

**CONTRIBUTION OF CONTRACT FARMING TO IMPROVE SMALLHOLDER SEED MULTIPLIERS ACCESS TO THE MARKET: IN RWANDA**



BY  
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**CONTRIBUTION OF CONTRACT FARMING TO IMPROVE SMALLHOLDER SEED MULTIPLIERS ACCESS TO THE MARKET: IN RWANDA**

Research Thesis Submitted to Van Hall Larenstein, University of Applied Sciences in Partial Fulfilment of the Requirements for The Degree of Master in Agricultural Production Chain Management: Horticulture Chain Specialisation.

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## **Dedication**

I dedicate this thesis to my lovely wife, Prim IGABIRE, and my son Kyan NDUWIMANA for their, endless love, encouragement, prayers, and above all to be an inspiration. To all my family for their immense love, support, and Sacrifice.

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### Abbreviations

<b>RAB</b>	Rwanda Agriculture and Animal Resources Development Board
<b>MINAGRI</b>	Ministry of Agriculture and Animal Resources
<b>GDP</b>	Gross Domestic Product
<b>PSTA II</b>	Strategic Plan for the Transformation of Agriculture in Rwanda, Phase 2
<b>OPV</b>	open-pollinated variety
<b>CIP</b>	Crops intensification Program
<b>APTC</b>	Agro-Processing and Trading Company
<b>SACCO</b>	Savings and Credit Cooperatives
<b>FAO</b>	Food and Agricultural Organisation
<b>CF</b>	Contract Farming
<b>Rwf</b>	Rwandan francs
<b>NGOs</b>	Non-Governmental Organisation
<b>RICA</b>	Rwanda Inspectorate and Competition Authority
<b>NISR</b>	National Institute of Statistics of Rwanda
<b>Kg</b>	Kilogram
<b>AFR</b>	Access to Finance Rwanda



## **Abstract**

This study with the title “Contribution of contract farming to improve smallholder seed multipliers access to the market in Rwanda” carried out in four different districts of two different Province of Rwanda. The main objective of this study was to assess the effectiveness of contract farming in improving smallholder maize seed multipliers income so that the improvement strategies can be established. The study was carried out at the beginning of the implementation of the new seeds supply system, after a pilot phase between June and August 2020.

The research surveyed the perspective of smallholder maize seed multipliers on the factors which can contribute to the success or failure of contract farming, and their capacities to produce the required quality and quantity maize seeds, a simple random sampling was used to select forty maize seed multipliers in the selected District. The researcher also conducted interviews among key informants from Government organisations and seed companies to get more clarity on how contract farming can increase trust between actors and what can be done for contract farming to contribute to high income to smallholder seed multipliers.

Contract farming is seen as the way of linking and maintaining smallholder maize seed multipliers on the seed market and ensure sustainable maize seed supply to the Rwandan farmers after the decision of the Government to pull out from bull buying of maize seeds.

The results show that Contract farming could contribute to increasing maize seed production, reducing transaction costs, and marketing risks, due to different factors such as the experience of smallholder multipliers involved, the value of hybrid maize seed, and the specificity of production, but also with good communication through a written contract including specific quality and quantity to supply, as well as establish pricing mechanism to serve as consistency engagement of both parties. However, there are some hindering factors such as long process and bureaucracy in maize seeds payment, limited and availability of pre-basic seeds, and accessibility of smallholder multipliers, that need to be taken into consideration so that the contact farming could have a positive impact on smallholder’s income

Since the study was conducted at the beginning of the implementation of the new maize seed supply system, data were focusing on perceptions and future plans, another study will be significant during the implementation to study and confirm the impact of contract farming.

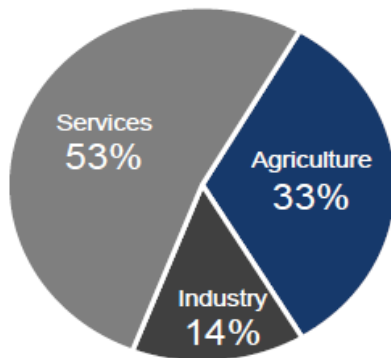
## CHAPTER1. INTRODUCTION

### 1.1 Agriculture Sector Overview

The Rwandan economy is highly dependent on the agricultural sector which accounts for around 33% of national GDP and almost 50% of all exports come from agriculture, however, only 2% of agriculture is export. The sector also includes 90% of the total workforce (Nelson, 2016).

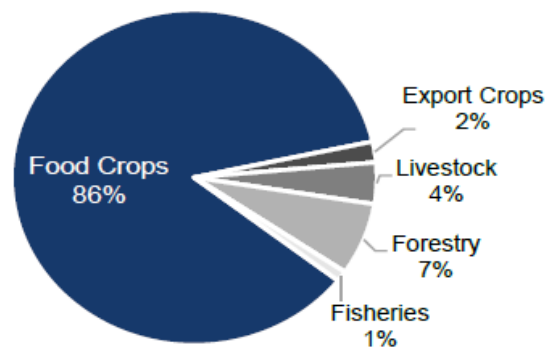
**Figure 1: Rwanda GDP composition (2014).**

**Key Sectors**  
2014, % of GDP



**Rwanda agriculture GDP composition (2013).**

**Key Agriculture Sectors**  
2013, % of Agriculture GDP



Source: World Bank (2016). Cited in Rwanda Early Generation seed study country Report

According to (Giertz, 2015), the Rwandan agricultural sector is dominated by small-scale subsistence farming as part of old farming practices and dependence on rain to farm and faces a set of restrictions including mainly its reliance on climatic conditions, weak linkages to the markets; Low level of productivity mostly due to the low use of required inputs such as improved seeds and fertilizers.

Maize is one of the staple foods and it is consumed in different traditional food preparation, the consumption of maize has been increasing and it is becoming an important cash crop for smallholder farmers, this put maize in major crops in the country and it is ranked second to the sorghum among the important cereals and third in all crops, maize crop is covering 100,000 ha which means 10% of the total cultivation land and is grown in all country's ecologies with an average of production 1.2 tons per ha (NGABITSINZE, 2014).

### 1.2 Significance of the Seed Product Chain in the Agricultural Development

Seeds are very essential in agriculture because they make up the determining factor of production; Seeds are a means of providing a series of improvements, all of which can benefit smallholders. Seeds can be a way to move new varieties, giving farmers access to more productive characters and improving yields (Gabriel, 2010). It's therefore very vital to meet the required quantity and quality for various intensification programs in various agro-bio-climatic regions. A sustainable rise in production and productivity hinges to a large extent on the development of high yielding varieties and the establishment of an efficient seed supply system allowing farmers to have easy access to these quality seeds (MINAGRI, 2007). after evaluation of the Strategic Program for the Transformation of Agriculture in Rwanda (PSTA II) in 2014, the findings show that PSTAII achieved 90% of the defined objectives but some of the objectives include, insufficient quantities of maize and wheat seeds produced nationally, sub-standard quality of domestically produced seed, poor seed sanitation and the dominance of crop pests and diseases, lowly germination of seeds distributed under the CIP, limited effective supply of seed have not been attained. It is in that context, the government of Rwanda together with all stakeholder has developed a new Strategic plan PSTA III with

two main objectives: first, to intensify, commercialize, and transform the Rwandan agriculture sector to enhance food security and nutrition, reduce poverty, and drive economic growth, secondly to accelerate sustainable increases and an expanded private sector role in production, processing, and value addition and commercialization of staple crops, export commodities, and livestock products (Nelson, 2016)

### 1.3 Research Problem

According to Gabriel(2010), the seed sector is gaining prominence such that, the government has supported the sector by establishing of the National Seed Service in 2001, the promulgation of the seed law in 2003, the implementation of a project supporting the seed commodity chain in 2005, and the announcement of a national seed policy in 2007.

Certified seed multiplication often is carried out by individual farmers and farmer associations. In recent times, about 18,000 ha of land are used by legitimately registered seed multipliers. These include 1,156 individuals and multiplier associations, and five private seed companies (RAB data, 2020) which sold all certified multiplied seeds to the Government, who also has the role of further processing and distributing the seeds to the farmers. (van den Broek, 2014)

According to the national seed policy of 2007 of Rwanda, the government through the ministry of agriculture (MINAGRI) intends to encourage the private sector actors in seed production and marketing activities so that it can gradually withdraw from this trend and focusing its efforts on coordination, regulation, quality control, and other key activities such as agriculture services delivery that cannot be carried out by the private sector (MINAGRI, 2007).

Governments' gradual withdrawal as a bulk buyer of the multiplied seeds leaves open market system making smallholder seed multipliers who have limited capacities of seeds processing, distribution, and limited market information access with an unstable, and uncertain market to supply seeds and limits seed multipliers ability to access the market of certified seeds.

In order to help and maintain smallholder seed multipliers and ensure the sustainability of seed supply to the Rwandan farmers, the government set different interventions such as organising training sessions on seed processing, subside of processing materials, help in the smallholder seed multipliers cooperative formation and the contract farming is one of these interventions to address this challenge of limited capacities of smallholders seed multipliers.

The contract farming defined as" an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forwarding agreements, frequently at predetermined prices " for smallholders, contract farming is expected to reduce market uncertainty; improve access to inputs, knowledge, and services; and thereafter to provide higher income. (Holtaland, 2017)

This intervention still requires in-depth research to determine the capacities of smallholder seed multipliers, opportunities, and/or alternatives, needs, trust, and willingness of smallholders towards seed companies. This research will also help to understand the level of government facilitation that can lead to the type of contract farming necessary to ensure the availability and sustainable supply of maize seeds to the farmers.

This study is focusing on maize seeds due to its importance as a staple food in Rwandan traditional food preparation, it also serves as a cash crop for small farmers since is currently grown in all Rwandan ecologies, however the productivity is still very low due to low adoption of new technologies and limited use of improved maize seeds which has an impact on annual production. As mentioned NGBITSINZE (2014) maize grain has to be imported in 2006 to supplement domestic production to satisfy local market demand.

**Problem Owner:** Rwanda Agriculture and Animal Resources Development Board (RAB), as a Government organisation with a general mission of developing agriculture and animal resources through research, agricultural

and animal resources extension, in order to increase agricultural and animal productivity as well as their derived, but also the responsibility of providing farmers and consumers of agricultural products with information, techniques and services meant for improving their profession and supplying the internal market with increased and quality production thereby raising their agricultural and animal husbandry incomes. RAB is commissioning this study which could help in improving smallholder seed multiplier's income.

#### **1.4 Research Objective**

To assess the effectiveness of contract farming in improving smallholder maize seed multipliers income and strategies to increase trust between smallholder maize seed multipliers and seed companies, and to propose appropriate improvement interventions: a case study of maize seed multipliers in Muhanga, Kamonyi, Ruhango of Southern Province and Rwamagana district in the Eastern Province of Rwanda.

#### **1.5 Research Questions**

##### **1. What are the dynamics of the current maize seed value chain?**

1.1 What are the stakeholders' roles, decision making, and leading power in the seed value chain?

1.2 What are the different capacities of smallholder seed multipliers to produce the required quantity and quality seed?

1.3 What are the alternatives market linkages for smallholder seed multipliers?

##### **2. What are the requirements to establish effective contract farming?**

2.1 What are the success and failure factors that can affect contract farming?

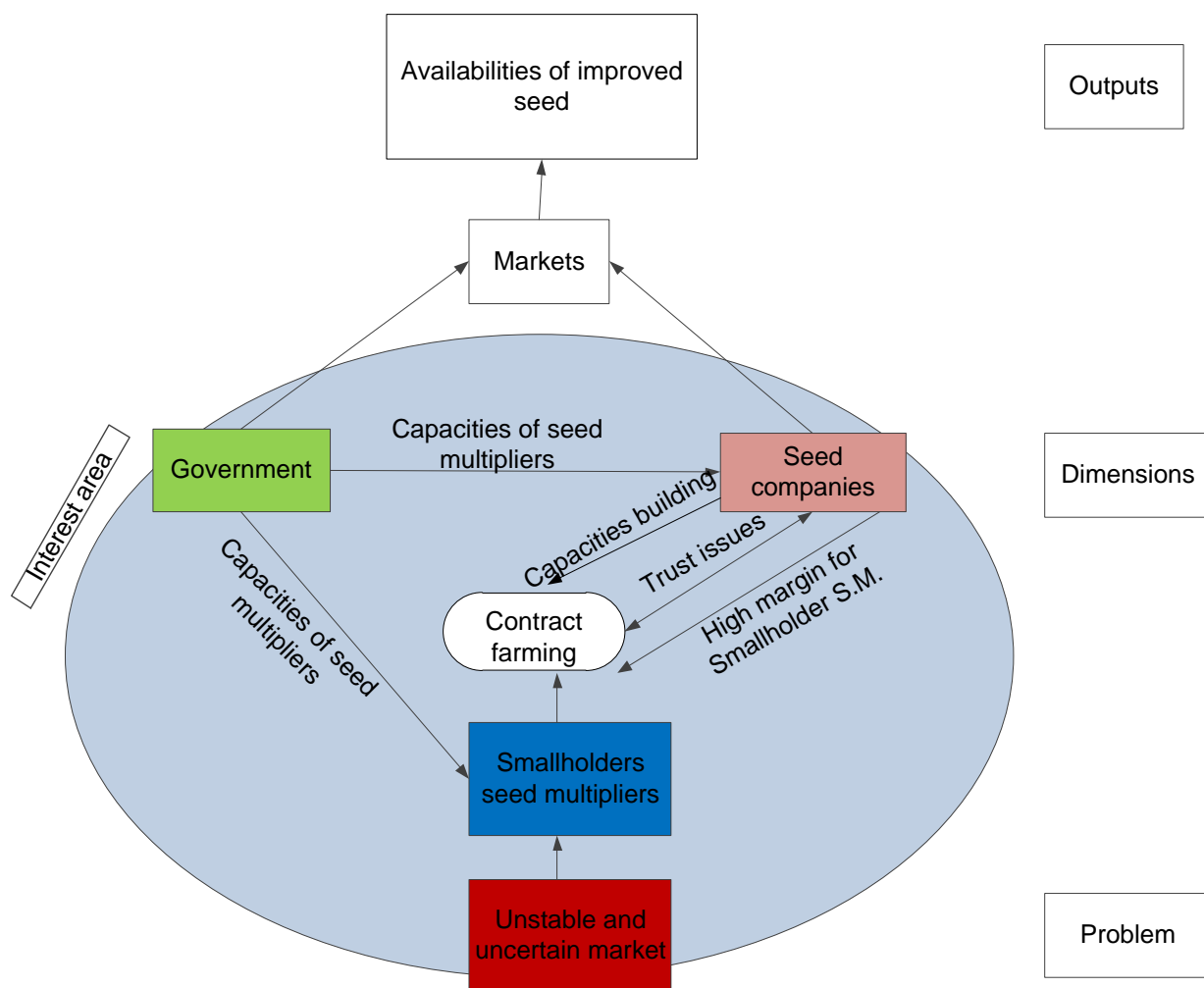
2.2 What can be done to improve trust between actors?

2.3 What needs to be done for contract farming to contribute to the higher income of smallholder seed multipliers that can lead to the contribution of Sustainable Development Goal 2?

## 1.6 Conceptual Framework

The problem is conceptualized in figure 2; the unstable and uncertain market of maize certified seeds from individual smallholder seed multipliers due to pulling out of the government from bulk buying of seeds from private multipliers. Contract farming is seen as one of the interventions that can help to link smallholder seeds multipliers to large seed companies. This study will contribute to finding out the capacities in terms of experience, land, processing equipment, and storage facilities of smallholder seed multipliers, trust between smallholders and large seed companies, and the plan of government to improve capacities of smallholders and seed companies. This study will also contribute to finding out what can be done by different actors to improve these areas in order to improve the availabilities of improved seed for maize farmers.

**Figure 2: Conceptual Framework**



Source: author

## 1.7 Definition of Terms

**Seed:** A seed is a small embryonic plant enclosed in a coating called seed coat, usually with certain stored foods; it is a reproductive structure that disperses and can survive for some time, It the part of a plant that can grow into a new plant.

**Pre-basic seed:** Pre-basic seed is the progeny of the breeder seed and is usually produced under the supervision of a breeder or his designated agency. This generation is commonly used for crops that have low multiplication ratios and where large quantities of certified seed are required.

**Certified seed:** Certified seeds are the issue from pre-basic or basic seeds produced under conditions that assure the maintenance of genetic concentration and identification of the variety and which meet certain minimum standards of concentration distinct by law and certified by a seed certification agency.

**Quality seed:** is defined as pure and varied with a high germination percentage, free from disease and pathogens, and with appropriate water content and weight. Quality seeds ensure good germination, rapid emergence, and vigorous growth. In this report, the term quality seed is sometimes used to describe a source of guaranteed quality seeds that meet the requirements of the certification agency.

**Contract farming:** in the context of this study, contract farming will be defined as an agreement between individual or/ and farmer cooperative seed multipliers and seed companies for the production and supply of seed production forward agreements.

**Small scale (smallholder) seed multiplier:** The term "smallholder" refers to farmers whose resources are limited compared to other farmers in the sector; and farmers who don't use advanced and expensive technologies. Smallholder seed multiplier is defined in this report as those producing seed on 15 hectares or less.

**Household:** a household is a family or a social unit living together, a household refers to a house and its occupants considered as a unit.

## **CHAPTER 2: LITERATURE REVIEW**

This chapter offers information on the review of earlier studies linked to this research study, in order to find support for the results. Under this direction, different subjects, and clarifications related to the seed value chain, with an emphasis on chain relationships between stakeholders, seed production, and marketing, will be assessed from different published sources and documents.

### **2.1 The significance of contract farming**

Contract farming is defined as an arrangement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forwarding agreements, often at pre-set prices (Wainaina, 2012).

Holtaland (2017) define contract farming as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forwarding agreements, frequently at predetermined prices “ for smallholders, contract farming is expected to reduce market uncertainty; improve access to inputs, knowledge, and services; and thereafter to provide higher income. For the purposes of this study, contract farming will be defined as an agreement between individual seed multipliers and seed companies for the production and supply of maize seeds following forward agreements, for smallholder CF will be the way of reduction of uncertainty of the market.

The arrangement usually involves the buyer in the provision of certain production support through, for example, the delivery of inputs and the facility of technical advice. From this agreement, the farmer undertakes to supply specific produce in quantities and according to quality standards within the agreed deadlines. The company, on the other hand, agrees to support the farmer's production and buy the produce at a predetermined price.

According to (Nham, 2012), concerns of exploitation in forms of large agribusiness firms using contracts to take advantage of cheap labour and transfer production risk to farmers. Despite these critics, it is also proven that contract farming generates high incomes and many other benefits for smallholder farmers. However, contract farming can be the answer to the problems of market disappointment, the provision of credit and agricultural inputs because the contracts often involve the provision of seed, fertilizer, and technical assistance on post payments and a defined price at harvest. (Nham, 2012).

Contract farming is a form of “vertical coordination aimed primarily at correcting the market failure associated with spot markets that occurs due to imperfect information” (Wainaina, 2012)

The strict management and coordination of agriculture value chain due to Market competition, consumer demands, technology development, government policies, product traceability require a high level of organisation which led to vertical coordination in agriculture chains (Holtaland, 2017)

As stated by (FAO, 2013) Contracting between producers and processing, or marketing firms remain practical methods to strengthen vertical coordination in the agriculture value chain. The motives for undertaking CF are various and different for buyers and farmers but all parties want to reduce market uncertainty and transaction costs. Farmers are motivated by access to markets for their product, technical assistance, and pre-financing for inputs by the contracting company on the practical price, farmers also are motivated by the new technology and innovations from the firms which are adapted to their needs and help them to satisfy market requirements. For the firms, their motivation is to protect a consistent and predictable supply of the need product that meets their specifications in terms of quality and quantity at a realistic cost.

### **2.1.1 Contract farming and Smallholders**

With the development of new technologies, globalisation, and expansion of agriproduct markets, smallholder farmers with limited market and production information, lack of savings and credit, failed to compete on the global open markets and these farmers are becoming marginalised, because the large farms are targeted for more profitable operations. (FAO, 2013)

Although some Critics of contract farming claim that large agribusiness firms use contracts to take advantage of cheap labour and transfer production risk to the farmers, Yet there is plenty indication that small farmers can be benefited from contract farming because frequently, the contract includes the delivery of inputs such as seed, fertilizer, and technical assistance, the firms also provide credit and new technologies to the farmers but also guaranteed the price at harvest time. (Nham, 2012)

According to (John Kanburi Bidzakin, 2019) contract farming is significantly contributing to the increases in yields and gross margins of smallholder farmers, and it is a recognised key to the problems of market failure by providing information, credit, and agricultural inputs.

### **2.1.2 Agribusiness firms and contract farming**

In order of answering to differences in challenges such as land acquisition, human resources management but also intensifying their operations, agribusiness firms favour contact farming over the sourcing products from the open market. Especially for Non-traditional crops with special qualities and food safety requirements (Simmons, 2005) due to the strict quality and timing requirement which can have an impact on packaging, preserving, and transportation aspects.

Food manufacturers and exporters usually face strict quality requirements and need products on time. These requirements reflect technical aspects such as the preservation, packaging, and transportation of products in order to meet consumers' demands for consistency. By dealing with smallholder through contract farming, the firms are reducing the production and price fluctuation risk, establishing a stable and reliable supply of quality produce. (Holtaland, 2017)

### **2.1.3 Benefits and problems of contract farming**

Both smallholders and firms get benefits from CF, to the smallholders the CF provides inputs, new technology, access to credit and offers a ready market for their products. The FC provides companies with a regular supply of raw materials, it's also provides all participants with better risk management, improved employment, and the development of an efficient farming system. (FAO, 2013)

CF is always used as coordination tools that help the actors to make different decisions related to the partner's needs. Such as the right quantity and quality to produce, the right time and place to deliver but also the allocation of resources to produce the right product required.

The CF is also utilised to offers and enforce the motivation but also as the accountability way in order to stimulate the performance of participants, therefore for a certain activity or a specific quality, a proper incentive should be specified for each contract partner for a better transaction.

As a vertical coordination tool between farmers and firms CF gives the firms a certain level of control to farmers' activities and helps to clarify the allocation of risk and to decides the role and level of each partner to overcome the risk.



Although CF has proven to be beneficial to both smallholder farmers and the firms, there are also many critics and challenges which can lead to problem or disadvantages to both of the parties.

Smallholder farmers with limited capacities, such as access to inputs, new technologies, low and unpredictable production but also the limited financial capacity can lose their autonomies due to the weakness and position of negotiation, this can lead to the acquisition of the land by external investors, overuse of land, transfer and increased the production risk to the farmers. Contracting agreements are often verbal or informal, and written contracts often do not provide legal protection, this Insufficient enforcement of contractual facility results in the breach of commitments by either party and as the farmers have to depend on only one buyer with the CF this can result to late payments and low price.

Even though in the CF scheme farmers give the impression to be vulnerable, firms also encounter challenges largely related to the transaction cost. Firms often work with large numbers of small farmers which are also largely scatted, and this implies a high level of support, a high level of the input distribution. In addition to this transaction cost generated due to a high level of logistics, administration, and support, the firms also experience extra costs for supervision and monitoring (World Bank, 2014).

#### **2.1.4 Types and factors for the success of contract farming**

Contract farming schemes is a general and wide concept which can vary according to different types of agreements, contract requirement, the scale of production, and the actors involved. Each type also has advantages and disadvantages depending on the management and the actors.

Holtaland (2017) highlight different types of contract farming such as

**Informal CF:** is defined as a simple supply agreement between farmers and individual or companies, this agreement is often seasonal, and particularly applies for Crops with the minimal amount of processing such as vegetables, and fruits. This type of contract is often limited to the provision of seed and basic fertilisers on the firm side, grading, and quality control on the farmers' side.

**Intermediary CF** includes an agreement between a firm and intermediaries who have on their side an informal production agreement with different farmers.

**The multipartite CF** involves a partnership between firms with a role of buying, farmers for production, and third parties to facilitate access to services, this type of CF is usually characterised by cost and risk-sharing between partners and dependence on smallholder producers.

**Centralised CF** involves an agreement between a firm and various farmer, the firm provides all production requirement inputs to all farmers and farmers agree to supply specific qualities and quantity on the planned times, this CF is characterised by a high level of production control on one side, and high level of investment on the other side.

**Nucleus-estate CF** include agreement of farmers to supply additional products, to supplement the production of a neighbourhood firm with their plantation, in order to have the required quantity and qualities to optimize the capacity of the processing plant. This model is characterised by the high level of supply chain control, and limited flexibility in choosing farmers to work with.

All these types of contract farming have it contribute to the success or failure of the agreement, however, they are also several financial, no financial, internal, and external factors that influence the connection between small farmers and firms, which contribute to the successful and sustainability of CF.

The success of CF is usually depending on the types of product involved, types of sellers and buyers but also the pricing mechanism.

**Product:** the higher value the commodity is and the more it needs investment to produce high quality its will highly depend on contract farming for more coordination and control from both parties. The product involves high technical skills and specific inputs to produce, with a high level of perishability, limited market outlets, and low risk of side selling are generally appropriate for CF.

**Types of sellers and buyers:** the relationship between actors involved is a crucial factor in the success of CF, the attitude of buyers who generally lead the contract process towards sellers will determine how strong and sustainable the agreement will be, the capacities of actors involved, but also the external working environment such as rules and regulations that direct the agreement are also the main factors influencing the success of CF.

**Pricing mechanism:** as in all contract, all parties need the to maximise the profits and minimise costs, pricing are frequently the causes of confusion and disputes in agreement, the clear and transparent pricing mechanisms are a crucial element of the success of CF, there are the different mechanism of pricing such as fixed prices at the beginning of production, the flexible prices based on the markets or others determinant costs, split prices where the buyers pay the first instalment before the production and others instalment paid depending on the sale prices realized by the firm, there is also a mechanism of consignment prices where the prices are calculated after the marketing and selling of the product.

All this mechanism can be successful depending on the management and flexibility of the actors, however the most important is the description of the product for instance various grades, clarity of quantity and quality, and the final conditions for the purchase. Different incentives to motivate farmers such as premium for quality and buying the product of the second grade are also important for the success of CF (Holtaland, 2017).

## **2.2 Value chain concept**

The value chain is 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 to create a finished product and delivery to final consumers, and final disposal after use (Devaux, 2016).

The value chain can also be defined as the actors connected along a chain producing, converting and providing goods and services to end consumers through a sequenced set of activities (Donovan, 2015)

The value chain development approach identifies the main bottlenecks in the system, uncovers their root causes, and offers holistic upgrade strategies that lead to more competitive and sustainable operations and businesses. The value chain approach assesses how the value of an end market is created by a sequential chain of activities carried out by actors supported by various business services and who are influenced by the particular business environment in which they operate (Van Engelen, 2013).

The value chain perspective also offers an important means of understanding the relationships between companies between the different actors involved in order to increase efficiency and the means to allow a company to increase its productivity and add value.

## **2.3 Stakeholders in maize seed value chain**

A stakeholder is someone who has something to gain or lose from the results of a planning process or project. Stakeholders can be organizations, groups, departments, structures, networks, or individuals.

Stakeholders comprise interest groups that are affected by the problem or those whose activities strongly affect the problem; those who have the information, resources, and expertise necessary to formulate and implement the strategy; and those who monitor the process of the different answers (FAO, 2006)

The seed value chain is composed of different Stakeholders; include actors in the value chain, supporters of the value chain, and influencers of the chain. The actors in the value chain are stakeholders directly involved in the seed production and their transition from production to the consumers (farmers). These include input suppliers, small and big scale seed producers, agro-dealers, and service providers. Supporters of the seed value chain are stakeholders who are not directly involved in seed production and its transition, but they provide important services to the value-added of the product such as the NGOs that provide technical support. However, the

influencers of the seed value chain are the regulatory institutions, certification agencies and policies makers (Bitzer, 2015)

## **2.4 Seed systems used by smallholders**

Seeds are an important entry point to promote productivity, nutrition, and resilience among smallholder farmers. As pointed out by (Sperling, 2016) although investments have mainly been focused on strengthening the formal sector, the informal seed sector remains the core of seed acquisition, particularly in Africa, where 90.2% of farmers access their seeds from informal systems, of which 50.9% come from local markets. In addition, 55% of seeds are paid in cash, which indicates that smallholders are already making significant investments in this area.

Even though the informal seed sector is still very important particularly in Africa, it is mostly based on old practices and low lacks of knowledge of farmers who selected and keep parts of their production as seeds for following seasons, exchanges between farmers and sometimes from the selection of food commodities sorted to be used as seeds. All these traditional practices lead to poor seed quality and the risk of spreading the disease (Gabriel, 2010).

## **2.5 Current Seed Systems in Rwanda**

Rwanda's seed chain is characterised by the coexistence of formal and informal seed sectors under which fall the four dominant seed systems include farmer-saved seed, public-private, public, and private seed system.

### **1. Informal sector**

In Rwanda, the informal sector is grounded on old practices of farmers, where they select, sort, and saved a part of their yield as seeds for the following season, exchanges between farmers and some farmers also sort and save seeds from food commodities purchase from the local market. This sector is still very important as they represent the majority of seed transaction volume even though they encounter varying constraints such as poor-quality seed, risk of disease propagation which resulted in low production. (Nelson, 2016).

### **2. Formal sector**

In Rwanda, the formal seed system is under development since the announcement of a national seed policy in 2007 and it is characterised by public-private, public, and private seed systems.

This sector is dominated by a public seed system under the seed system unit of RAB and some agriculture development projects such as One Acre Fund, Harvest Plus for the production from foundation seed to certified seeds.

Public-private and private seed system is done by individual seed multiplication and seed companies but the involvement of the private sector in seed production is still not encouraging due to under-resourced of the formal system and lacks solid private seed sector to complement public sector activities (Nelson, 2016). And it's restricted to the definite association, cooperatives, and companies which multiply and market seeds in partnership with RAB (MINAGRI, 2007).





### **3. Main seed systems in Rwanda**

70 % of the planted maize seed in Rwanda are hybrids seeds and hence sourced within the formal seed sector. 30% of remaining are open-pollinated varieties (OPV) and sourced from both formal and informal seed sectors (Nelson, 2016).

Recognising the essential performance benefit of hybrids over OPV, the Rwandan government has decided to reduce the production of OPV seeds and promote locally produced hybrid seeds; this decision has a negative

influence on the capacity of the seed system to produce quality OPV maize seeds, which is quickly becoming an informal market.

**Figure 3: Main seed systems in Rwanda**

Seed Systems	 Farmer-saved	 Public – Private	 Public	 Private
Type of Crops	Local food crops	Food and cash crops	Major food and cash crops	High-value crops
Crops	<ul style="list-style-type: none"> <li>• Common bean</li> <li>• Potato</li> <li>• Maize (OPV)</li> <li>• Banana</li> <li>• Sweet potato</li> <li>• Cassava</li> </ul>	<ul style="list-style-type: none"> <li>• Maize (OPV)</li> <li>• Potato</li> <li>• Common bean</li> </ul>	<ul style="list-style-type: none"> <li>• Maize (OPV)</li> <li>• Potato</li> <li>• Soybean</li> <li>• Wheat</li> <li>• Rice</li> <li>• Common bean</li> <li>• Cassava</li> </ul>	<ul style="list-style-type: none"> <li>• Maize (hybrid)</li> <li>• Soybean</li> <li>• Vegetable</li> </ul>
Types of Varieties	Local and improved	Improved	Improved	Improved and hybrids
Quality Assurance System	Farmer-selected	Farmer-selected, certified emerging through private seed producers	Certified	Certified
Seed Distribution	Farmer-saved, farmer to farmer exchanges (trading, selling)	Local private seed companies, agro-dealers, farmer groups, cooperatives	Agro-dealers and NGOs	Regional private seed companies, NGOs, agro-dealers

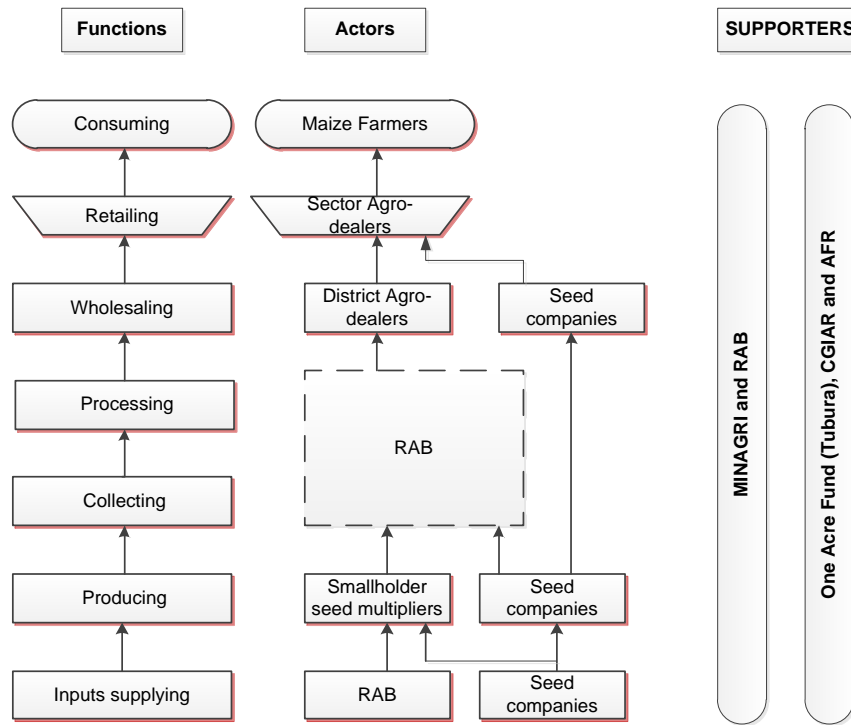
Source: Rwanda Early Generation seed study, country Report (2016)

## 2.6 Maize Seed value chain

As the government of Rwanda embarked on the transformation of subsistence to market-oriented agriculture, the request for high-yielding seeds and the need to develop new planting materials have increased over the past decade. However, coordination of the seed value chain remains very weak and the flow of information between the different actors is limited (Nelson, 2016).

The maize value chain has been coordinated by the Ministry of Agriculture and Animal Resources through their different subordinate organization, currently through RAB, since the establishment of the National Seed Policy in 2003 (MINAGRI, 2007). Figure 4 below.

**Figure 4: Maize Seed value chain Map**

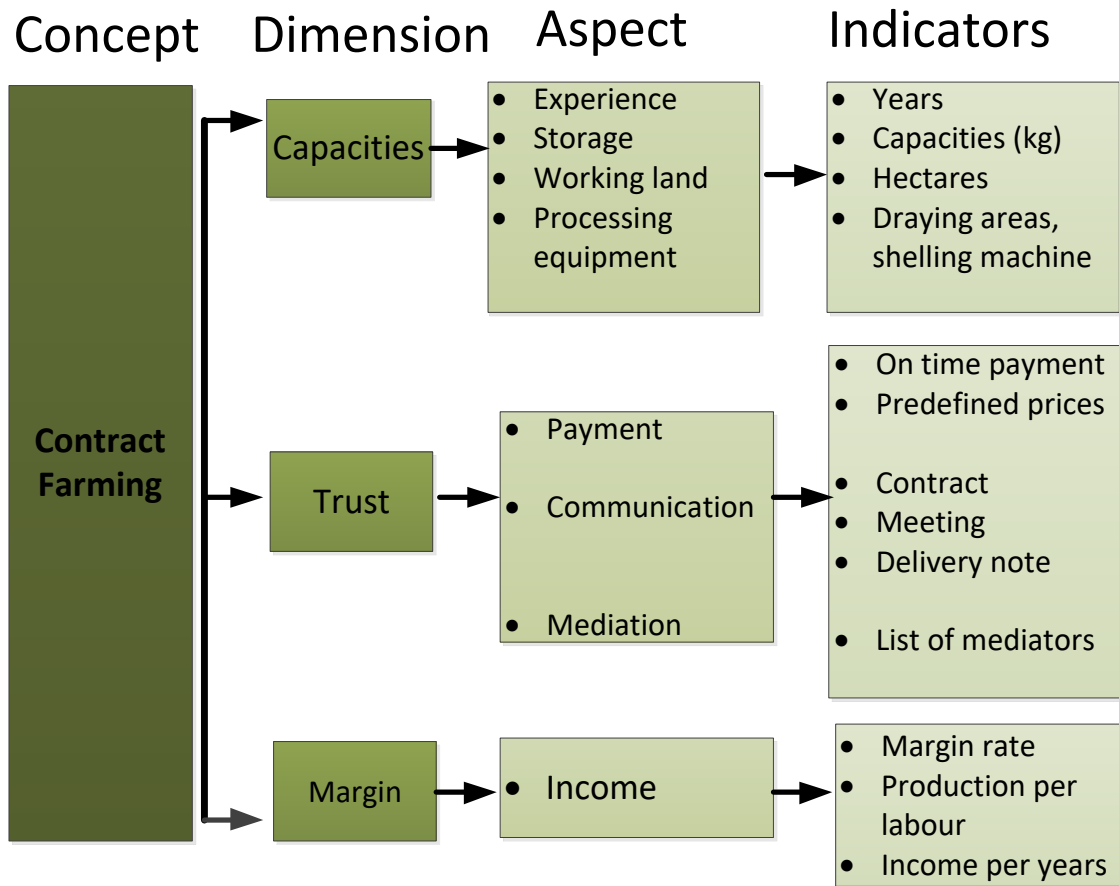


Source: author

## 2.7 Operationalization of the study

Operationalization of the concept of contract farming between smallholder seed multipliers and seed companies, different dimensions which are capacities of smallholder multipliers which can attract the contractors, trust between actors for the smooth working environment and margin for seed multipliers, aspects and their specific indicators which will be assessed and analysed in this study will be listed and connected in the operationalization framework (figure 5) below.

Figure 5: Operational framework



Source: author

## CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

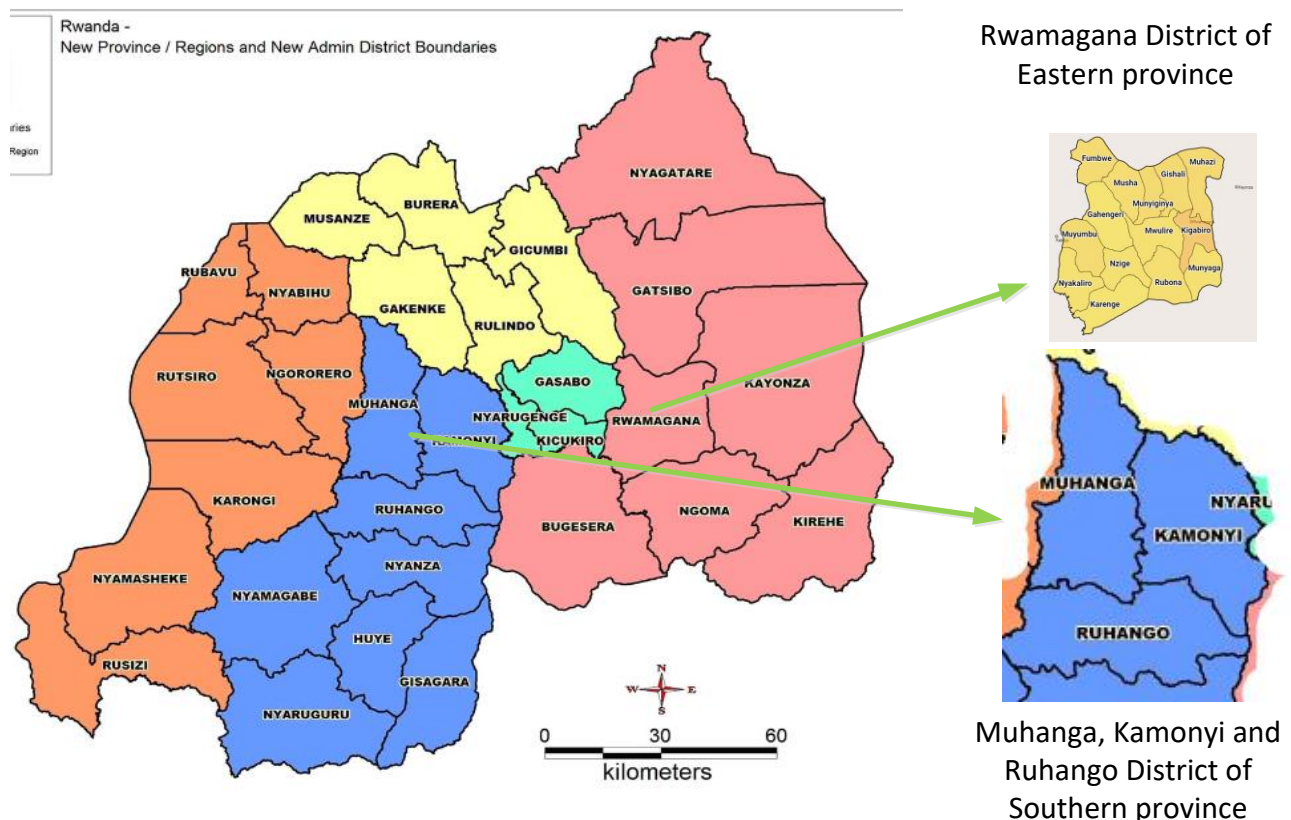
The methodology of this research covers the research study area, research design, research framework, data collection, and data analysis. Both qualitative and quantitative approaches were used based on collected primary data from the survey and secondary data from the literature.

### 3.1 Study area

This study was conducted in four districts in two different provinces of Rwanda, namely Muhanga, Ruhango and Kamonyi, with 94798 ha of agriculture land but only 11% of improved seed used, and this makes these three districts the largest agricultural land in the southern province, but with the lowest percentage of improved seeds used (National Institute of Statistics of Rwanda, 2018). The study also covered Rwamagana District of the Eastern province (figure 6). Agriculture is the major activity in these districts that engages about 80% of the district population (Government of the Netherlands, 2016) where 78% of the farmers are smallholders with an average of 0.9 ha of land per household (National Institute of Statistics of Rwanda, 2012)

The district of Rwamagana in the Eastern province has 63 small seed multipliers working on 468 ha of land, and the province of South has 207 small seed multipliers working on 4979 ha of land. (RAB data)

**Figure 6: Projection of working districts throughout Rwanda map**

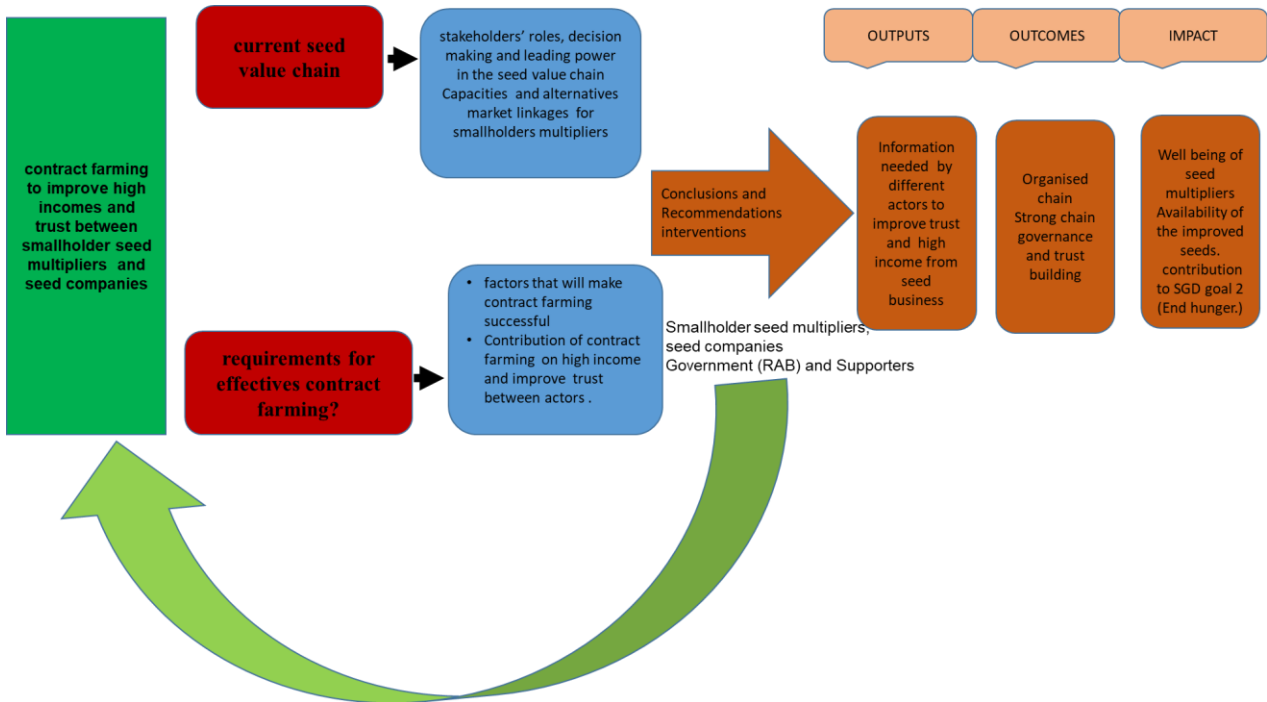


Source: [https://commons.wikimedia.org/wiki/File:Rwanda\\_Districts\\_Map.jpg](https://commons.wikimedia.org/wiki/File:Rwanda_Districts_Map.jpg)

### 3.2 Research strategy

This study used qualitative and quantitative approaches. It comprised both primary and secondary data sources. Primary data collected from the survey and interviews, and also secondary data obtained from desk research through existing literature which are essential for establishing basic information related to the research topic from different sources like the internet source, textbooks, scientific journals, and different reports.

**Figure 7: Research framework**



Source: author

### 3.3 Data collection

This research study was conducted during COVID 19 pandemic period; Rwanda is one of the affected countries with 410 cases on 4th June 2020 (Rwanda Biomedical Center, 2020). Given the trend of this COVID-19 pandemic, the collection of data required to take certain precautions that will guide and make the transition to obtaining relevant data without endangering the lives of the respondents and the researcher.

#### 3.3.1 Desk study

Secondary data acquired from different sources such as books, scientific journals, official reports, and the Internet were used to find information from the current literature review related to this topic, these data were very important to confirm the foundation of this research and the results. This also helps to identify the stakeholders' roles, decision making, and leading power in the seed value chain.

#### 3.3.2 Survey

The survey was carried out in four District, Muhanga, Ruhango, Kamonyi, and Rwamagana, where the Smallholder seed multipliers were the main target group for the study. A sample of 40 smallholder maize seed multipliers was randomly selected from a list of all maize seed multipliers working in 4 Districts (RAB data). To understand different



capacities of smallholder seed multipliers to produce the required quantity and quality seed but also to get from smallholders' perspective the factors that can make contract farming successful and what can be done to increase trust between them and seeds companies (table1). Giving the current trend of COVID-19 pandemic the researcher couldn't travel to the field for data collection, to cope with this problem a substitute data collector with a bachelor's degree in statistics applied to economies was hired to collect quantitative data. To ensure the validity and accuracy of quantitative data, the commissioner has made an employee available to assist the data collector to the extent possible and the researcher conducted a meeting with both, to discuss and clarify the questionnaire and the follow up through telephone call was conducted during data collection. The data was filled in using an online form so that every day the researcher could verify and cross-check the data collected.

**Figure 8: Pictures of survey data collection in Muhanga District**



Source: Data collector

### 3.3.3 Interview

Key informants from government institutions (RAB) and others actors involved (seed company, and individual seed multipliers) were purposively selected according to their role and position, were consulted and interviewed at the time of research to get more clarity on what can be done for contract farming to contribute to high income to smallholder seed multipliers and how contract farming can increase trust between actors (table1). Given the pandemic period, to maintain the validity and accuracy of the qualitative data a semi-structured online interview was conducted with highly focused questions, and some interviews were recorded according to the interviewee's consent.

- 40 Smallholder seed multipliers
- 6 Key Informant (1RAB, 3 Seed Company, and 2 individual seed multipliers): online Interviews were conducted.

### 3.4 Data Processing and analysis

After data collection, the quantitative data collected from individual seed multipliers used questionnaire, were organised, Microsoft Excel and SPSS were used to derive descriptive statistics which helped to understand similarities and differences in motivation, trust, and willingness of contracting with seed company among seed multipliers based on their capacities(experiences, infrastructure facilities) on different research questions such as factors to improve trust between actors, varies linkages of seed multiplies, capacities of seed multipliers but also their perspective on how contract farming can be successful and contribute to increasing their income ( high

margin). The stakeholder matrix tool was used to describe and analysis their roles, decision making, and their leading power in the seed value chain.

The qualitative data from the interviews were described, classified, and processed using Excel. The data were divided into different categories according to sub-questions, such as market linkages for small seed multipliers, factors for successful contract farming, and improving trust between actors. each category was coded and grouped, these helped to link the categories to the sub-questions and give them meaning and compare the result.

### Summary of research methodology

**Table 1: Data collection methods**

SN	Research Question	Research strategy and Data Collection Tools	Analysis processes or output	Indicators / Findings
1	<b>What is the situation of the current maize seed value chain?</b>			
1.1	What are the stakeholders' roles, decision making, and leading power in the seed value chain?	Desk Study  Survey and Interview	Qualitative analysis	stakeholder's role, decision, and influence in the seed value chain
1.2	What are the different capacities of smallholder seed multipliers to produce the required quantity and quality seed?	Survey: online Questionnaire	Descriptive statistics SPSS or Excel	quantity of seed Production, experience, size of land, processing and storage facilities
1.3	What are the alternatives market linkages for smallholder seed multipliers	Survey:  online Questionnaire interviews:  Checklist questions.	Qualitative analysis	markets opportunities of seed for smallholder seed multipliers
2	<b>What are the requirements to establish effective contract farming?</b>			
2.1	What are the success and failure factors that can affect contract farming?	Survey:  online Questionnaire interviews: Checklist questions  Desk study	Qualitative analysis	Influential Factors from smallholder's perspective - Influential Factors from key informant perspective
2.2	What can be done to	Survey:	Qualitative analysis	-How to improve trust

	improve trust between actors?	online Questionnaire interviews: Checklist questions		between smallholders and the firm from smallholder's perspective - How to improve trust between smallholders and the firm from firm and policy perspective
2.3	What needs to be done for contract farming to contribute to the higher income of smallholder seed multipliers that can lead to the contribution of Sustainable Development Goal 2?	Survey: online Questionnaire interviews: Checklist questions	Descriptive statistics /SPSS or Excel Qualitative analysis	Indicator 2.3.1. Volume of production per ha. Indicator 2.3.2 Average income of small-scale seed producers per year. -Actions to improve contract farming from multipliers perspective -Action to improve contract farming from policy and firm perspective

Source: Author

### 3.5 Ethical Consideration

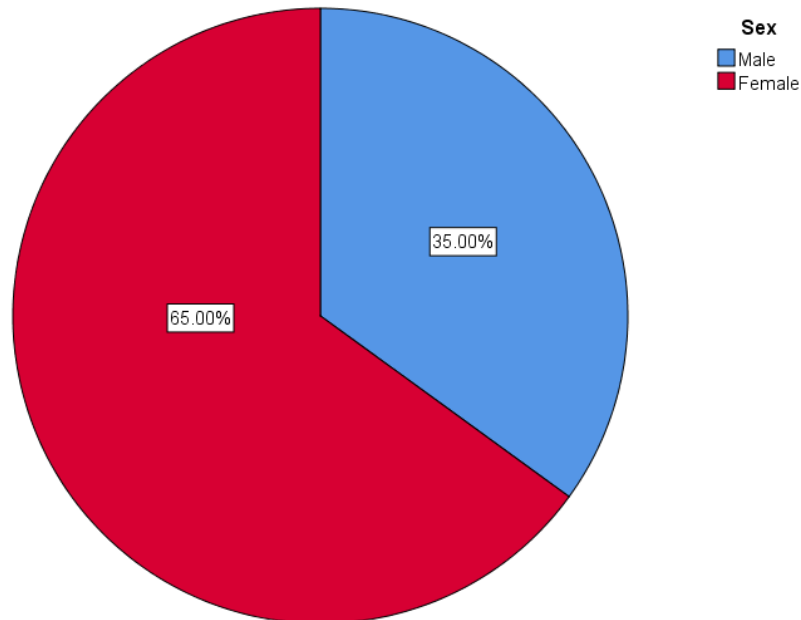
In this study and especially during data collection, the researcher took into consideration and respected all ethical concerns. Each respondent was clearly explained the purpose of the study and was requested their consent to participate in the study. the interviewees were requested their consent for recording if necessary, all respondents were ensured about their anonymity and that they are not under any obligation to be part of the research and it is in their rights if they ever feel the need to stop.

## CHAPTER 4: RESULTS PRESENTATION

This chapter is counting the findings from a survey carried out from smallholder maize seed multipliers and interviews conducted on seeds companies that buy seeds from multipliers and key informants from RAB as a government organisation in charges of regulation and coordination of the seed value chain.

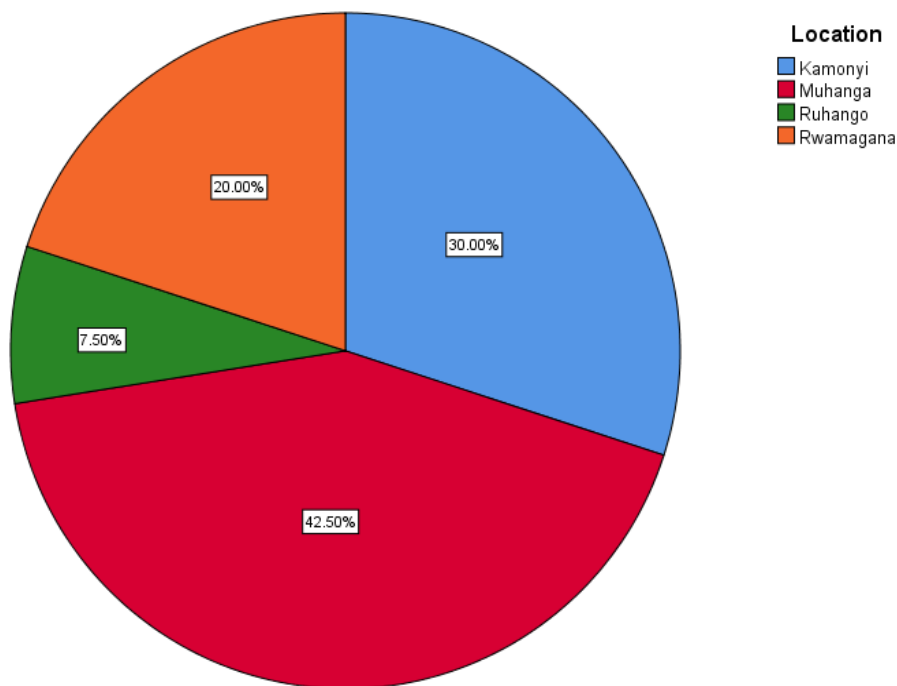
The survey carried out among 40 smallholders from four different District, where 30% of the respondent were from Kamonyi, 42.5% from Muhanga 7.5% from Ruhango and 20% were from Rwamagana (figure 10), the findings also show that 65% of respondents were female and 35% were male (figure 9),

**Figure 9: Respondents by gender**



Source: Author, Field data (2020)

**Figure 10: Respondents by location**



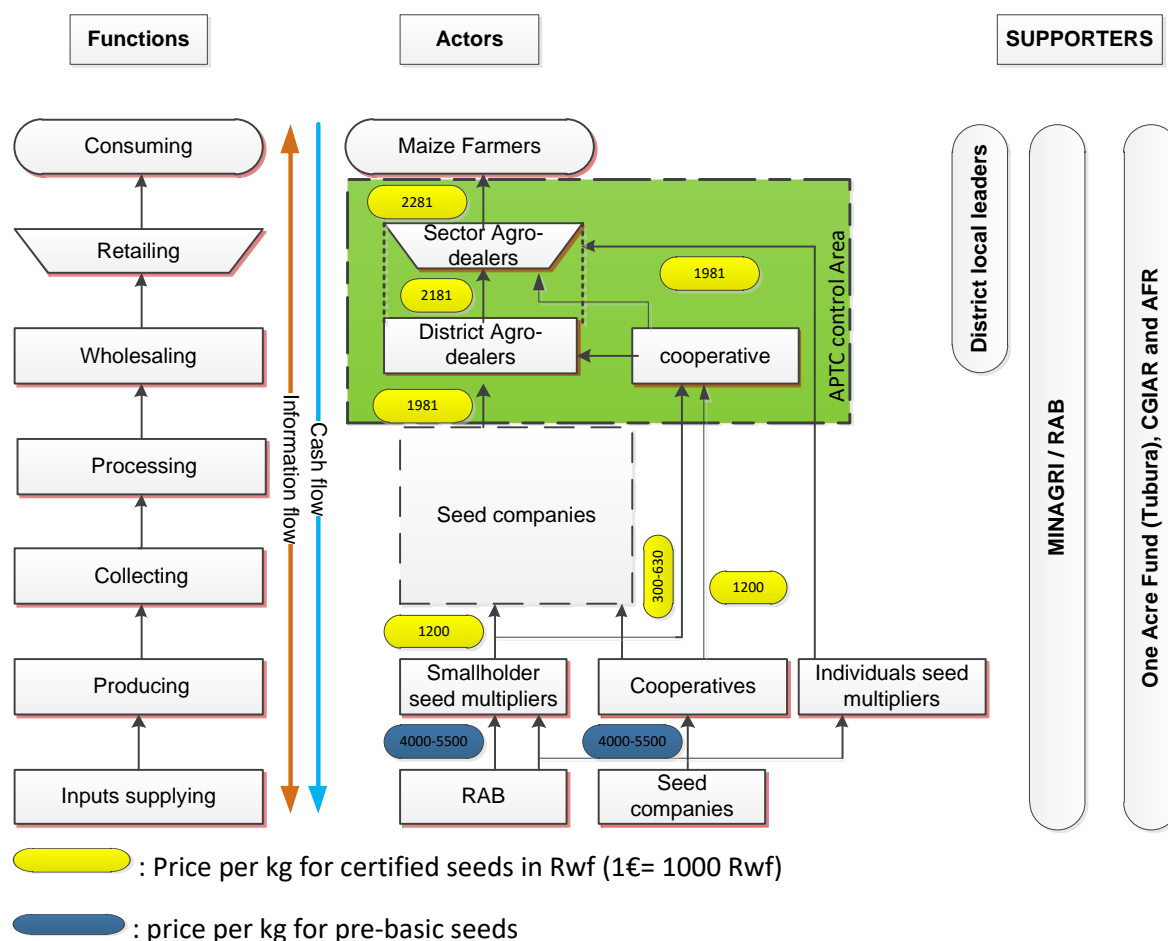
Source: Author, Field data (2020)

#### **4.1. Stakeholders' role, decision making and leading power in the Maize seed value chain**

The maize seed sector has different stakeholders playing a crucial role in this sector from production, processing, and distribution to last users, in this sector there are supporters and influencers, all these stakeholders have a different level of decision and power in the coordination of this chain.

The organisation of the chain, position, and different functions of stakeholders are presented on the chain map (Figure 11), and Power and interest grid (figure 12) helped to understand the leading and decision-makers in the maize seed value chain.

**Figure 11: Maize Seed new value chain Map**



Source: author, field data

#### 4.1.1 Different Stakeholders and their role in new maize seed value chain

From 2007 the Government of Rwanda through the Ministry of Agriculture and Animal Resources Development decide to pull out from bulk buying of maize seed in order to boost the private sector in seeds production and marketing activities, after years of mobilisation and policy development this decision started to be implemented in 2018 as a pilot phase. Before the government decides to pull out from bulk buying of the maize seeds, RAB role was not only coordinating and monitoring of the sectors but was also the main actor in these chain by playing a crucial role of inputs supply through different activities such as, Insures the development of new varieties for producers, Produces required foundation seeds and ensuring the maintenance of varieties in circulation through breeding and genetics conservation. RAB was also playing a big role in collecting seeds from seeds multipliers and distribute to maize farmers (figure 4).

According to the seed division manager in RAB, for the government to promote and encourage the private sector, the government decided to pull out from collecting and distribution of certified seeds, and these roles will be played by individual and cooperative seed multipliers or seeds companies with the required capacities.

With the new system, RAB is still playing the role of inputs supplying, coordination, monitoring, and promoting the use of improved seeds, and capacity building for all maize seed chain stakeholders (Table 2).

Seed company leaders and policymakers interviewed confirmed that maize seed production is still dominated by individual smallholder seed multipliers, some cooperatives, and seed companies. In this new system, the companies and big cooperatives are playing the role of collecting, processing, packaging, and distribution of the maize seed to district agro-dealers which has the role of wholesaling of the seeds to The sector agro-dealers with also have the role of retailing of the seeds to maize farmers.

In the new maize seed value chain, a private company: Agro-Processing Trust Company(APTC) is a limited company with shareholders, appointed by the Ministry of Agriculture to organise and supervising maize seed distribution, to avoid trafficking of seed outside of the country, APTC is working as an intermediary actor between seed companies and agro-dealers as mentioned by seed division manager in RAB. This company plays a crucial role in coordination and monitoring the entire process of seed distribution, documentation, and payment process (see the leading power of APTC). The local government through District has the role of payment of the 55% of the seeds subsidy to seeds companies.

**Table 2 Stakeholders matrix in new maize seed value chain**

Functions	Actors involved	Role in the chain
Inputs supplying	RAB, international seed companies	Variety development and conservation Ensures Foundation Seeds production Production and multiplication of pre-basic and basic seed
	District Agro-dealers	Fertilisers and pesticide distribution
Producing	smallholder seed multipliers, cooperative, international, and national seed companies	Production, multiplication, and Distribution of basic and certified maize seeds.
collection and processing	Individual seed multipliers, cooperative and seed companies	Collecting maize seeds from smallholder multipliers, Sorting, grading, coating, and packaging collected seeds. Distribution packaged seeds to agro-dealers through APTC.
selling	District and sector agro-dealers	Sale and supply of maize seeds to farmers in the district and sectors
consuming	Maize farmers	Effective use of maize improved seeds
<b>Supporters</b>		
Supervision and payment	District management	Mobilization and ensure the efficient use of improved seeds Follow up of the distribution of the seeds to the farmers Payment of the seeds subsidy to seeds companies.

Coordination	APTC	Supervision and monitoring the entire process of seed distribution Documentation and payment process follow up serve as a link between seed companies, district and RAB management
Regulation	MINAGRI, RAB	Formulate and update political orientations and seed policy strategies Coordination, monitoring, and promoting the use of improved seeds Capacity building for all maize seed chain stakeholders. Allocation of budget and funds to support maize seed value chain
Inspection and certification	Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA)	Ensures seed quality control at all levels and provide seed certificate
PROGRAMS AND NGOs	One Acre Fund	Facilitates activities and transactions to various agricultural value chain levels, including seed supply and market support
	Harvest Plus	Work with private multipliers and cooperatives to produce and multiply certified seeds of released varieties for transfer to farmers.
Financial institution	Access to Finance Rwanda (AFR)  Bank and SACCO	Works with institutions and agents in the maize, coffee, tea, dairy, and Irish potato value chains to identify financial needs Facilitate engagement with financial service providers and increase access to services.

Source: Author, Field Data

#### 4.1.2 Leading power and decision making in the new maize seed value chain

1. Inputs supply: all the interviewed respondents stated that RAB has a great influence on the maize seed value chain as it is in charge of the development of new varieties for producers, Production of required foundation seeds, and ensuring the maintenance of varieties in circulation, RAB also as the government institution in charge of coordination, monitoring and regulation have a big influence in the whole chain as confirmed by the seed Division manager (figure 12).



2. Production: 92.5% of multipliers stated that seed multiplication is their main activities, whereas before starting to produce, a seed multiplier must declare the soil to be used and the certifying institution (RICA) must approve the soil, 100 % of the respondent use their own land for multiplication, and 85% of the multipliers have more than 5 years of experience (figure 13). Although seed companies working with smallholder multipliers and RAB, generally decide qualities and varieties of seeds to be produced, multipliers also decide which quantities and when to produce. They are also allowed to work with a company, cooperative or individual multiplier of their choice.

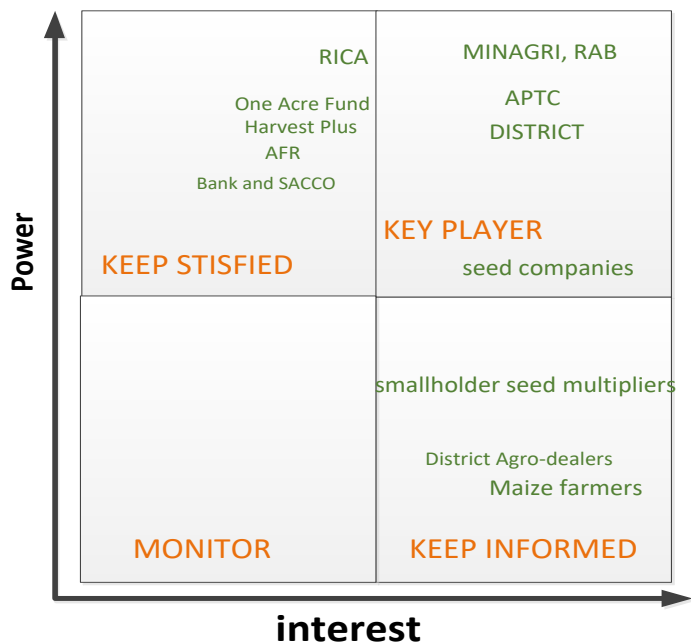
3. collection, processing, and marketing: seeds companies interviewed and the seed division manager in RAB mentioned that collection, processing, and marketing of the maize seed are done by the selected companies, cooperative and/or individual seeds multiplier according to their willingness and their capacities. After meeting selection criteria such as capacities of allocation of 50 ha of land, the establishment of storages in different working districts, processing, and marketing capacities. The selected candidates sign a tripartite contract between them, working Districts, and RAB so that they are authorised collection, processing, and marketing of maize seed. This gives them the power to establish contract farming with smallholder multipliers whose capacities do not allow them to supply their seeds to the open market. As the chain is developing, the companies will also be allowed to start their research in order to start developing their own planting materials and varieties, as stated by the seed division Manager in RAB, they want to build the capacities of the private sector to the level of having their breeding unities.

At this level of the chain RAB also have a large influence as the government institution in charge of regulation coordination, and monitoring of the chain, up to now there are 21 selected seed multipliers include 15 seed companies, 1 cooperative, and 5 individual seed multipliers that are allowed to contract with smallholder seed multipliers. APTC also has a large influence in this chain (figure 11) since the Division manager mentioned that agro-dealers can't buy the seeds direct from the seeds companies, they must pass through the Agro-Processing Trust Company (APTC), they pay the needed quantity and specify the varieties, then APTC on his side will pay the seed companies the fixed price minus service fees. APTC will provide then to agro-dealer a receipt with a specific company where the agro-dealer can collect the needed seeds. APTC should monitor and supervise how agro-dealers distribute seeds to maize farmers and record all farmers who have obtained seeds. Together with other delivery documents, a list of farmers will be sent to the seed companies and copies to the local government (District), to facilitate seed companies to invoice the District for the government subsidy.

Local government will mobilise farmers to use improved seeds (Hybrid), supervise and approve the list of all farmers buys seeds from agro-dealers so that the District will pay the government subsidy based on the list.

Supporters: the Government of Rwanda through Ministry of agriculture and RAB has the responsibility of supporting the development of maize value chain, as stated by seed division manager RAB are supporting in different area such as training for smallholder multipliers in agriculture practices, availability of processing equipment to seeds companies and support the process of price setting. Although 82.5% of smallholder multipliers confirm that they have no other support than the government, all Seed companies interviewed and the RAB seed division manager confirmed that they have other supports, NGOs like One Acre Fund (Tubura) supporting in marketing and agriculture services delivery, and all the seed companies interviewed confirmed that they work with financial institutions.

**Figure 12 Power and interest grid with stakeholder**

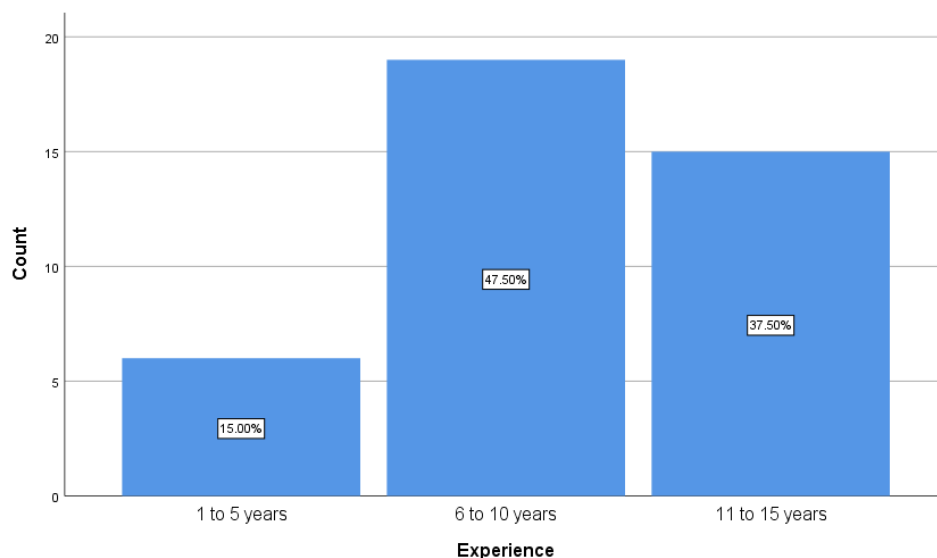


Source: Author

#### 4.2. Different capacities of smallholder seed multipliers to produce the required quantity and quality seed

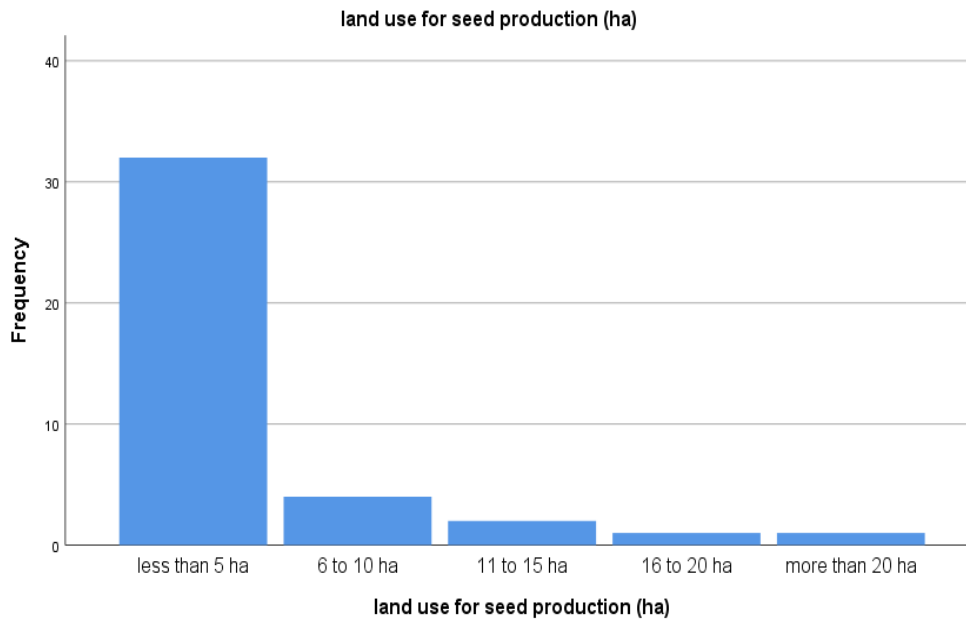
The findings from the survey show that 15% of the respondents have experience of 1 to 5 years of seed multiplication, 47.5% have experience of 6 to 10 years and 37.5% have more than ten years of experience (figure 13). The result also shows that all respondents are working on their own land, even though 80% of respondents are working on less than 5 ha of land. 10% are working on 6 to 10 ha of land, 5% of respondents are working on 11 to 15 ha of land while, 2.5% have a land of 16 to 20 ha and finally, 2.5% have more than 20 ha of land (figure 14).

**Figure 13: Experience of respondents in seed production**



Source: Author, field survey (2020)

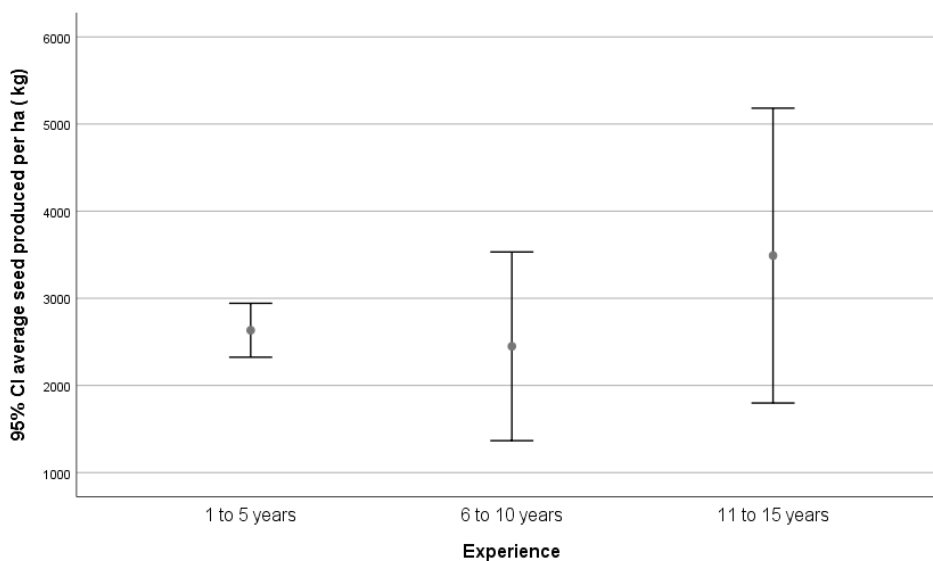
**Figure 14: land use for seed production**



Source: Author, field survey (2020)

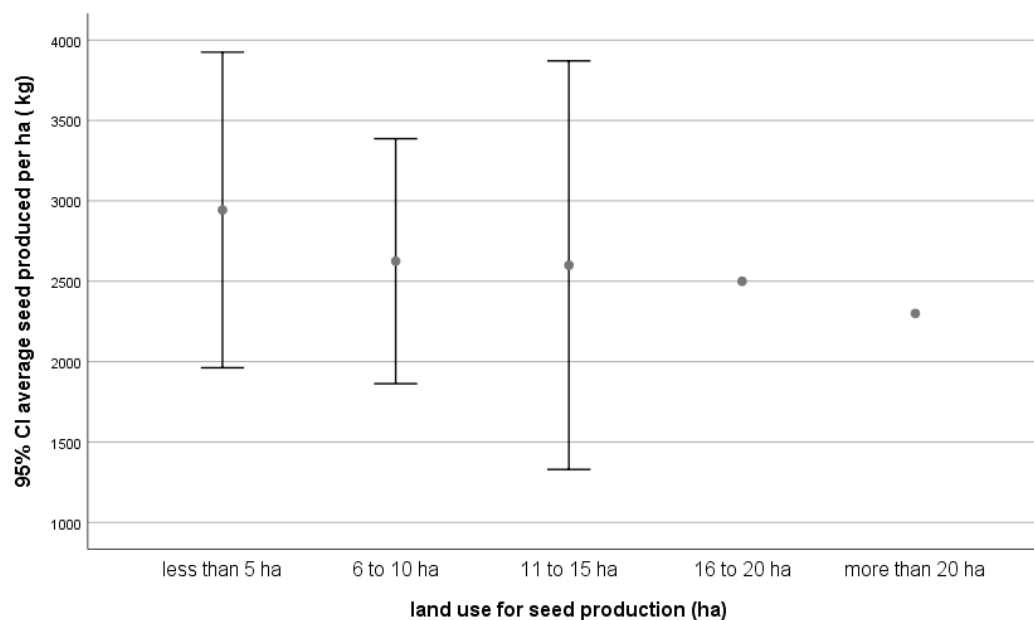
A statistical test was used to verify whether there is a difference in average production per ha between multipliers with different experience and the different size of working land, results from the ANOVA test shows that there was no difference in average production per ha between multipliers with different experience, there was also no difference in production between multipliers with different size of land.

**Figure 15: Average production per ha by experience**



Source: Author, field survey (2020)

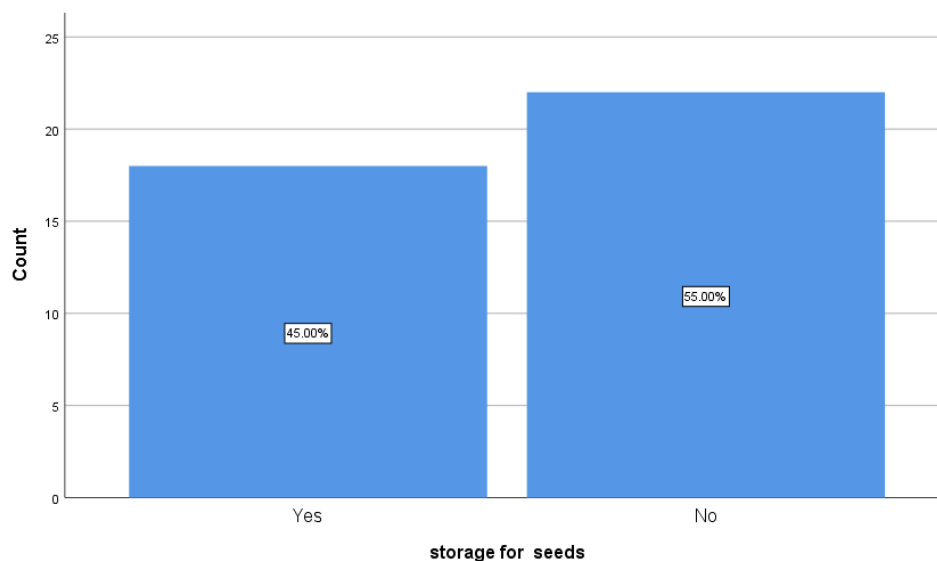
**Figure 16: Average production per ha by land size**



Source: Author, field survey (2020)

The research also noted that all Respondents have the minimum of the requirement of the processing equipment where 100% of them have only a Drying area and shelling machine, and 55% do not have the storage for their production seeds to use after shelling and drying (figure 17) where they must depend on their buyer's storage and the 45% with own storage stated that they faced challenges of insect, rodent, moisture, and heat damaging the maize grain in the store (figure 18).

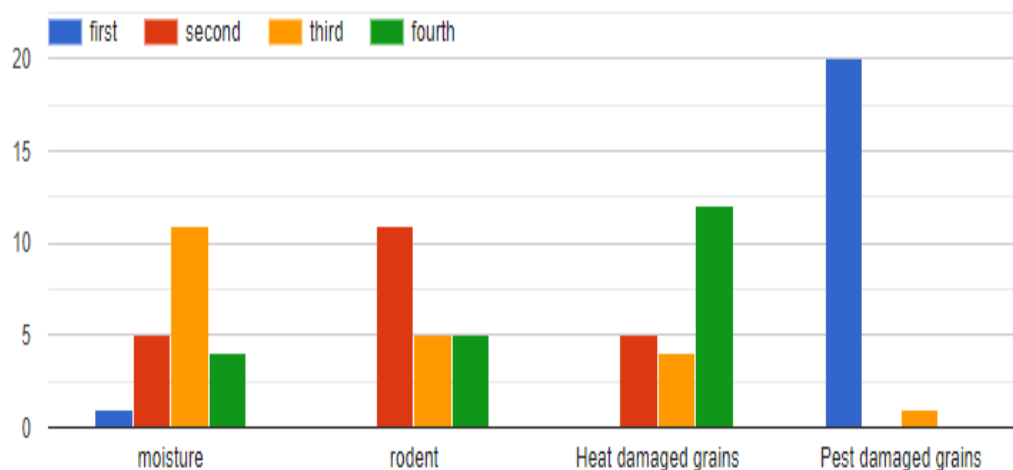
**Figure 17: Storage for produced seed**



Source: Author, field survey (2020)

Figure 18: losses in seeds storage

what are the most losses do you accounted in your storage



Source: Author, field survey (2020)

#### 4.3 Alternatives market linkages for smallholder seed multipliers

The seed multipliers interviewees highlighted that the way of selling their maize seed is through seed companies, joining the cooperative which have management, financial and marketing capacities to compete to the open market of maize seeds, seed Division manager also confirm that smallholder seed multipliers have to work with seed companies and cooperative but he also mentions that individual multipliers with required capacities are allowed to sell his produce directly to the market, he can even have a contract with other small multipliers. Even though in this new system, only selected multipliers, cooperative and seed companies with required capacities such as, being able to allocate 50 ha of land for maize seed production, financial, management and logistics capacities of supplying seeds in different District, are allowed to supply maize seeds to the farmers, smallholder seed multipliers have possibilities to choose which partners to work with. This is different from the old system where all maize seed multipliers were required to sell their produce to RAB as stated by the Seed division manager.

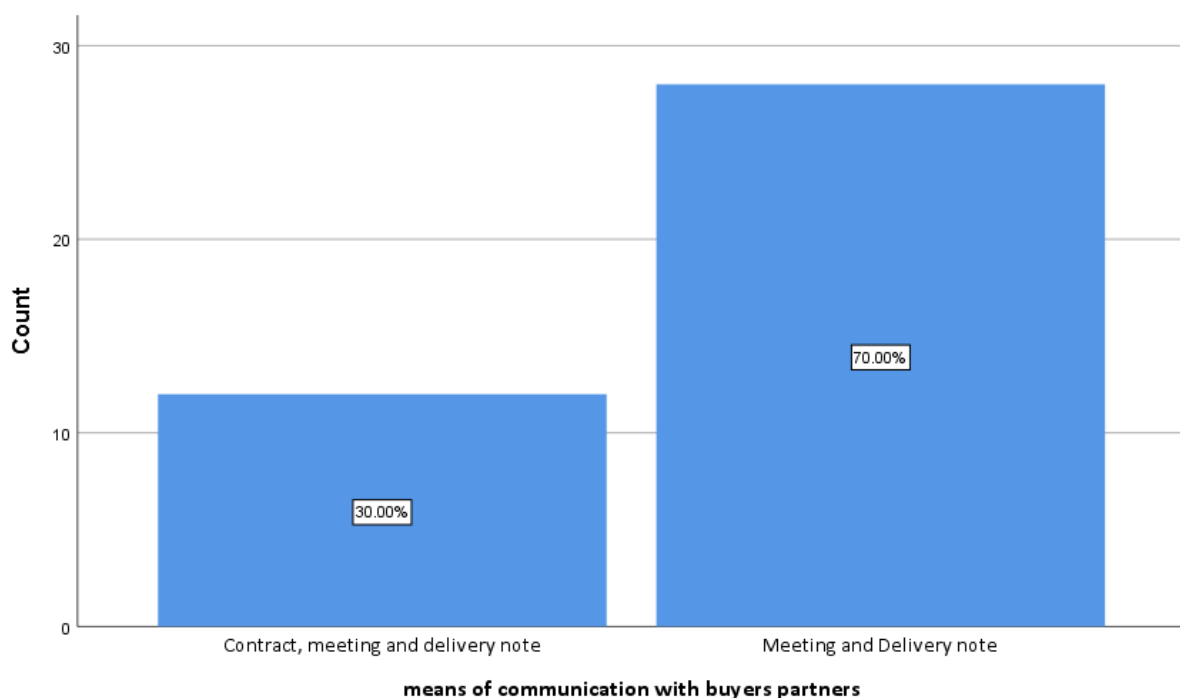
#### 4.4 Success and failure factors that can affect contract farming

From the survey, the results show that 40% of smallholder multipliers are motivated by the price in the first place, 47.5 % by the time of payment in the second place, and 30 % are motivated by the consistency of the buyer on the third time. The results also show that 70% of the respondents do not have yet contract with their buyers, they only communicate via meeting and delivery note (figure 19) after the supply of their products, and most of them, 97.5% are using amicably and local leaders as a way of mediation, only 2.5% are planning to enforce their contract using courts, local leaders and amicably as mediation way (figure 20). All the interviewee from seed companies stated that the most challengers faced are the limited quantity and availability of foundation and pre-basic seeds using in certified seed production, this also has been confirmed by the seed division manager in RAB confirming that currently, only RAB has the required laboratories for breeding and varieties development, that why the government have to import seeds to supplement locally produced variety, but these imported varieties costs a lot of money and with a delay in distribution. The division Manager also mentioned that in long run RAB has a plan to

motivate and support private seed companies to develop their own breeding laboratories so that they can produce their own planting material and varieties and the Government also gradually pull out in these activities. Other challengers stated by companies are inadequate and insufficient storages not only on the small multipliers side but also on the companies' side, they as well face challenges of accessibilities of the smallholder seed multipliers they work with, due to the poor condition of the roads and other infrastructure. One of the seed company managers interviewed specified that seed companies need to build their financial stability by working with different financial institutions, NGOs and maintain good collaboration with local leaders, RAB, and MINAGRI in general for them to dealers with seed market challenges.

The seed division manager also mentioned that to boost the maize seed markets, but also to ensure a consistent domestic supply of quality seeds, the government of Rwanda decides to stop importing of hybrid maize seed which at moments costs 4 billion Rwf, so that all required maize seed can be produced locally.

**Figure 19 Means of communication with Buyers**

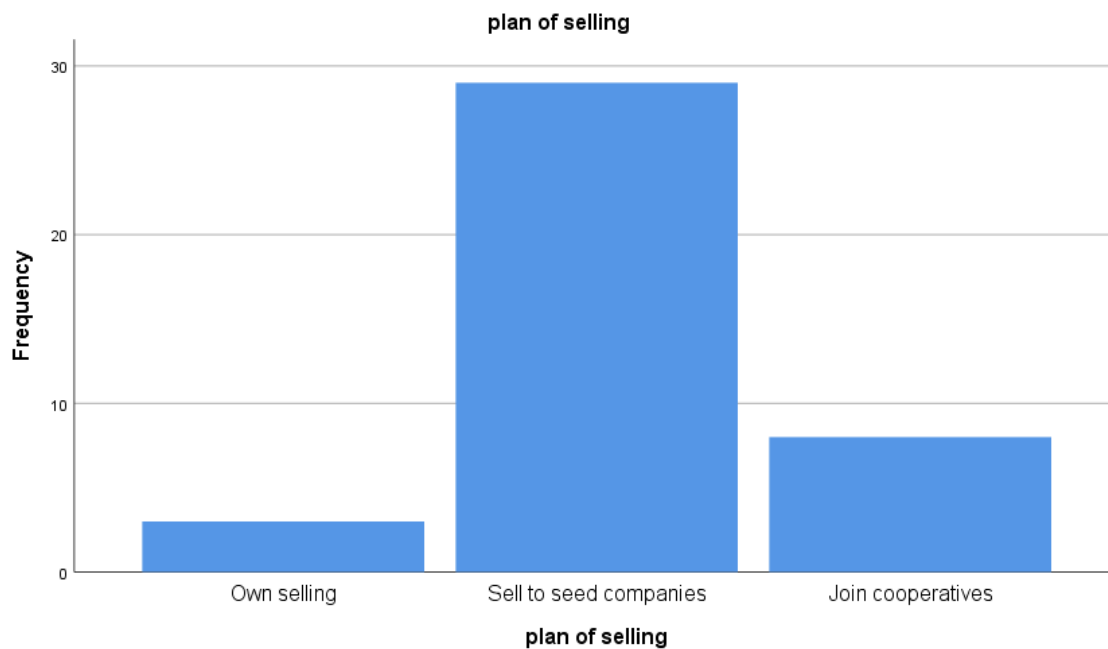


Source: Author, Field data (2020)

#### 4.5 Improving trust between actors

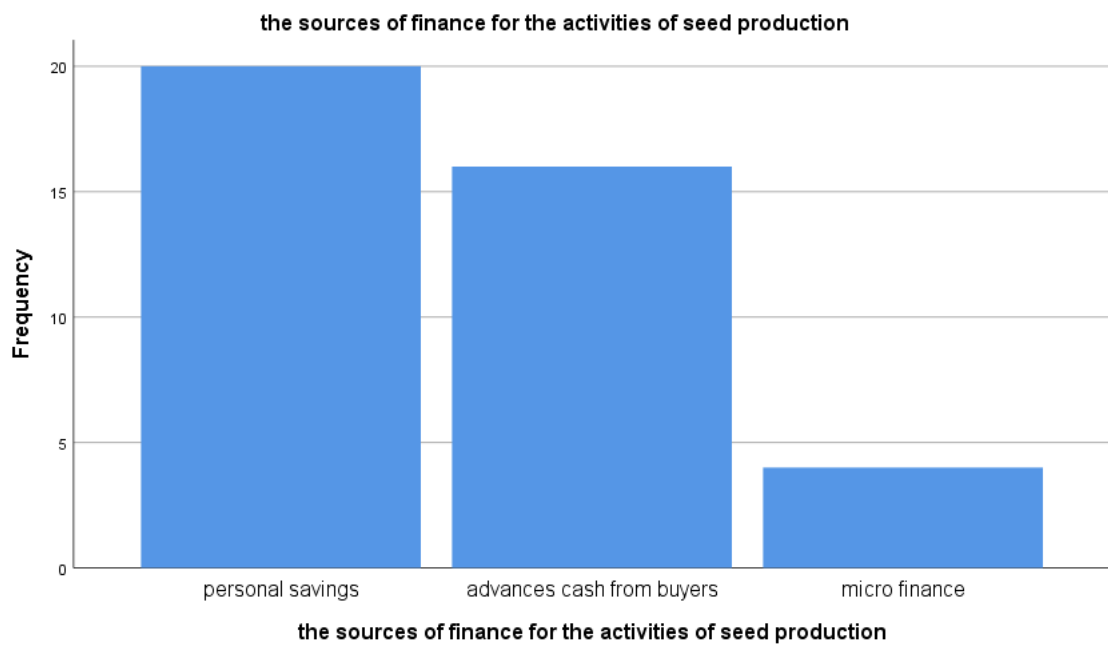
Results From the survey show that 72.5 % of respondents (N= 40) are planning to work with seed companies via contract farming, 20% have a plan of Joining or keep maintain their cooperative, and only 7.5% want to sell themselves directly to the markets (figure 20). The research also discovers that 50% of the respondents use their personal savings to finances production activities, 40% are financing the production from advanced cash from buyers and 10% of the respondents receive funding from microfinance institutions (figure 21).

**Figure 20 plan of seeds selling**



Source: Author, Field data (2020)

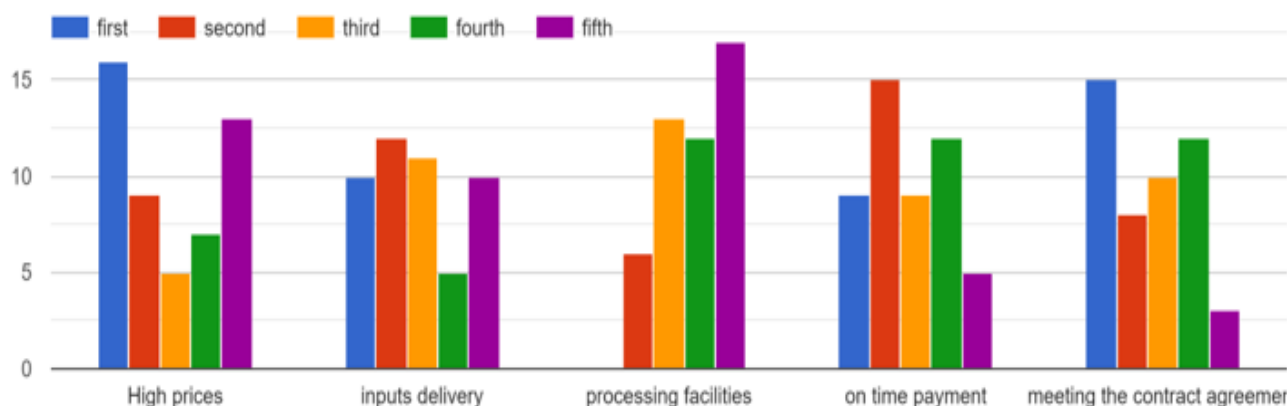
**Figure 21 sources of finance for production activities**



Source: Author, Field data (2020)

Although 37.5% of smallholder multipliers ranked high price as first and 22.5% as the second requests to the contracting parties (figure 22), all interviewed companies mentioned that the strategies to maintain their producers and create a good working environment are the payment on time, to provide them with all needed inputs such as seeds, fertilisers, and especially with irrigation facilities, and technical assistance. All companies also have a plan of providing postharvest facilities such as sorting, coating, and packaging and make stores available to the multipliers. All the interviewed companies confirm that they planning to advance money to multipliers, for their production activities and also provide them credits based on the provision of the production, 6 to 10 % of the provision precisely for RUMBUKA ltd, one company specified that they pay social security, health insurance and school fees for the family of the multipliers. RUMBUKA ltd also confirm has a plan of advertisements of all their activities, setting demonstration plots in all sectors of the country so that multipliers and also particularly maize farmers will start patronising their seeds.

**Figure 22 Motivation for contract farming**



Source: Author, Field data (2020)

#### 4.6 Contribution of contract farming to the higher income of smallholder seed multipliers

The resultant from the survey shows that 72.5% of smallholder seed multipliers are planning to sell their hybrid maize seeds through seeds companies, 20% of respondents join the cooperatives to sell their maize seeds and only 7.5% have a plan of selling themselves their seeds direct to the open markets (figure 20). The statistical test was used to verify whether there is a difference in production per ha between multipliers selling to companies, multipliers selling to cooperative and multipliers sell themselves to the open markets. After one-way ANOVA test the resultant show that there is no difference in production per ha between multipliers selling their seeds to seeds companies, multipliers selling their seeds through cooperative, and multipliers selling themselves to the open markets, shown by p-value (0.389) in table 3



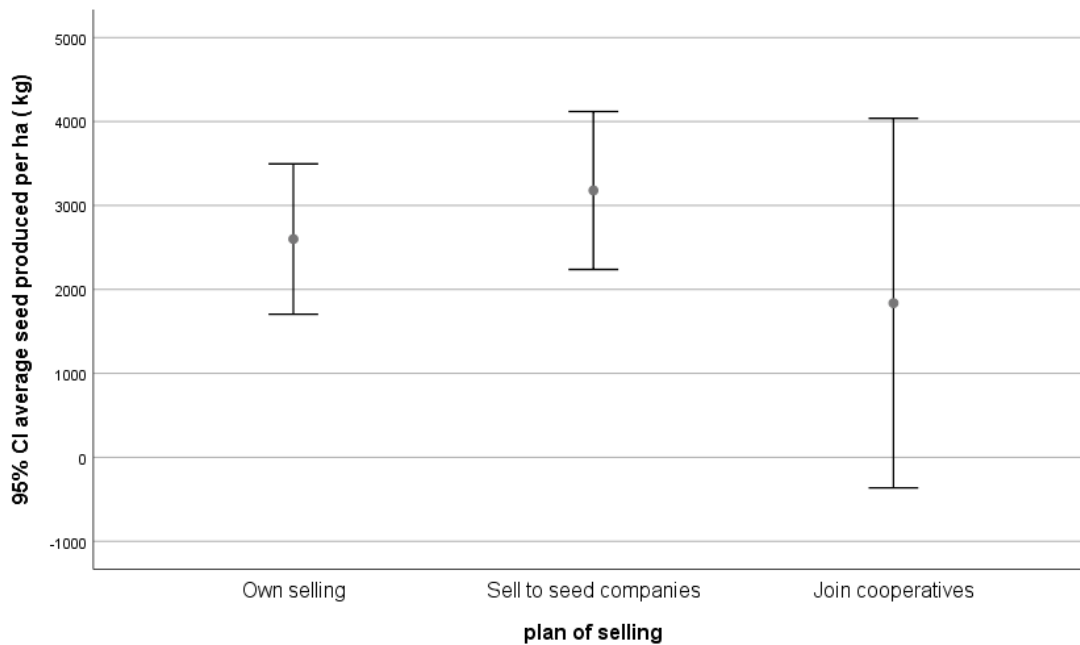
**Table 3 ANOVA, Average seed production per ha between the plan of selling**

average seed produced per ha ( kg)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11526915.413	2	5763457.706	.970	.389
Within Groups	219932565.362	37	5944123.388		
Total	231459480.775	39			

Source: Author, Field Data(SPSS)

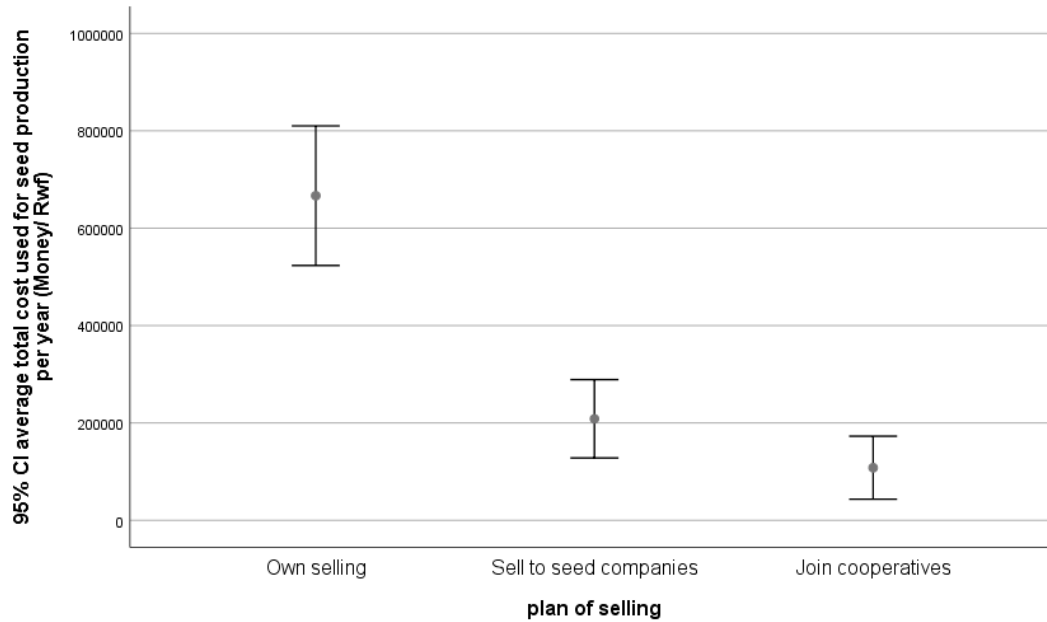
**Figure 23 Average seed produced per ha**



Source: Author, Field data (2020)

The statistical test was also used to verify whether there is a difference in average total cost used for seed production per ha, between multipliers selling to companies, multipliers selling to cooperative and multipliers sell themselves to the open markets. After a one-way ANOVA test, the resultant show that there is a difference in average total cost used for seed production per ha, between multipliers sell themselves to the open markets and multipliers selling to companies, and also between multipliers selling to cooperative, however, there was no difference in the average total cost used for seed production per ha, between multipliers sell to seed companies and multipliers sell to cooperative. (figure 23 & table 4)

**Figure 24 average total cost for seed production**



Source: Author, Field data (2020)

**Table 4 ANOVA test: average total cost for seed production between the plan of selling**

Dependent Variable: average total cost used for seed production per year/ ha (Money/ Rwf)

Tukey HSD

(I) plan of selling	(J) plan of selling	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Own selling	Sell to seed companies	458218.391*	113744.189	.001	180513.64	735923.14
	Join cooperatives	558666.667*	126971.011	.000	248668.83	868664.50
Sell to seed companies	Own selling	-458218.391*	113744.189	.001	-735923.14	-180513.64
	Join cooperatives	100448.276	74898.087	.382	-82414.29	283310.84
Join cooperatives	Own selling	-558666.667*	126971.011	.000	-868664.50	-248668.83
	Sell to seed companies	-100448.276	74898.087	.382	-283310.84	82414.29

\*. The mean difference is significant at the 0.05 level.

Source: Author, Field Data(SPSS)

The statistical test was also used to verify whether there is a difference in selling price between smallholder multipliers according to the buyer partners. After the one-way ANOVA test the resultant show that there is a significant difference in selling price between multipliers selling their seeds to seeds companies and multipliers selling their seeds through cooperative shown by p-value (0.000) in table 5, but they were no significant difference in selling price between multipliers selling themselves to the open markets and multipliers selling to the seed companies shown by p-value (0.93).

**Table 5 ANOVA, Selling price**

### Multiple Comparisons

Dependent Variable: selling price now

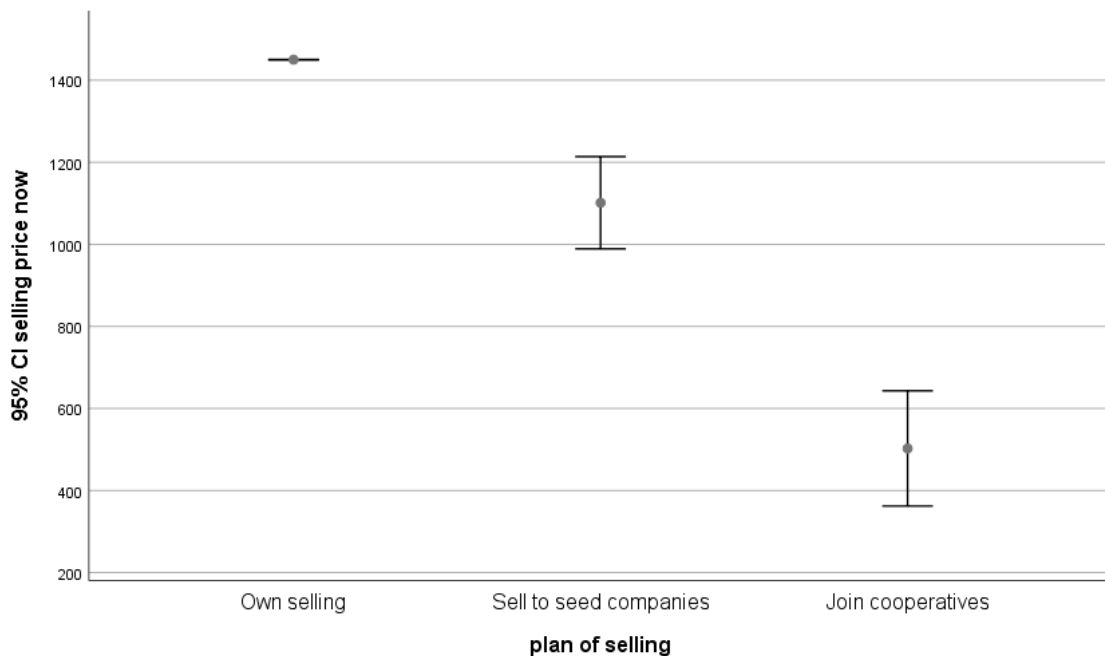
Tukey HSD

(I) plan of selling	(J) plan of selling	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Own selling	Sell to seed companies	348.621	162.083	.093	-47.10	744.34
	Join cooperatives	947.500*	180.931	.000	505.76	1389.24
Sell to seed companies	Own selling	-348.621	162.083	.093	-744.34	47.10
	Join cooperatives	598.879*	106.728	.000	338.30	859.45
Join cooperatives	Own selling	-947.500*	180.931	.000	-1389.24	-505.76
	Sell to seed companies	-598.879*	106.728	.000	-859.45	-338.30

\*. The mean difference is significant at the 0.05 level.

Source: Author, Field Data (SPSS)

**Figure 25 Selling price**



Source: Author, Field data (2020)

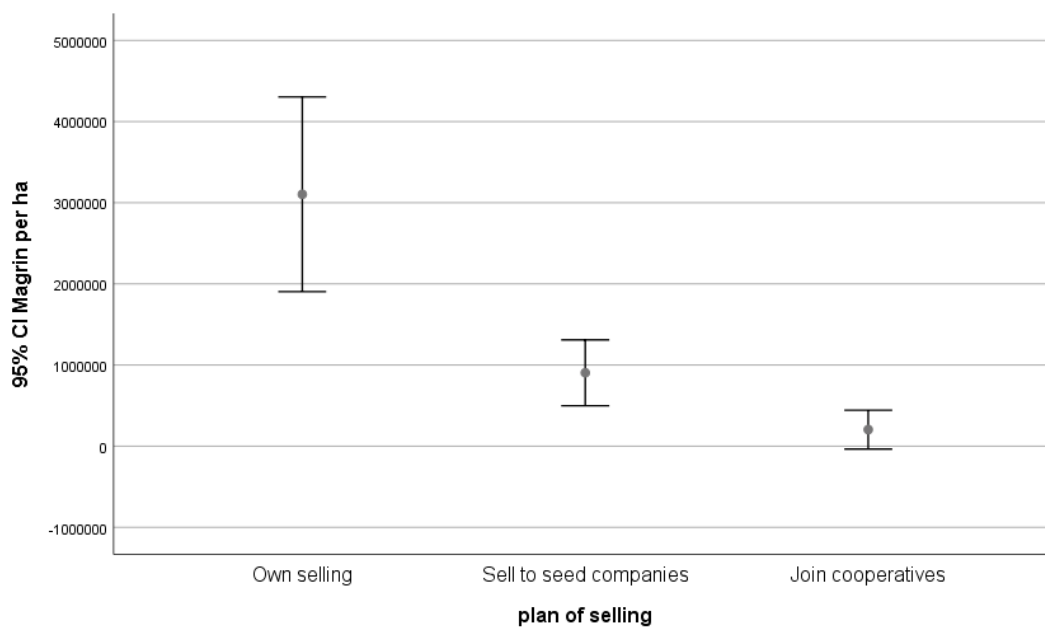
This difference in selling price inspires verification also where there is a difference in margin rate between multipliers according to the buyer partners. After a statistical test, the result shows a difference between multipliers selling to seeds companies, multipliers selling through cooperative, and multipliers selling themselves shown by p-value (0.000) in table 5

**Table 6 ANOVA, Margin rate**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1840808320199 7.125	2	9204041600998 .562	10.325	.000
Within Groups	3298178310814 0.370	37	891399543463. 253		
Total	5138986631013 7.500	39			

Source: Author, Field Data (SPSS)

**Figure 26 Margin rate**



Source: Author, Field data (2020)

## CHAPTER 5: DISCUSSION

This chapter of discussion is including the reflection of the analysis of the results obtained from the literature review, interviews, and survey.

This study was used different literature related to contract farming in order to compare and confirm the results from the field, in this study the three different seeds companies interviews were conducted with two operations manager of the companies and one with the managing director, the key information was collected from RAB with seed division manager.

The survey was conducted in 4 different District, and as Rwanda is the country highly motivated in gender promotion and women empowerment (UNDP Rwanda, 2018) but also a country with 51% of women as a population, women were also dominated in the seed sector where the results show that 65% of the respondents were female (figure 9). Since the study was conducted at the beginning of the implementation of contract farming intervention after a pilot phase, most of the answers were about future plans for smallholder seed multipliers and seed companies.

### 5.1 Stakeholders' role, decision making and leading power in the new Maize seed value chain

Based on the results from interviews, the role of stakeholders in the new maize value chain with contract farming has largely changed compared to the old chain where all multipliers were obligated to sell their seed to RAB, this change of roles and activities also had an impact on decisions and leading power.

Maize seeds multipliers are highly interested in the seed value chain as 92.5% make it their main activity, however, they have limited influence (table 6) on the seed value chain due to different challenges such as limited financial capacities, limited working land, and late payment. so, they must depend on partners to access markets.

Seed companies are highly interested in the seed sector, with a high level of influence on seed multipliers due to the crucial role of collecting, processing, and marketing of maize seeds they are playing in this value chain, however, they have limited power on the market of the seeds due to tight control of the market by APTC that have the power of deciding which agro-dealer to buy to which companies. This can have a negative impact on market information and relations between seed companies and agro-dealers.

**Table 7 Stakeholder Analysis**

Stakeholders	Level of influence (Low, Medium, High)	Interest of the stakeholder in the value chain	Functions in the value chain	The limitations of the stakeholder in the value chain
Maize Farmers	Low	Profit	Maize Seed utilisation	<ul style="list-style-type: none"><li>- The high price of seeds</li><li>- Limited funds</li><li>- Limited land</li><li>- Insufficient seed quality and quantity</li><li>- Poor farming practices</li></ul>
Smallholder seed multipliers	Medium	Profit	Seeds multiplication	<ul style="list-style-type: none"><li>- Low price</li><li>- late payment</li><li>- limited land</li><li>- limited funds</li><li>- insufficient inputs and postharvest</li></ul>

				equipment
Seed companies	High	Profit	Production, collection, and distribution	<ul style="list-style-type: none"> <li>- late payment</li> <li>- limited funds</li> <li>- lack of processing capacities</li> <li>- storage and marketing capacities</li> <li>- inaccessibility of multipliers</li> </ul>
APTC	High	Profit	follow up, Organising, and supervision.	<ul style="list-style-type: none"> <li>- The long process of seeds distribution from seed companies, agro-dealers, maize farmers and Districts and all related documentation in the distribution</li> <li>- Insufficient supply</li> <li>- limited number of staff</li> </ul>
District and sector agro-dealers	Low	Profit	Retailing seeds to maize farmers	<ul style="list-style-type: none"> <li>- Insufficient supply</li> <li>- Limited purchasing capacities of farmers</li> <li>- Long process of payment</li> </ul>
District (LOCAL GOVERNMENT)	High	Good working environment	Supervision	<ul style="list-style-type: none"> <li>- Smuggling of the seeds</li> <li>- Delay of seed budget from MINAGRI</li> </ul>
MINAGRI/ RAB	High	<ul style="list-style-type: none"> <li>-chain Organisation</li> <li>- Increased of high quality and quantity of the maize seeds</li> </ul>	<ul style="list-style-type: none"> <li>- price setting together with other actors</li> <li>- basic seed supply</li> <li>- monitoring and regulation</li> </ul>	<ul style="list-style-type: none"> <li>- Insufficient of basic seed from research</li> <li>- Limited seed budget</li> </ul>
RICA	High	Production and distribution of quality seeds	Control the quality of seeds throughout the process from production to distribution	<ul style="list-style-type: none"> <li>- Limited budget</li> <li>- inaccessibility of multipliers</li> </ul>
Harvest plus, one acre-fund	High	Support and Capacity building of Agriculture sectors	<ul style="list-style-type: none"> <li>- Trainings</li> <li>- Fund</li> <li>- Research</li> </ul>	- low adoption of new technologies
Banks and SACCO	High	profit	- credits and funds	<ul style="list-style-type: none"> <li>- limited capacities of multipliers</li> <li>- late or no payment of credits.</li> </ul>

Source: Author

## 5.2 Different capacities of smallholder seed multipliers to produce the required quantity and quality seed

Land and labour are among the drivers of engagement in contract farming by companies (Holtaland, 2017) and it is proven that all the respondents are working on their own land, and the majority have more than 5 years of experience ( figure 12) in maize seed production which can explain that there is no difference in average production between multipliers with different experience and different land size( Figure 14&15). On the other hand, smallholder seed multipliers also need the partnership with seed companies due to their limited capacities of processing as the result show that all respondents have only a drying area and shelling machine, more than a half of the respondents don't have storage and few with storage the result shows that they encounter various losses due to storage below the standard ( figure 16) These show that even though seeds multiplier needs partnerships with other actors to complete and access the maize seed market, they also have potentials and awareness that can interest seed companies.

The results show that smallholder seed multipliers have experience and even those with less experience have an equal production this might be because the new multipliers are young and better educated/ trained, they also have land and other potentials to attract seed companies, but since the multiplication of hybrid requires particular skills and additional investments (MacRobert, 2014). The decision of producing hybrid maize seed over OPV seeds could motivate the smallholder multipliers with a low level of education since according to Meemken (2019) stated that CF provides farmers access to extension services.

**Figure 27: Maize seed drying Area**



**Figure 28: maize seed sorting activity**



Source: Data collector

## 5.3 Alternatives market linkages for smallholder seed multipliers

From the interviews, seed multipliers had only one market opportunity before 2018 when the government decides to pull out from seed buying and promote other interventions including contract farming since all seed multipliers were compulsory to sell their seeds to RAB.

Phil (2003) stated that the main alternative for the agribusiness firm looking for enlarging its activities is to source from the open market, however, the result of this study shows that it is not easy in seeds marketing sector of maize in Rwanda, Dues to the particularity of the seed quality needed to the market especially hybrid seeds, seed companies will depend on the particular types of farmers with experience in seed production and specific skills on how to multiply hybrid maize seeds, these factors will create a huge competition between seed companies and cooperatives to work with experienced seed multipliers,

In this new seed value chain, smallholder multipliers are getting advantage of this competition because they have various choices of actors to work with and this could create a strong link between multipliers and seed companies. The study also noticed that seed multipliers have the alternative of selling their seeds direct to the market instead of selling to companies or cooperatives, yet these require different capacities including financial and marketing skills, if smallholder seed multipliers have different opportunities, access to the markets is guaranteed. (Bijman, 2008)

#### 5.4 Success and failure factors that can affect contract farming

Since there is the uncertainty of the maize seed market after the government initial decision of pulling out in bulk buying maize seeds in 2007 and start the implementation of this decision in 2018 (MINAGRI, 2007). But also a high demand of hybrid maize seeds on the market which require definite production skills and also a specific investment as stated by the seed division manager, contract farming can be considered as an alternative intervention to minimise transaction costs and organise production, processing, and marketing process of hybrid maize seeds (Bijman, 2008).

The interviews show that there is a significant market for hybrid maize seeds due to the decision of the government to stop importing hybrid maize seeds, but also due to the country ambitious program called the Crop Intensification Program (CIP) which shifted the country from an importer of food to exporter. this program promotes the use of improved seed and involves other policies such as land use consolidation and Government input subsidy (Nicola, 2010), this is in line with Holtaland (2017) confirmed that for contract farming to be successful, there must be a potential and sustainable market.

However, the long process and bureaucracy due to the number of organisations involved in contract farming implementation (figure 10& table 2) could hinder the success of CF as confirmed by world bank (2014) stated that contract farming especially in developing countries is affected by the high level of bureaucracy and big gap and complexity of the legal economic system.

Even though seed company's managers interviewed mention that they facilitate groups formation of multipliers so that the companies can provide them with technical skills and other facilities in the group, the limited quantity, and availability of pre-basic seeds using in certified seed production but also the limited accessibility of the smallholder seed multipliers will have a large effect in contribution and on the performance of contract farming as confirmed by Wainaina (2012), the further away small farmers are from the road, the more likely they are not to participate in contract farming.

Although hybrid maize seeds are not Highly perishable crops, which can affect the need of contract farming for coordination, however, it is a High-value crop that depends on investments of inputs such as particular basic seeds including male and female parents, irrigation, and specific knowledge to produce high quality of seeds (MacRobert, 2014) it also requires high levels of coordination in processing and delivery process, this is also confirmed by Bijman(2008) stated that the most appropriate crop for contract farming is the crops with high value due to investment and skills involved to produce high qualities.

Tightly control mechanisms involved in maize seed supply in Rwanda, prevent the high risk of smuggling and side selling, these also are in line with TechnoServe and IFAD (2011) confirm that crops with restricted markets channels and low risk of side selling are best for contract farming.

The result ( figure 19) shows that the majority of respondents were motivated by high price and payment on time of their seed, this is in line with Holtaland (2017) who argues that a clear pricing mechanism is decisive for the success of contract farming, yet seed division manager mentioned that maize seed prices are fixed with government through RAB together with seeds companies. this may have a negative impact on contract farming implementation due to no participation of smallholder seed multipliers in price-fixing. The result (70%) also shows that the majority of the respondents stated that they don't have a written contract with buyers which can also influence on-time payment and breach of agreements.

As the contract farming is initiated by the government and has a formal way of control, this could mean that CF will have an impact on seed sourced only in a formal way, and this also means that CF has an impact on more than 70% of seed markets since Nelson (2016) stated that 70% of the maize seed planted in Rwanda are Hybrid and sourced from the formal sector, but this is in contradiction with Sperling (2016) stated that in Africa, 90.2% of farmers access their seeds from informal systems.



## 5.5 Improving trust between actors

Even though contract farming was introduced by the Government as one of the interventions to maintain smallholder seed multipliers in the seed sector, but also ensure the sustainability of maize seed supply to the Rwandan farmers. The majority of respondents (72.5%) stated that they are planning to contract with seed companies this could confirm the answers of interviewed seed companies mentioned that they are also concerned with building trust and a strong relationship with the seed multipliers by providing them with all needed inputs, advancing them money for production activities, providing credits for others social needs. Some of the companies also specifically pay them the social security and health insurance fees (Meemken, 2019) however this effort of companies could be affected by pricing mechanism that excluding smallholder multipliers and delay in payment due to the long process it takes to companies to get payment from District of supplied seeds to the farmers Since the majority of respondents stated motivated by the high price, regular customers and on-time payment. this can be confirmed by Holland (2017) who stated that a transparent pricing mechanism is vital for the success of contract farming.

As Good communication is indispensable for the successful contract farming (Holtaland, 2017), the study finds a good communication between multipliers and seeds companies because 97.5% of the respondents choose to resolve amicably any problem and refer to locals leaders in case of misunderstanding so that they can reduce possible risks, long bureaucracy, and weak legal system. This is in line with Sorsa Debela Gelalcha (in Holtaland, 2017, 115pp.number) stated “Mutual trust and smooth relationships are much more important for the success of contract farming than any legal enforcement mechanism. Contract farming imposed by one of the parties or a third party is unlikely to be successful and more likely to result in breaching of the agreement.”

even though they did not have a written contract as a communication means, all respondents stated having a regular meeting with buyers and they are using a delivery note in case of supply. The fact that this supply chain of maize seeds was still new the time of research can explain the no written contract between seed companies and multipliers due the organization process to start the good working environment since some of the seed companies interviewed stated planning to have a contract with individual multipliers or their group.

Since all interviewed seed companies confirmed that seed companies are providing inputs and credits for production activities according to Holtaland (2017) this mean that the types of contract farming in place is the centralised model which involve an agreement between a firm and various farmer, the firm provides all required inputs for production, and farmers agree to supply specific qualities and quantity on the planned times. The result also showed that seed companies are investing much in inputs provision, processing activities, and storage since the majority of multipliers stated using the storage for their buyers this is also in line with Holtaland( 2017) stated that this type of contract farming is characterised by the high level of production control on one side, but also the high level of investment on the other side due to technical assistance, logistics process and related infrastructure.

## 5.6 Contribution of contract farming to the higher income of smallholder seed multipliers

Even though, the statistical test shows no difference in average seed production per ha (table 3) between multipliers sell to the cooperative and multipliers sell to the seed companies. Yet there is a remarkable large standard deviation of production per ha within the group selling to the cooperative (figure 20), some of the multipliers have a very high production per ha and others have very low production per ha. compared to the group of multipliers selling to the seed companies (figure 20) where all multipliers are in the same range of production per ha, this could mean that multipliers who choose to work through contract farming have certain common information, capacities, and production skills. This factor could give insight that contract farming could be favourable to multipliers with skills and capacities to manage production risk which is in line with FAO (2013) stated that large companies mostly choose contracts with large farms to minimize transaction costs.

The results of the statistical test also show (table 4) a remarkable difference in selling price between seed multipliers selling their seeds to the cooperative and multipliers selling to companies (figure 19), the result shows that the seed companies are willing to buy seeds at a much higher price than what the cooperative gives.

Even though there was a difference in average total cost use for seed production per ha between multipliers sell to seed companies and multipliers sell to cooperative, the high price given by seed companies could explain the high difference in margin rate finds between smallholder seeds multipliers sell to the cooperative and those sell to seed companies (figure 23).

## 5.7 REFLECTION

This research was carried out at the start of the implementation of the new maize seed value chain, the aimed was to assess the effectiveness of contract farming in improving smallholder maize seed multipliers income, and strategies to increase trust between smallholder maize seed multipliers and seed companies, and to propose to Rwanda Agriculture and Animal Resources Development board the appropriate improvement interventions.

**Reflecting on the research topic:** at the beginning of my course in APCM my first idea about the thesis topic was to work on the banana value chain, due to the experience I have in the field, however as currently, I am working as a seed program officer in charge of facilitating, support and monitoring the private seed multipliers, I was inspired by my lectures but also my job supervisor that I can contribute in the improvement of the implementation of the new see value chain which is related to my work.

I chose maize value chain for two reasons, one, it offers me the opportunity to understand more, and to impact on the lives of smallholder seed multipliers which can be affected by the implementation of the new maize seed value chain, as the seed production is the main activity for their income generation. The second reason was that the results from the study and recommendations could contribute to the sustainable supply of improved maize seeds to Rwanda Farmers.

**Reflecting Data Collection:** Data collection was one of the most difficult and stressful sessions during the thesis trajectory. This research study was conducted during COVID 19 pandemic period; and Rwanda was one of the affected countries. Due to the precautions and instructions the researcher couldn't travel to the country for the data collection, the substitute data collector was hired for survey data collection, and interviews were done online by skype, WhatsApp, and phone call. However, it was a period of experiential learning by doing to enrich my future research determination. It was the opportunity to build on the research methods learned in class but also to apply the experience gained from the mini-survey and mini-thesis.

Before data collection, I held a meeting with the data collector and my colleague who was supposed to help and guide the data collector. During this meeting, we discussed the survey questionnaire and I have an opportunity to pilot the data collection with them. During this discussion, we realise that I need to make some modification in my research area, due to lockdown in some of the areas as covid-19 pandemic control measure. Initially, in the thesis proposal, the research plan was to cover a district of Rwamagana in the eastern province, but after a discussion with my colleague and data collector, I decided to add 3 other districts of the southern province, so that we can avoid data shortage due to challenges which can be brought by the lockdown. During the pilot, I also realised that I needed to make some adjustments to the questions to make it specific and understandable to farmers. All these processes made me aware of my responsibilities as a researcher to think about all the possibilities of the sampling process, to keep adjusting the research plan according to the situation, but also the importance of testing the questionnaire and consulting colleagues and experts before carrying out a research.

During survey data collection, I followed the process using a phone call whenever possible, to guide and give further explanation to the data collector, this also helps me to adjust, add or remove some questions depending on

the situations, these also made me reflect on how the questionnaire is very important for the valid and accurate data collection so that its need to be revised and tested much possible time before field works.

During survey data collection I was also making contact for online interviews, the online interviews were also challenging to the researcher but also to the interviewee. Some of the informant contacted did not reply to the message so we had to replace them with other informants, Due to the poor connection and limited time for respondents some interview had to be cancelled during the process and postponed for late, In order to get accurate data from the interviews, given to the connection challenges and limited time, I had to ask specific questions and stay focused on the topics by probing questions. even though I had been supported by the practical skills learned from the online mini-thesis interviews, it was very difficult for the first interviews to keep respondents focus on the topic and we lost time on probing questions because sometimes the respondents deviated from the expected answers. I realized that I had to know exactly what I am looking for, adapt, and adjust quickly to the questions, this provided me enough confidence to continue with other interviews and it was a good experience for my future professional career. After each interview, I transcribe and review the entire interview process to understand the challenges to be considered for the next interview. These also gave me insight into the importance of on-time transcription and how one interview can help to prepare the next one. It was also a good experience to improve my transcription and my interview skills.

**Reflecting on Data processing, and results:** During survey data processing, the data from the questionnaire was moved to Microsoft excel for cleaning and calculation of all needed data, then transfer to SPSS for analysis. After transcribing all interviews, qualitative data were coded with keywords related to the topic. The results show that, Although the implementation of contract farming was only at the beginning, all actors, especially the small seed multipliers, were aware and ready for the process, yet they were some contradictions in answers between the key informant and small seed multipliers. The study also realises that these new value chains still have a long way to go to be completely independent of the government involvement due to the limited bargaining power of smallholder multipliers, but also the limited capacities of seed companies to develop and produce their own basic seeds, but also processing and distribution capacities.

**Reflecting on writing the report:** As a researcher, but also as a student, I was required to write the thesis report according to the VHL report format, even though I had some experience acquired from the different report, and mini-survey done in class, this task was to some extent challenging, specifically on the discussion part, but with the support and guidance of my supervisor, I received inspiration and confidence to complete my task. From this process, I gained significant experience in writing research reports, the importance of triangulation during the discussion of the result, how to confirm or challenge the field results to the interviews and literature review results.

**Significance of the study:** since this study was carried out at the beginning of the implementation of the new maize seed value and the seed market for smallholder multipliers were still uncertain, this research was relevant to RAB as a commissioner and in charge of monitoring and regulation of the seed value chain. It will help in understanding the expected outcome and challenges so that the improvement strategies can be suggested and recommended. this study will also contribute as a source of information to small seed multipliers and seed companies on what each party expects from the other.

**Reliability of this study:** As this study was carried out at the start of the implementation of the new chain and only a few respondents participated in the pilot phase, the answers given by the respondents and the interviewee could come only from the assumption and not from the experience and the reality of what they encountered. Since this study was commissioned by RAB and the researcher was known by the respondent as one of the staff in charge of monitoring and controlling the implementation of the new chain, this could affect the responses given by the smallholder multipliers trying to exaggerate, in order to influence the decision of the commissioner, On the other hand, the seed companies interviewed could also try to influence the commissioner by providing only positive responses to the researcher.

**limitations of the study:** Given the period this research was carried out; it encountered some limitations. Initially, the plan was to conduct the field data collection in one District, but in order to avoid the lack of respondent due to the lockdown in some places, as covid-19 pandemic control measures, the researcher had to enlarge the study area and add three districts, this was a limitation to cover large study area for the substitute data collector, given to the limitation of transport means caused by the control measures of covid-19.

This study was also carried out at the start of agriculture season in the country, this was a limitation to this study because all respondents were busy preparing the season so they did not have enough time to respond questionnaire, Some key informants were also so busy that it was quite difficult to get them to answer questions. One seed company selected due to the experience of working under contract farming with external seed companies was not able to give us the requested interview, the researcher had to replace it with other company with less experience.

To maintain the reliability of the data, we had to postpone the visit several times, and sometimes the data collector guided by the researcher had to involve in respondents' activities so that they can have enough time to discuss with them, I have also postponed the interviews several times and each time I have had it I have had to ask short and specific questions.

## **CHAPTER 6: CONCLUSION AND RECOMMENDATION**

### **6.1 Conclusion**

This chapter presents the conclusion of the study related to the objective which was to assess the effectiveness of contract farming in improving smallholder maize seed multipliers income and strategies to increase trust between smallholder maize seed multipliers and seed companies and to propose appropriate improvement interventions: a case study of maize seed multipliers in Muhanga, Kamonyi, Ruhango of Southern Province and Rwamagana district in the Eastern Province of Rwanda. By answering the different research questions of this study, the conclusion will be given to better understand the effectiveness of contract farming in the development of the maize seed value chain in Rwanda.

#### **6.1.1 the dynamics of the current maize seed value chain**

##### **6.1.1.1 Roles, decision making, and leading power of stakeholders in the new maize seed value chain**

This study showed (figure 11) that the maize seed value chain includes various stakeholders with different roles, interests, and power of influencing the chain. This chain has supporters such as programs, NGOs and financial institutions, and main actors. Seed multipliers accredited to high interest as they make seed production their main activity, evidence from the study highlighted that their influence in the chain is on a medium level since they still depend on seed companies to have production inputs, storage, and other capacities needed for production activities. Even though the government is trying to pull out from this chain so that the private seed multipliers can take control and lead the chain. They still have large influence due to the provision of the pre-basic seed used for commercial seed production, and the fact that they still pay 55% of the seed as a subsidy to the maize farmers.

In the new maize chain, the study also noticed that APTC as a private company appointed by the government to organise and control the distribution of maize seed has a huge influence on the chain due to the fact that all transactions between seed companies and agro-dealers must pass through them.

##### **6.1.1.2 Capacities of smallholder seed multipliers to produce the required quantity and quality seed**

Smallholder maize seed multipliers in the study area have the minimum capacity of production such as owning the working land and experience in the seed field to interest the contractors (figure 13& 14), yet contract farming might be a reliable scheme to produce quantity and quality maize seeds due to the provision of inputs, skills, and new technologies, contract farming will be also very important to provide storage and financial support to smallholder multipliers which will increase their capacities in production and market risk management.

##### **6.1.1.3 Alternatives market linkages for smallholder seed multipliers**

The pull out of the government in bulk buying of maize seeds created alternatives market linkages for smallholder seed multipliers because now they have choices of contracting with any seed companies they want, they can organise themselves together to form cooperatives which sell maize seeds or individually with required capacities they can sell their maize seed direct to the markets.

## **6.1.2 The requirements to establish effective contract farming**

### **6.1.2.1 The success and failure factors that can affect contract farming**

This study shows that the CIP program with all different policies involved such as land use consolidation and seed subsidy (Nicola, 2010) will highly contribute to the success of the contract farming due to its influence on the high demand for hybrid maize seed on the market. The fact that hybrid maize seed is also a highly valuable commodity with specific knowledge and investment for production but also the strict control that prevents the high level of maize seed trafficking and smuggling to all bordering countries, will highly contribute to the success of the contract farming.

But on the other hand the study finds various factors that can hinder the performance of contract farming such as, limited quantity and low availability of pre-basic seeds essential for certified/ commercial seed multiplication, pricing mechanism excluding smallholder multipliers, long process, and bureaucracy in seed payment and distribution, and finally accessibility of smallholder seed multipliers, all these factors can be the high risks of failure for contract farming.

### **6.1.2.2 What can be done to improve trust between actors?**

Seed companies are making a lot of efforts to build the trust between the companies and multipliers by facilitating them on inputs and others social needs availability, but smallholder seed multipliers also show their interest in high price and regularity of buyers (figure 22), involving smallholder seed multipliers in pricing mechanism, and providing a written contract as a communication means including specific quality and quantity, price and delivery and time of payment might serve as consistency engagement of both parties.

### **6.1.2.3 What needs to be done for contract farming to contribute to the higher income of smallholder seed multipliers that can lead to the contribution of Sustainable Development Goal 2?**

Although the study did not focus on the processing and distribution cost of the seeds involved in selling direct to the market, the result shows that the individual seed multipliers who will be able to sell their seeds directly to the markets are those who will be providential enough to get the high price because they will get the last price set by the government.

However, if operative and well-organised Contract farming are established, it might be a reliable way of increasing production, reducing transaction costs, and marketing risks which have an impact on smallholder seed multiplier's income. Since seed companies mentioned providing the technical training to multipliers and advance them with production costs.

Smallholder seed multipliers also need to work together so that they can influence decision making and pricing mechanisms.

## **6.1.3 Sustainability of the new maize seed value chain**

The implementation of the new maize seed value chain will help increase the benefits for the family members of the actors, it will contribute to the society and the environment but also the economic wealth of all the actors involved.

### **Profit**

With contract farming smallholder seed multipliers will have the support in terms of inputs, credits, and technical assistance from seeds companies, these supports will contribute to the high productivity and reduces production cost and risk which will increase the output per labour, the CF also will contribute to the improvement of bargaining power of smallholder multipliers, all these factors will contribute to the increase of value share of the smallholder seed multipliers.

**Figure 29 maize seed planted field**



Source: data collector

### **People**

Since the seed companies interviewed mentioned that they pay social security, health insurance, and school fees for the children of small multipliers, but also the plan of seed companies to help small multipliers working in a group, these will contribute to the social welfare and livelihoods of the small seed multipliers. As the result also show that majority of small seed multipliers are women, the skills training and capacity building activities for producers organised by seed companies and the Government will increase their abilities and leadership qualities, this will allow women to contribute to the development of their families.

### **Planet**

Technical skills and training support for small seed multipliers will help to reduce the negative impact of poor agricultural practices, small multipliers will start to use different inputs such as pesticides and fertilizers appropriately, which will contribute to the conservation of animals such as earthworms, birds, bees which have a significant impact on the conservation of wildlife.

**Figure 30: maize seed field preparation**



Source: data collector

## 6.2 Recommendation

**Recommendation for smallholder multipliers:** As the majority of small seed multipliers work on the small land less than 5 ha, they could organize themselves into working groups with large land for production, so that they can negotiate the contract together so that they can influence the content of the contract such as pricing, payment system, technical and financial supports.

### **Recommendation to seed companies:**

Seeds companies could think about how to help smallholder multipliers to find out the alternative markets for the rejected maize which will not serve as seeds as an additional incentive for them. This will motivate smallholder multipliers and increase trust with their partners.

As most of the extension services from government and external supporters destined to smallholder seed multipliers are focusing on production and agriculture practices, seed companies should include other aspects of training such as coordination, marketing, and transaction costs management, that can help well collaboration with smallholder multipliers.

### **Recommendation to the government:**

As APTC is the organisation which can decide which agro dealer to buy to which company, MINAGRI through RAB should set a strong and strict policy that defines clearly the roles and limitation of APTC to avoid the biases whether APTC can favour some companies over the others and keep directing agro-dealers to the same companies. Ministry of agriculture and RAB should shorten the long process of seed supply and payment by putting the farmers' subsidy money in the bank so that the maize farmers can get the money with all the process involved before going to buy seeds. This will avoid the long process of farmer's records, and bureaucracy in the payment process.

### **Recommendations for further research:**

Due to inputs subsidy that boosts maize seeds markets, further researches are needed to find out the sustainability of the seed markets on the maize farmers level in case of no subvention from the government, which can have an impact on the smallholder seed multipliers markets.

As this study was carried out at the start of the implementation of the new value chain, another study will be needed after two agriculture seasons to evaluate if the scheme is working properly.

Finally, for the government to resolve the issue of the uncertainty of the maize seed market raised after the government decided to withdraw from the bulk-buying of maize seeds, especially for small seed multipliers. The government of Rwanda should continue supporting smallholder multipliers to integrate the contract farming scheme through training and other support which can help them to increase their negotiation capacities such as availability of seed processing materials. The government should also continue to support other alternative maize seed markets by supporting the formation and development of cooperatives of small seed multipliers with strong marketing capacities that can help them sell their seeds directly to the markets.



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## ANNEXES

### Annex1. INTERVIEW CHECKLIST FOR EXPERTS

Checklist for interview

Key Informant MINAGRI & RAB

Interviewer: Jean Pierre NDUWIMANA

Master Student at Van Hall Larenstein Netherlands

Date: .....

Respondent

Name: .....

Organisation: ....

Position: .....

District: .....

Sector: .....

1. What are the seed policies in general?
2. what are the roles of contract farming in promoting the private sector in seed production and marketing?
3. what are the factors that can contribute to the success of contract farming? (influence and support of policy)
4. what are the factors that can contribute to the failure of contract farming and how the government intends to intervene?
5. What are the contributions of the government to help increase trust between seed multipliers and the seed companies?
6. what are the contributions of the government to improve the capacities of actors (production capacities of smallholder multipliers and processing and distribution capacities of seed companies?)
7. What are other market linkages for smallholder seed multipliers?
  - which can be advised to smallholder seed multipliers
  - will not be the risk of side selling for seed companies
8. what will be the new roles of Government in this new seed value chain.

## **Annex2. INTERVIEW CHECKLIST FOR COMPANY MANAGERS**

Checklist for interview

Key Informant: Seed Company

Interviewer: Jean Pierre NDUWIMANA

Master Student at Van Hall Larenstein Netherlands

Date: .....

Respondent

Name: .....

Organisation: .....

Position: .....

District: .....

Sector: .....

1. Tell me about the background of your seed business

- Source of seeds
- Number of farmers' work with
- Location of stock.
- District of distribution

2. what is the relationship with seeds multipliers:

- written contract
- verbal agreement
- middleman

3. what are your strategies to maintain and increase the numbers of seeds multipliers work with?

4. what are the challenges accounted for in seed sourcing?

5. what do you think can help you to improve a good relationship with seeds multipliers?

6. what are the support do you provide to seeds multipliers to meet the required qualities and quantity

7. what are the contributions of the government to improve capacities of seed sourcing and distribution?

### Annex3. Questionnaire

#### Contribution of contract farming to improve smallholder seed multipliers access to market

I am a master Student at Van Hall Larenstein University of Applied Sciences in Agriculture Production Chain Management program. I am conducting a research on the Contribution of contract farming to improve smallholder seed multipliers access to the market with the objective of assessing the effectiveness of contract farming in improving smallholder seed multipliers income and increase trust between them and the seed companies and to propose appropriate improvement interventions. I would like to request your answers to the following questions that will take around 10 to 15 minutes of your time. Your answers will be used only for the purpose of this study and will be kept confidential. Thank you for your cooperation.

1. Farmer Code

Your answer

2.date of interview

Date

3.District, Sector, and Cell

Your answer

4.Gender

Male

Female

total own land (in ha)

Your answer

land use for seed production (ha)

Your answer

5.how many years have you been multipliers maize seeds?

1-5

6-10

11-15

16 plus

6.average seed produced per year (kg)

Your answer

7.average total cost used for seed production per year (Money/ Rwf)

Your answer

8.is the seed production your main economic activity?

yes

No

9.what are the sources of finance for your activities of seed production

personal savings

advances cash from buyers

microfinance

bank loans

10.do you have storage for your seeds

Yes

No

11. If No where do you store your production seeds

Your answer

12. If yes what capacities is your store (kg )

Your answer

13.what are the size of the storage?

Your answer

14. What are the following criteria that work for your store?

Aeration space

Cemented floor

storage pallets  
well close roof

15.what are the processing equipment do you have?

Drying Areas  
Shelling Machine  
Cleaning facilities  
Grading machine  
coating Machine  
packaging

16.what are the most losses do you accounted in your storage

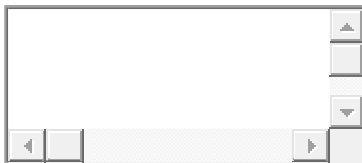
first  
second  
third  
fourth  
moisture  
rodent  
Heat damaged grains  
Pest damaged grains  
moisture  
rodent  
Heat damaged grains  
Pest damaged grains

17. Since 2018 RAB requested to all seed multipliers to start selling their produce directly to the market (agro-dealers) did you start to do so??

yes  
No

18.if No: why?

Your answer



19.how are you planning to sell

myself  
seed Companies  
join cooperative  
Other:



20. can you please explain your choice?

Your answer

21.if yes, how are you selling your produced seed?

myself

seed Companies

join cooperative

Other:

22.can you please explain your choice?

Your answer

23. At what price were you selling your seed before? (per kg)

Your answer

24. At what price are you selling your seed now in the new system? (per kg)

Your answer

25.what are the motivation for your choice??

First

Second

third

price

payment on time

regular costumes

price

payment on time

regular costumes

26. What are the means of communication with your selling partners?

Contract

Meeting

Delivery note

27.what means of mediation do you have?

Amicably



Local leaders

Courts

Other:

28. What do you think will help you the most to sell your produce?

Contract with seed companies,

joining cooperative

selling the product, myself

29. What do you need the most from the contract with partners? (ranking them from by preference)

first

second

third

fourth

fifth

High prices

inputs delivery

processing facilities

on-time payment

meeting the contract agreement

High prices

inputs delivery

processing facilities

on-time payment

meeting the contract agreement

30. do you get any support from other actors apart from your buyers?

Yes

No

If yes which actors

Government

Inputs suppliers

Financial institution

Other:

31. what will you advise RAB and MINAGRI to help seed multipliers to have good collaboration with seed multipliers?

Your answer

32. what will you advise Seed companies to help seed multipliers to meet the required quality and quantity?

Your answer

#### Annex 4: List of Key informants

Interviewee No	Organisation	Profession	Interviewee's position
1	RAB	The governmental organisation responsible for agricultural research and extension services	Seed Unit Division Manager
2	Rumbuka ltd	Seed company	Operations manager
3	Top quality Production ltd	Seed company	Operations manager
4	IABM	Seed company	Managing Director
5	Individual seed multipliers	Seed production	Seed producer in Rwamagana District
6	Individual seed multipliers	Seed production	Seed producer in Ruhango District

#### Annex 4: Time Framework

Activities	May	June	July	Aug	Sep
Developing of research proposal					
Submission of research proposal					
Desk study					
Questionnaire and checklist design					
Survey and interview data collection					
Data analysis					
Compilation of report					
Final Submission of report					