]	.383	.375	.23156

a. Predictors: (Constant), Maize_value_chain

The results in Table 4.22 indicated that the maize value chain variables contribute 0.383 representing 38.3% change in performance of agribusiness cooperative COMARU. This indicated that 61.7% change in performance of COMARU comes from other variables that are not studied. This is indicated by the Adjusted R^2 = 0.383.

Table 4.23: ANOVAa Model Four

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.528	1	2.528	47.154	.000[b]
	Residual	4.075	76	.054		
	Total	6.604	77			

a. Dependent Variable: Performance

b. Predictors: (Constant), Maize_value_chain

The results in Table 4.23 indicated that the F-test= 47.154 which is positive and p-value= 0.000 which less than 5% therefore we cannot accept the second null hypothesis which stated that There is no joint effect of maize value chain on agribusiness performance in agribusiness cooperative in Eastern Provide of Rwanda.

Table 4.24: Coefficientsa of Model Four

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.833	.527		1.581	.118
	Maize_value_chain	.778	.113	.619	6.867	.000

a. Dependent Variable: Performance

The results in Table 4.24 indicated that maize value chain as a whole has positive and significant effect on whole performance of COMARU agribusiness (β1= .619; t=6.867.083; p-value= .000). This means that for 1 unit increase in maize value chain will lead to .619 increase in whole performance of COMARU agribusiness.

PERF= β0+β1 MVC +ε Estimated Model 4.

Based in the results in table 4.8 the econometric model is set actually as follows:

PERF= .833 - .619 MVC + .527 Actualized Model 1.

Where PERF = Performance

MVC= Maize Value Chain

4.4. Interview with COMARU value chain players

4.4.1 COMARU Leaders

According to COMARU leaders, the cooperative was created in 2013 but it was operating in an informal way with its members each growing his small portion of land. This time the yield was minimal and it could not be enough for market. It was from 2017 when it was organized in a formal way and it started producing for the market in a more organized and advanced manner. Since then the harvest has increased in quantity and quality has been improved to meet market requirement. The harvest is stored, prepared and packaged for the purpose of selling to earn money for the cooperative.

The cooperative's current land is 40Ha big with 78 members among whom 5 are cooperative leaders, namely, chairman, vice-chairman, secretary and two members. These are selected through votes by the general assembly of cooperative members. The size was obtained after the members of the cooperative had consolidated their portions and created the 40Ha to increase the production. The land consolidation idea initially came from the agricultural officers in the district who sensitized the farmers to join their pieces of land and grow a single crop to increase the production.

Clinton Health Access Initiative (CHAI) played a big role in organizing the cooperative and assisting in capacity building through conducting trainings, workshops, organizing study tours and field practices. The members were taught the modern ways of growing maize, applying fertilizers, growing maize on line and using improved seeds. It is from here that the members of cooperative started preparing land and growing maize together, using improved seeds and applying fertilizers.

After training on new farming skills and applying fertilizers and improved seeds, the quantity of harvest increased significantly and the quality of maize changed. 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 markets nearby 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 25m. The government through 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.

4.2.2 Role of actors in support of COMARU

Clinton Health Access Initiative (CHAI) is one of the players that supported COMARU to transform from traditional maize farming to market oriented farming. This organization assisted COMARU in different areas including capacity building through trainings on farming skills like planting maize on line, spacing maize, applying fertilizers, using improved seeds; it also conducted workshops, field practices tours.

Apart from capacity building, CHAI offered to COMARU post harvest handling materials like drying sheets and tarpaulins. CHAI further negotiated the market and influenced the signing of the contract between COMARU and the buyer of it products, Africa Improved Foods (AIF). This requires more efforts for the cooperative to supply maize constantly to AIF as per contract.

Africa Improved Foods buys maize from different farmers including COMARU but despite being the buyer, AIF makes sure it makes follows up of the maize production from the field until it is delivered for processing. This is in line with efforts to ensure the quality of maize from the field, past harvest handling, packaging until it is ready for transportation and processing. This is to make sure that maize produced meets the required standards which must be monitored throughout the chain.

4.4.3 Challenges related to maize production

Despite all the efforts by the cooperative and its partners to produce the required quality and quantity for the market, there are a number of challenges related to the business including the following:

Climate change which affect planting dates and farming seasons; few post-harvest infrastructure and facilities, High input costs, insufficient management skills, Land consolidation cases with some farmers, Mismatch maize market price and production cost among others.

4.5. Results from Secondary Data

This part presents the results from the cooperative's reports of their production before and after the improved maize value chain with an intervention of actors, namely, Clinton Health Access Initiative and Africa Improved Foods.

Table 4.25: Farmers' production in cooperative before and after improved maize value chain

		Quantity (Tons)	Input Cost	Total Income	Net Profit
Valid	Before MVC	160	3,800,000	20,000,000	16,200,000
	After MVC	280	1,600,000	38,000,000	36,400,000
	Difference	**120**	**2,200,000**	**18,000,000**	**20,200,000**

Source: Secondary Data, 2019

According to the table 4.25, it shows the farmers' production in the cooperatives before and after improving maize value chain initiated by the actors including Clinton Health Access Initiative and Africa Improved Foods. It demonstrates that COMARU had produced small quantity of maize (160 tons) before improving farming and handling of maize and where land used was fragmented. After the initiative of actors (CHAI and AIF) the production of the cooperative increased from 160 tons to 280 tons. This indicates that the contribution of partners in COMARU was very significant to the farmers' production where they had a chance of getting training about modernization of agriculture; they used improved seeds and got post-harvest materials and other assistance from Clinton Health Access Initiative (CHAI) and also they had a potential market as indicated by the contract signed with Africa Improved Food (AIF) company.

As concerns the input cost of the cooperatives, it was indicated that before improving maize value chain, the input costs were big 3,800,000 million because the members of the cooperative invested more money to prepare the seed and buying the fertilizers and many more expenses while after maize value chain the cooperative got sponsor or actors who supported them to perform some activities.

Talk about the total income during those two periods, it was presented that the total income also was very low before where the total amount was 20,000,000 Frw while after the total amount was 38,000,000 frw which means that after gaining knowledge in agriculture and some financial capacity the income increased significantly. The net profit also was doubled from 16,200,000 frw to 36,400,000 frw after acquiring new farming skills.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary of findings

The main objective of the study was to analyze the implication of maize value chain on agribusiness performance. The study investigated the aspects of use of inputs; improved seeds, fertilizers, post handling skills, training advanced to the farmers in cooperative and application of scientific farming practices.

5.1.1. Effect of maize value chain on production increment in COMARU

The first specific objective was to examine the effect of maize value chain on production increment in COMAR. The results in table 4.14 indicated that the F-test= 5.122 which positive and p-value= 0.001 which is less than 5%. Therefore the results showed that maize value chain (input, production process, postharvest handling, distribution process) had positive effect on production increment in agribusiness of cooperatives in Eastern Provide of Rwanda. The results in Table 4.15 indicated that input process has positive and significant effect on production increment in COMARU agribusiness ($\beta1$=0.231; t=1.937; p-value= 0.057). This means that 1 unit increase in input process led to 0.231 increases in production of COMARU. Postharvest handling has a positive and significant effect on production increment of Agribusiness cooperative (COMARU). The interview that was conducted with actors in value chain in COMARU also confirmed that the use of good seeds, fertilizers and proper post harvest handling led to the increase of production in COMARU.

5.1.2. Investigate the effect of maize value chain on quality of outputs in COMARU

The second specific objective was to investigate the effect of maize value chain on quality of output in COMARU, the results in Table 4.18 indicated that input process has positive and insignificant effect on quality of output in COMARU agribusiness ($\beta1$= 0.129; t=1.395; p-value= .167). This means that for 1 unit increase in input process will lead to 0.129 increase in quality of output in COMARU agribusiness. Production process had positive and significant effect on quality of output in COMARU agribusiness ($\beta2$= 0.165; t= 1.724; p-value= .089). This means that 1 unit increase in production process will led to 0.165 increase in quality of output in COMARU agribusiness. Postharvest handling has a positive and significant effect on quality output in

COMARU agribusiness. This was indicated by (β3=0.252; t=2.645; p-value= 0.010). This means that 1 unit increase in postharvest handling led to 0.252 increase in quality of output in COMARU agribusiness. Lastly, distribution process also had a positive and significant effect on quality of output of agribusiness cooperative of this study (COMARU). This is indicated by (β4=0.546; t=6.073; p-value= 0.000). This means that 1 unit increase in distribution process will lead to 0.546 increase in quality of output in COMARU agribusiness. Proper use of inputs and professional post harvest handling and excellent harvest distribution led to the better quality of maize produced by COMARU.

5.1.3. Determine the effect of maize value chain on profitability in COMARU.

The third specific objective was to investigate the effect of maize value chain on profitability in COMARU. The results in table 4.21 indicated that the input process has positive and insignificant effect on quality output in COMARU agribusiness (β1= -0.009.129; t=-0.083; p-value= 0.934). This means that 1 unit increase in input process led to 0.009 decrease in profitability of COMARU agribusiness. Production process had positive and significant effect on quality output in COMARU agribusiness (β2= 0.334; t= 2.959; p-value= .004). This means that for 1 unit increase in production process led to 0.334 increase in profitability of COMARU agribusiness. Postharvest handling had a positive and significant effect on profitability of COMARU agribusiness. This was indicated by (β3= -0.093; t= -0.832; p-value= 0.408). This means that 1 unit increase in postharvest handling led to 0.093 decrease in profitability of COMARU agribusiness. Lastly, distribution process has also a positive and significant effect on quality output of agribusiness cooperative of this study (COMARU). This was indicated by (β4=0.599; t=5.652; p-value= 0.000). This means that 1 unit increase in distribution process lead to 0.599increase in quality output in COMARU agribusiness. The results in totality showed that the improved quality of maize attracted the buyer to buy almost all the maize produced by COMARU hence increasing the profitability of the cooperative.

5.1.4. Evaluate the joint effect of maize value chain on agribusiness performance in COMARU.

The fourth specific objective was to investigate the effect of maize value chain on performance in COMAR. The results in table 4.24 indicated that maize value chain as a whole has positive and significant effect on whole performance of COMARU agribusiness (β1= 0.619; t=6.867.083; p-

value= 0.000). This means that 1 unit increase in maize value chain led to 0.619 increase in the whole performance of COMARU agribusiness. The quality inputs used in production of maize and all the processes carried out from production to distribution of maize to the buyer led to the better performance of the business of COMARU.

As indicated in the COMARU records, the production and income during the first years before the value chain was improved was relatively low where the total income was 20,000,000 frw while after improving maize value chain the total income was 38,000,000 frw. The figures confirm that after gaining knowledge on farming practice and use of proper inputs the income increased significantly. The net profit also was doubled from 16,200,000 frw to 36,400,000 frw. It implies that the improvement of seeds, application of fertilizers, trainings of farmers and acquisition of post-harvest handling materials contributed a lot to the increased production, quality and profitability of the cooperative (COMARU).

5.2 Conclusions

The results of this research allowed the researcher to conclude that the consolidation of the land by farmers, training on new farming skills, use of proper inputs with support from other actors including Government, CHAI and AIF contributed significantly to shift from substance to business oriented agriculture.

It is imperative however to note that despite the recommendable development demonstrated by COMARU, the level of agribusiness in Rwanda and Nyagatare in particular is still low. The improvement made would not have been possible without other actors' interventions. We can only be confident of the sustainable agribusiness when maize cooperatives can be able to support themselves and do most of activities on their own.

5.3 Recommendations

From the summary findings and conclusions above, the following recommendations were made:

i. Training of small farmers on use on the proper use of inputs (seeds, fertilizers) and farming techniques should be enhanced.

ii. Sensitization on land consolidation by farmers should be intensified.

iii. Search for markets for small farmers should go hand in hand with quality improvement and all stake holders should consider this as a priority since value chain is customer driven.

REFERENCES

Ahmadi, N., (2013) Rethinking plant breeding. In *Cultivating Biodiversity to Transform Agriculture* (pp. 91-140). Springer, Dordrecht.

Akenbor, C., (2011) An empirical investigation of value-chain analysis and competitive advantage in the Nigerian manufacturing industry. *International Multidisciplinary Journal, Ethiopia*, 2(3), 188-198.

Borman, W. (1993) *Expanding the criterion domain to include elements of contextual performance.* New York: Jossey-Bass.

Campbell, J. (1996) *The substantive nature of job performance variability*, in K. R. Murphy (Ed.). Individual differences and behaviour in organizations, San Francisco: Jossey-Bass.

Codeço, S.C.Q.M.S., 2017. Promoting grain legume seeds in animal feeding: unveiling the nutritive value and phytochemicals of European varieties.

Cohen, M., 2018. Should Human Milk Be Regulated. *UC Irvine L. Rev.*, *9*, p.557.

Dessale, , D., (2017) *Technical efficiency in teff production: the case of smallholder farmers in Jamma District, South Wollo Zone, Ethiopia* (Doctoral dissertation, Haramaya University).

Dessale, M., (2017) *Technical efficiency in teff production: the case of smallholder farmers in Jamma District, South Wollo Zone, Ethiopia* (Doctoral dissertation, Haramaya University).

Ehrman, M.U., (2019) A Call For Energy Realism: When Immanuel Kant Met The Keep It In The Ground Movement. *Utah Law Review*, *2019*(2).

Ejdemo, P., (2015) Wind power, regional development and benefit-sharing: The case of Northern Sweden. *Renewable and Sustainable Energy Reviews*, *47*, pp.476-485.

Gereffi, G., (2006) *The Governance of Global Value Chains*. Review of International Political Economy, 12(1): 78-104.

Gibbon, P. (2003*) Upgrading Primary Production*: A Global Commodity Chain

Giuliani, E., (2005) *Upgrading in global value chains:* lessons from Latin American Clusters. World Development 549-574.

Imhmed, A., (2012) *The Impact of the Value Chain Activities on the Competitive Performance of the Manufacturing Industries of Libya.* Business and Management Review, 01 – 07.

Jacoby R., (2005) *Achieving High Performance through Capabilities*: What's Required to Dominate in the Service Business.

Kaplinsky, R. (2000) *Globalization and Unequalisation: What Can be Learned from Value Chain Analysis.* Journal of Development Studies 117-146.

Kaplinsky, R. (2001) *A Handbook for Value Chain Research.* Working Paper Prepared for the IDRC, Brighton, UK, Institute for Development Studies.

Kebea, J., (2016) *Engaging students in the anchor mission of the university: A mixed-methods study utilizing the Delphi method*. Drexel University.

Kofi, D., (2018) The Political Economy of Agricultural Commercialisation In Ghana: A Review.

Laven, A. (2011) *The Ghanaian State and Inclusive Upgrading in The Global Cocoa Chain" in, Value chains, Social Inclusion and Economic Development*: Contrasting theories and realities" Editors AHJ Bert and Sietze Vellema 2011.

Levitin, A.J., (2018) Bankruptcy's Lorelei: The Dangerous Allure of Financial Institution Bankruptcy. *NCL Rev.*, *97*, p.243.

Miller, C., (2007) *Agricultural value chain finance:* Tools and lessons; FAO and Practical Action.

Owen, D., (2018) *Smart water technologies and techniques: data capture and analysis for sustainable water management*. John Wiley & Sons.

Porter, E., (1985) *Competitive Advantage. Creating and Sustaining Superior Performance*. New York. P 38.

Reiter, N., (2019) Blowing It: Why Is Wyoming Failing to Develop Wind Energy Projects. *Wyo. L. Rev.*, *19*, p.45.

Saunders, M. (2012) *Research Methods for Business Students* 6th edition, Pearson Education Limited

Soma, K., (2016) *Informational governance–A systematic literature review of governance for sustainability in the Information Age.* Environmental Science & Policy, 56, pp.89-99.

Thelen, F., (2017) *Becoming I'x: Maya ontological decolonization and the turn to theater in postwar Guatemala* (Doctoral dissertation).

UNIDO, (2009) *Agro-Value Chain Analysis and Development*: The UNIDO Approach. United Nations Industrial Development Organization, Vienna Press.

Van Berkum, S., (2000) Dvortsin, L. and Roza, P., 2010. *Opportunities for Dutch agribusiness in Russia*. LEI, part of Wageningen UR.

Van Schalkwyk, (2017) *Generation Y students' attitudes towards eBooks and eBook adoption* (Doctoral dissertation, North-West University (South Africa), Vaal Triangle Campus).

Yu, M. (2016) *A grey forecasting approach for the sustainability performance of logistics companies*. Sustainability, 8(9), p.866.

Reports

MINAGRI, (2008) on Strategic plan for transformation of agriculture in Rwanda- Phase II.

MINECOFIN,

(2012) Economic Transformation Guidance Note: Draft, Kigali.

MINICOM (2012), Private Sector Development Strategy: Draft, Kigali.

RAB (2017) Rwanda agriculture sector situation report, Kigali.

APPENDICES

Section A: Profile of Respondents

1. **Gender:**

   a. Male [ ] b. Female [ ]

2. **Age group:**

   a. 20-30 [ ] b. 31-40 [ ] c. 41-50 [ ] d. 51 and over [ ]

3. **Education Background**

   a. PhD [ ] b. Masters Degree [ ] c. Bachelor Degree [ ]

   d. Secondary Diploma [ ] e. Primary Certificate [ ] f. None Education [ ]

4. **Experience project management**

   a. One Year [ ] b. Two Years [ ] c. Three Year [ ] d. Four Years & above [ ]

5. **What is the aim of your cooperative?**

   a. To produce for subsistence [ ] b. To produce for market [ ] c. Other reasons [ ]

Section B= Maize value chain

I. INPUT STATEMENT

		SA	A	NA	DA	SD
S№	**STATEMENT**	**5**	**4**	**3**	**2**	**1**
1.	The cooperative gets seeds on time					
2.	The cost of seeds is affordable.					
3.	The labor cost is affordable/cheap since cooperative members are more involved.					
4.	The cooperative gets good quality of fertilizers.					
5.	The fertilizers are affordable to the cooperative.					

II. PRODUCTION PROCESS

S№	STATEMENT	5	4	3	2	1
1.	The cooperative has qualified famers.					
2.	The cooperative trained its workers in farming.					
3.	The cooperative has been consolidated and well prepared for planting.					
4.	Seeds planting are done in time after seasonal studies.					
5.	Harvest is properly done and farmers are trained to handle harvesting process.					

III. POST HARVEST PROCESS

S№	STATEMENT	5	4	3	2	1
1.	The cooperative has equipped warehouse/stock.					
2.	The cooperative has drying equipment/materials that take care of the harvest.					
3.	The workers in the cooperative are trained in handling the harvest (Maize).					

IV. DISTRIBUTION OF PRODUCT

S№	STATEMENT	5	4	3	2	1
1.	The cooperative has the capacity of packaging its products.					
2.	The product stored is highly protected in the cooperative warehouse.					

Section C= AGRIBUSINESS PERFORMANCE

I. PRODUCTION INCRIMENT

S№	**STATEMENT**	**5**	**4**	**3**	**2**	**1**
1.	From the year 2016 till to date the production of the cooperative has increased.					
2.	The cooperative partners have also increased and funded its production process through training in farming.					
3.	The products are in highly demand by the manufactures of maize products.					

II. ANALYSIS OF OUTPUTS

S№	STATEMENT	5	4	3	2	1
1.	The cooperative's quality maize has improved.					
2.	The cooperative has trained staff in planting.					
3.	There's high quality in production process of maize in cooperative.					
4.	There's quality in procedures of maize handling.					
5.	There's quality in storing the products.					
6.	Products reach customers (manufactures) in good transport means.					

III. PROFITABILITY OF THE COOPERATIVE

S№	STATEMENT	5	4	3	2	1
1.	The sales revenue of the cooperative product (maize) has increased in last five (5) years.					
2.	The costs of cooperative are cheaper than selling price.					
3.	Cooperative members send their children to school and get school fees from the income they generate from cooperative.					
4.	Cooperative members are able to pay medical insurance for their families using income they get from their cooperative.					
5.	Cooperative members have constructed or acquired shelter using income from their cooperative.					
6.	Cooperative members are equipped with saving culture in microfinance institutions (SACCO).					
7.	Cooperative members have invested in other income generating projects.					

IV. PARTNERS CONTRIBUTION

S№	STATEMENT	5	4	3	2	1
1.	The cooperative has received different government intervention (physically and financially).					
2.	The cooperative has benefited training from Clinton Health Access initiative (CHAI).					
3.	The cooperative has received workshops, tours that enabled capacity building from CHAI					
4.	The partners negotiated market for the cooperative.					
5.	Cooperative buyers have partnered in quality insurance of maize.					

PART III: INTERVIEW GUIDE:

a. FOR FARMERS' LEADERS

1. What is the main activity of your cooperative and when did you start?

2. How big the land for growing maize and how many members is does the cooperative have?

3. How did your cooperative acquire land?

4. What are the challenges related to your activities?

b. FOR OTHER ACTORS IN COMARU

1. For how long have you worked with COMARU?

2. What are your roles in assisting COMARU to achieve its goals?

3. What are your views about COMARU's achievements?

Appendix I: SPSS Outputs

A. Statistics for Input Process

Statistics

	N		Mean	Std. Deviation
	Valid	Missing		
The cooperative gets seeds on time	78	0	4.95	.222
The cost of seeds is affordable.	78	0	4.92	.268
The labor cost is affordable/cheap since cooperative members are more involved.	78	0	4.24	.928
The cooperative gets good quality of fertilizers.	78	0	4.42	.655
The fertilizers are affordable to the cooperative.	78	0	4.72	.622

The cooperative gets seeds on time

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	4	5.1	5.1	5.1
	Strongly AGree	74	94.9	94.9	100.0
	Total	78	100.0	100.0	

The cost of seeds is affordable.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	6	7.7	7.7	7.7
	Strongly AGree	72	92.3	92.3	100.0
	Total	78	100.0	100.0	

The labor cost is affordable/cheap since cooperative members are more involved.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	26	33.3	33.3	33.3
	Agree	7	9.0	9.0	42.3
	Strongly AGree	45	57.7	57.7	100.0
	Total	78	100.0	100.0	

The cooperative gets good quality of fertilizers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	2.6	2.6	2.6
	Neutral	1	1.3	1.3	3.8
	Agree	37	47.4	47.4	51.3
	Strongly AGree	38	48.7	48.7	100.0
	Total	78	100.0	100.0	

The fertilizers are affordable to the cooperative.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Disagree**	**1**	**1.3**	**1.3**	**1.3**
	Neutral	4	5.1	5.1	6.4
	Agree	11	14.1	14.1	20.5
	Strongly AGree	62	79.5	79.5	100.0
	Total	78	100.0	100.0	

B. Statistics for Production/ Farming Process

Statistics

	N		Mean	Std. Deviation
	Valid	Missing		
The cooperative has qualified famers.	78	0	4.46	.697
The cooperative trained its workers in farming.	78	0	4.53	.503
The cooperative has been consolidated and well prepared for planting.	78	0	4.29	.839
Seeds planting are done in time after seasonal studies.	78	0	4.42	.694
Harvest is properly done and farmers are trained to handle harvesting process.	78	0	4.67	.474

The cooperative has qualified famers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	3.8	3.8	3.8
	Agree	33	42.3	42.3	46.2
	Strongly AGree	42	53.8	53.8	100.0
	Total	78	100.0	100.0	

The cooperative trained its workers in farming.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	37	47.4	47.4	47.4
	Strongly AGree	41	52.6	52.6	100.0
	Total	78	100.0	100.0	

The cooperative has been consolidated and well prepared for planting.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.3	1.3	1.3
	Disagree	4	5.1	5.1	6.4
	Neutral	1	1.3	1.3	7.7
	Agree	37	47.4	47.4	55.1
	Strongly AGree	35	44.9	44.9	100.0
	Total	78	100.0	100.0	

Seeds planting are done in time after seasonal studies.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	2.6	2.6	2.6
	Neutral	3	3.8	3.8	6.4
	Agree	33	42.3	42.3	48.7
	Strongly AGree	40	51.3	51.3	100.0
	Total	78	100.0	100.0	

Harvest is properly done and farmers are trained to handle harvesting process.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	26	33.3	33.3	33.3
	Strongly AGree	52	66.7	66.7	100.0
	Total	78	100.0	100.0	

C. Postharvest handling Process

Statistics

	N		Mean	Std. Deviation
	Valid	Missing		
The cooperative has equipped warehouse/stock.	78	0	4.87	.336
The cooperative has drying equipment/materials that take care of the harvest.	78	0	4.81	.457
The workers in the cooperative are trained in handling the harvest (Maize).	78	0	4.55	.526

The cooperative has equipped warehouse/stock.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	10	12.8	12.8	12.8
	Strongly AGree	68	87.2	87.2	100.0
	Total	78	100.0	100.0	

The cooperative has drying equipment/materials that take care of the harvest.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	2	2.6	2.6	2.6
	Agree	11	14.1	14.1	16.7
	Strongly AGree	65	83.3	83.3	100.0
	Total	78	100.0	100.0	

The workers in the cooperative are trained in handling the harvest (Maize).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	1.3	1.3	1.3
	Agree	33	42.3	42.3	43.6
	Strongly AGree	44	56.4	56.4	100.0
	Total	78	100.0	100.0	

D. Distribution Process

Statistics

	N		Mean	Std. Deviation
	Valid	Missing		
The cooperative has the capacity of packaging its products.	78	0	4.68	.497
The product stored is highly protected in the cooperative warehouse.	78	0	4.77	.623

The cooperative has the capacity of packaging its products.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	1.3	1.3	1.3
	Agree	23	29.5	29.5	30.8
	Strongly AGree	54	69.2	69.2	100.0
	Total	78	100.0	100.0	

The product stored is highly protected in the cooperative warehouse.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.3	1.3	1.3
	Neutral	5	6.4	6.4	7.7
	Agree	5	6.4	6.4	14.1
	Strongly AGree	67	85.9	85.9	100.0
	Total	78	100.0	100.0	

E. Production Increment

Statistics

	N		Mean	Std. Deviation
	Valid	Missing		
From the year 2016 till to date the production of the cooperative has increased.	78	0	4.86	.350
The cooperative partners have also increased and funded its production process through training in farming.	78	0	4.28	.788
The products are in highly demand by the manufactures of maize products.	78	0	4.62	.825

From the year 2016 till to date the production of the cooperative has increased.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	11	14.1	14.1	14.1
	Strongly AGree	67	85.9	85.9	100.0
	Total	78	100.0	100.0	

The cooperative partners have also increased and funded its production process through training in farming.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	5.1	5.1	5.1
	Neutral	4	5.1	5.1	10.3
	Agree	36	46.2	46.2	56.4
	Strongly AGree	34	43.6	43.6	100.0
	Total	78	100.0	100.0	

The products are in highly demand by the manufactures of maize products.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	5.1	5.1	5.1
	Neutral	5	6.4	6.4	11.5
	Agree	8	10.3	10.3	21.8
	Strongly AGree	61	78.2	78.2	100.0
	Total	78	100.0	100.0	

F. Quality of Outputs

Statistics

	N		Mean	Std. Deviation
	Valid	Missing		
The cooperative's quality maize has improved.	78	0	4.82	.477
The cooperative has trained staff in planting.	78	0	4.73	.475
There's high quality in production process of maize in cooperative.	78	0	4.03	.852
There's quality in procedures of maize handling.	78	0	4.18	.575
There's quality in storing the products.	78	0	4.55	.677
Products reach customers (manufactures) in good transport means.	78	0	4.65	.479

The cooperative's quality maize has improved.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.3	1.3	1.3
	Agree	11	14.1	14.1	15.4
	Strongly AGree	66	84.6	84.6	100.0
	Total	78	100.0	100.0	

The cooperative has trained staff in planting.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	1.3	1.3	1.3
	Agree	19	24.4	24.4	25.6
	Strongly AGree	58	74.4	74.4	100.0
	Total	78	100.0	100.0	

There's high quality in production process of maize in cooperative.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	27	34.6	34.6	34.6
	Agree	22	28.2	28.2	62.8
	Strongly AGree	29	37.2	37.2	100.0
	Total	78	100.0	100.0	

There's quality in procedures of maize handling.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	7	9.0	9.0	9.0
	Agree	50	64.1	64.1	73.1
	Strongly AGree	21	26.9	26.9	100.0
	Total	78	100.0	100.0	

There's quality in storing the products.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.3	1.3	1.3
	Neutral	5	6.4	6.4	7.7
	Agree	22	28.2	28.2	35.9
	Strongly AGree	50	64.1	64.1	100.0
	Total	78	100.0	100.0	

Products reach customers (manufactures) in good transport means.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	27	34.6	34.6	34.6
	Strongly AGree	51	65.4	65.4	100.0
	Total	78	100.0	100.0	

G. Profitability

Statistics

	N		Mean	Std. Deviation
	Valid	Missing		
The sales revenue of the cooperative product (maize) has increased in last five (5) years.	78	0	4.08	1.365
The costs of cooperative are cheaper than selling price.	78	0	4.47	.801
Cooperative members send their children to school and get school fees from the income they generate from cooperative.	78	0	4.31	.588
Cooperative members are able to pay medical insurance for their families using income they get from their cooperative.	78	0	4.06	.651
Cooperative members have constructed or acquired shelter using income from their cooperative.	78	0	4.47	.528
Cooperative members are equipped with saving culture in microfinance institutions (SACCO).	78	0	4.29	.512
Cooperative members have invested in other income generating projects.	78	0	4.18	.503

The sales revenue of the cooperative product (maize) has increased in last five (5) years.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	7.7	7.7	7.7
	Disagree	11	14.1	14.1	21.8
	Agree	15	19.2	19.2	41.0
	Strongly AGree	46	59.0	59.0	100.0
	Total	78	100.0	100.0	

The costs of cooperative are cheaper than selling price.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.3	1.3	1.3
	Disagree	2	2.6	2.6	3.8
	Neutral	3	3.8	3.8	7.7
	Agree	25	32.1	32.1	39.7
	Strongly AGree	47	60.3	60.3	100.0
	Total	78	100.0	100.0	

Cooperative members send their children to school and get school fees from the income they generate from cooperative.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	5	6.4	6.4	6.4
	Agree	44	56.4	56.4	62.8
	Strongly AGree	29	37.2	37.2	100.0
	Total	78	100.0	100.0	

Cooperative members are able to pay medical insurance for their families using income they get from their cooperative.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	5.1	5.1	5.1
	Neutral	2	2.6	2.6	7.7
	Agree	57	73.1	73.1	80.8
	Strongly AGree	15	19.2	19.2	100.0
	Total	78	100.0	100.0	

Cooperative members have constructed or acquired shelter using income from their cooperative.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	1.3	1.3	1.3
	Agree	39	50.0	50.0	51.3
	Strongly AGree	38	48.7	48.7	100.0
	Total	78	100.0	100.0	

Cooperative members are equipped with saving culture in microfinance institutions (SACCO).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	2	2.6	2.6	2.6
	Agree	51	65.4	65.4	67.9
	Strongly AGree	25	32.1	32.1	100.0
	Total	78	100.0	100.0	

H. Partners Contribution

Statistics

	N		Mean	Std. Deviation
	Valid	Missing		
The cooperative has received different government intervention (physically and financially).	78	0	4.29	.758
The cooperative has benefited training from Clinton Health Access initiative (CHAI).	78	0	4.14	.679
The cooperative has received workshops, tours that enabled capacity building from CHAI	78	0	4.03	.683
The partners negotiated market for the cooperative.	78	0	3.53	1.214
Cooperative buyers have partnered in quality insurance of maize.	78	0	3.86	1.374

The cooperative has received different government intervention (physically and financially).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	3.8	3.8	3.8
	Neutral	5	6.4	6.4	10.3
	Agree	36	46.2	46.2	56.4
	Strongly AGree	34	43.6	43.6	100.0
	Total	78	100.0	100.0	

The cooperative has benefited training from Clinton Health Access initiative (CHAI).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.3	1.3	1.3
	Neutral	7	9.0	9.0	10.3
	Agree	49	62.8	62.8	73.1
	Strongly AGree	21	26.9	26.9	100.0
	Total	78	100.0	100.0	

The cooperative has received workshops, tours that enabled capacity building from CHAI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.3	1.3	1.3
	Disagree	1	1.3	1.3	2.6
	Neutral	8	10.3	10.3	12.8
	Agree	53	67.9	67.9	80.8
	Strongly AGree	15	19.2	19.2	100.0
	Total	78	100.0	100.0	

The partners negotiated market for the cooperative.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6.4	6.4	6.4
	Disagree	15	19.2	19.2	25.6
	Neutral	9	11.5	11.5	37.2
	Agree	32	41.0	41.0	78.2
	Strongly AGree	17	21.8	21.8	100.0
	Total	78	100.0	100.0	

Cooperative buyers have partnered in quality insurance of maize.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	6.4	6.4	6.4
	Disagree	15	19.2	19.2	25.6
	Neutral	4	5.1	5.1	30.8
	Agree	16	20.5	20.5	51.3
	Strongly AGree	38	48.7	48.7	100.0
	Total	78	100.0	100.0	

Appendices II: SPSS Hypothesis Test

I. Testing Hypothesis One

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.468[a]	.219	.176	.48799

a. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.879	4	1.220	5.122	.001[b]
	Residual	17.384	73	.238		
	Total	22.264	77			

a. Dependent Variable: Production_increment

b. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.022	1.187		.019	.985
	Input_Process	.429	.222	.231	1.937	.057
	Production_Process	-.211	.139	-.187	-1.518	.133
	Posthavest_handling	.507	.236	.263	2.145	.035
	Distribution_Process	.234	.133	.203	1.758	.083

a. Dependent Variable: Production_increment

J. Testing Hypothesis Two

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.727[a]	.528	.503	.24144

a. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.769	4	1.192	20.453	.000[b]
	Residual	4.255	73	.058		
	Total	9.025	77			

a. Dependent Variable: Quality_Ouput

b. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.105	.587		-.178	.859
	Input_Process	.153	.110	.129	1.395	.167
	Production_Process	.119	.069	.165	1.724	.089
	Posthavest_handling	.309	.117	.252	2.645	.010
	Distribution_Process	.400	.066	.546	6.073	.000

a. Dependent Variable: Quality_Ouput

K. Testing Hypothesis Three

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.588[a]	.346	.310	.28193

a. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.070	4	.767	9.655	.000[b]
	Residual	5.802	73	.079		
	Total	8.872	77			

a. Dependent Variable: Profitability

b. Predictors: (Constant), Distribution_Process, Input_Process, Posthavest_handling, Production_Process

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.739	.686		2.536	.013
	Input_Process	-.011	.128	-.009	-.083	.934
	Production_Process	.238	.080	.334	2.959	.004
	Posthavest_handling	-.114	.137	-.093	-.832	.408
	Distribution_Process	.435	.077	.599	5.652	.000

a. Dependent Variable: Profitability

L. Testing Hypothesis Four

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.619[a]	.383	.375	.23156

a. Predictors: (Constant), Maize_value_chain

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.528	1	2.528	47.154	.000[b]
	Residual	4.075	76	.054		
	Total	6.604	77			

a. Dependent Variable: Performance

b. Predictors: (Constant), Maize_value_chain

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.833	.527		1.581	.118
	Maize_value_chain	.778	.113	.619	6.867	.000

a. Dependent Variable: Performance