

THE CONTRIBUTION OF IRISH POTATO COLLECTION CENTERS IN LINKING POTATO SMALLHOLDER FARMERS TO MARKETS: CASE OF MUSANZE DISTRICT - RWANDA



By

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September 2018



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POTATO SMALLHOLDER FARMERS TO MARKETS: CASE OF MUSANZE
DISTRICT - RWANDA**

**Research project submitted to Van Hall Larenstein University of Applied Sciences in
partial fulfilment of the requirements for the Master Degree in Agricultural Production
Chain Management -**

By

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September 2018

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Dedication

I dedicate this thesis to my family for their huge love, support and
sacrifice

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LIST OF ACCRONYMS

APTC:	Agro Processing and Trading Company
BPR:	Bank Populaire du Rwanda
EICV:	Integrated Household Living Conditions Survey
FGD:	Focus Group Discussions
GDP:	Gross Domestic Product
GoR:	Government of Rwanda
KIT:	Royal Tropical Institute
CIP:	Crop Intensification Programme
MINALOC:	Ministry of Local Government
MINICOM:	Ministry of Trade and Industry
MINAGRI:	Ministry of Agriculture and Animal Resources
NISR:	National Institute of Statistics of Rwanda
RAB:	Rwanda Agriculture Board
RCA:	Rwanda Cooperatives Agency
NGO:	Non-Governmental Organization
PCC:	Potato Collection Center
PASP:	Post-Harvest and Agribusiness Support Project
SACCO:	Savings and Credit Cooperatives
UNESCO:	United Nations Educational Scientific and Cultural Organization
USAID:	United Nations Agency for International Development
SNV:	Netherlands Development Organization
SWOT:	Strength Weakness Opportunities Threat

Abstract

Irish potato was introduced in Rwanda in the beginning of 19th century and today is among the high cultivated crops in the country where it qualifies Rwanda to be 6th largest potato producer in Africa. It is the first purchased crop amongst food commodities market. It is rich in hydrocarbons and starch. The Rwanda Agriculture board and seed multipliers are the main sources seeds for farmers, however they remain scarce. At least 80% of seeds are imported from Uganda. Irish potato is highly produced in the Northern-western provinces in main four district among which Musanze is the first. A big amount of smallholder famers depends on potato production. Although the production continued to increase, farmers have been claiming to incur into losses due to middlemen who dictated prices and caused serious price fluctuation. This situation alarmed the Ministry of Trade and Industry which took the decision of organizing the potato value chain by stopping middlemen in the chain; and setting seasonal prices. However, the problem persisted. This study seeks to assess the efficiency of Irish Potato collection centers (PCCs) in leveraging smallholder farmers access to higher profitable markets in Musanze district. To achieve this objective, it was very important to find the response to the dynamics in the Irish potato value chain in Musanze District and strategies that potato collection centers can apply in Musanze to link farmers to higher profitable markets.

The desk and field research were both important. After desk research, a case study was conducted in the field where data were collected from focus group discussions for farmers and interviews to other selected stakeholders that have a relation with PCC in the chain. Collected data were processed into results.

It was indicated by results that there were a formal and informal chains in the potato chain. In the informal chain, middlemen were the main players who have power because they decide their own prices. However, even though some farmers and buyers prefer work with them, they are not allowed to be in the chain, and who ever to sell or buys to them is fined. The formal chain is led by the Agro Processing and Trading Company which has a mandate to organize and controlling potato value chain in Musanze. The prices set by the Ministry of Trading, Industry and commerce were implemented but because their change wait for a new season, some stakeholders sold potatoes on different attractive prices which attracted farmers to skip chain functions and go to retail on Kigali market.

Different stakeholders mentioned the PCC Challenges. Among others, collection centers have lost the power to sell directly to customers and to decide independently since this is under APTC's responsibility. Challenges were found as well in some stakeholders' relations where the demand and payment channels were confusing vis-à-vis producers and customers due to the interferences of responsibilities between APTC and PCC

To make the Irish Potato collection center efficient, it is crucially importance to establish a clear policy elaborating the PCC responsibilities so as to avoid stakeholders' tasks interferences. PCC as farmers' selling point should bear the selling power. In order to foster PCC integration and management, it is necessary to recruit skilled and qualified staff capable to develop, supervise, manage and innovate activities that promote PCC to a higher level of diversifying qualities of potatoes and selling to all the range of market segment inexhaustibly.

CHAPTER 1. INTRODUCTION

1.0. Background

The Rwanda is a country without access to the sea located on the border between Central and East Africa. It is part of the Great Lakes region. Nicknamed the "land of a thousand hills", it shares borders with, in the north, Uganda, in the east, Tanzania, in the south, Burundi, and in the west, the Democratic Republic of the Congo. Rwanda's population is of almost 12,089,721 inhabitants (PopulationData.net, 2018). While its centrally located capital Kigali is expanding, Rwanda is still very much a rural-based country. Official figures state that 85% of the population lives in rural areas, and 90% of the population cultivates at least one parcel of land (NISR 2012).

Agriculture in Rwanda accounts for a third of Rwanda's GDP; it constitutes the main economic activity for the rural households (especially women) and remains their main source of income. The agricultural population is estimated to be a little less than 80% of the total population. The sector meets 90% of the national food needs and generates more than 70% of the country's export revenues. The contribution of the agriculture sector to the GDP has consistently been estimated at about 30% while the average Real GDP growth of the sector for the past five years was estimated at 5% (UNESCO, 2017).

In Rwanda, agriculture sector is dominated by small-scale, subsistence farming under traditional agricultural practices and rain-fed agriculture (Giertz et al., 2015).

Irish potato (hereafter referred to as "potato") is a plant grown for its tubers (roots) rich in hydrocarbons and starch. Irish potato crops were first introduced in Rwanda at the beginning of the 19th century and are now being cultivated throughout Rwanda, particularly in the northern provinces of Ruhengeri (currently Musanze) and Gisenyi (currently Rubavu) where rainfall and soil conditions are favourable. Since the mid-1970s, when transport and infrastructure developed, marketing potatoes for urban consumption has taken on a new importance. In 1979 the Government of Rwanda (GoR) initiated a national programme to improve potato production (Programme National d'Amélioration de la Pomme de terre, PNAP) that concentrated on the development and dissemination of improved varieties. Unfortunately, the civil war in 1994 damaged the country's infrastructure and potato production was seriously affected. But since 1999, both FOs and NGOs have initiated activities to rebuild both the physical and knowledge infrastructure (Fané et al., 2006). Potato has become an important food crop in Rwanda with about 133,000 hectares under cultivation and more than 1 million MT of potatoes produced. Irish potato requires a relatively cool and moist climate to achieve the best results (BPR, 2012).

Rwanda is the 6th largest producer of potatoes in Africa, which is significant given the relative land size of the country. Irish potato is one of the most important crops in Rwanda and is one of the government's six priority crops falling under the Crop Intensification Program (CIP). The country plans to increase production significantly through expanding area under production and increasing yield per hectare (productivity) (FAO, 2018). Irish potatoes are the second Rwanda most important staple. The integrated household living conditions survey EICV3 indicated that they constitute 7.6 percent of all food purchases, and 8.3 percent of all food consumption. The country produces a number of different potato varieties, some of which are recognized throughout the region. These vary in taste and cooking characteristics as well as their adaptation to specific soil types. The variety *Kinigi* is particularly prized for its taste and chipping characteristics. In 2012, Irish potatoes were the second largest vegetable crop after bananas in terms of volume produced (over 2.1 million MT). EICV3 data for 2010/11 indicate that it was grown by 52.9 percent of all households. Much of the crop is consumed locally; only a small volume is exported. National yields of potatoes in Rwanda agricultural Season A have tended to be higher than those in Season B and areas sown in Season A have been consistently higher, so

60 percent of the national crop is now produced from Season A and 40 percent from Season B (Giertz, 2015).

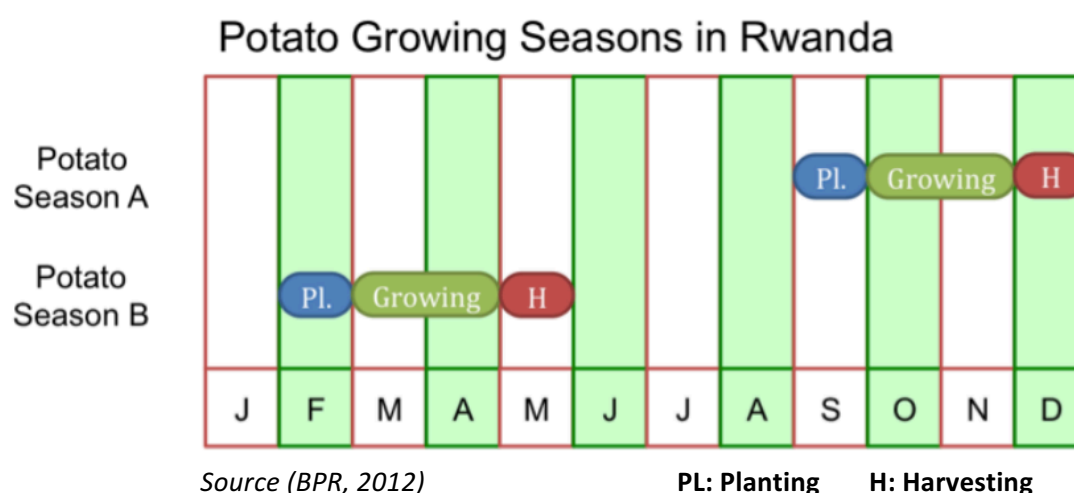
1.1 Seed production and input supply

The national agricultural research institute (Institut des Sciences Agronomiques du Rwanda, ISAR currently Rwanda Agriculture Board (RAB)) has long experience in breeding high-yield potato varieties that are resistant to pests, and in producing quality ‘breeder’ seeds. With donor support, the Ruhengeri research station built new greenhouses for improved potato seed production and relaunched on-station and on-farm trials. The national seed service (Service National des Semences, SNS) is the next operator in the seed chain; using improved seed material from RAB it produces foundation seed for further multiplication by producers. SNS provides technical support to these producers and supervises certification of registered potato seeds (Fané et al., 2006). However, seeds keep being scarce compared to farmers’ demand, in most cases farmers have to keep a part of their harvest as seeds for the following season. Currently, they complain that 80% of potato seeds of the their favorite variety ‘kinigi’ are imported from Uganda.

1.2 Irish potato production

Data for Agricultural season 2012A in Rwanda indicates that 60 percent of potato production is concentrated in just three districts: Nyabihu (19 percent) and Rubavu (23 percent) in Western Province, and Musanze (20 percent) in Northern Province. The high levels of production in these three districts are attributable to higher levels of rainfall, which allow the crop to be grown three times during the year. For instance, in Musanze, potatoes are harvested in December/January, April/May, and August/ September, although the significance of the third harvest is debatable (USAID, 2013). The potato production cycle is short, only about 4 months compared to 6 months for beans or 8 months for maize, making it in theory possible to have up to three production cycles per year, provided water (rain / irrigation) is available (BPR, 2012). There is a strong market for potato in Rwanda as commercial production fails to meet demand.

Figure 1: Potato growing seasons in Rwanda



The seasonality of the potato trade reflects the domestic production cycle. When local supplies are low and prices high, potatoes enter Rwanda from Uganda and exports to Burundi and the DRC are reduced. Conversely, immediately after harvest, supplies are abundant (in December and May), leading to low prices and minimal imports from Uganda, and exports peak. This peak

export market could be expanded if potatoes were harvested in a mature condition that would allow for improved storage (USAID, 2013).

Since 1961, Rwanda's potato output has risen from less than 100,000 tonnes to a 1.3 million tonnes in 2005. According to FAO data based on imputation methodology, potato production in 2014 was 2,213,560 tonnes. Most of potato sector consists of small family farmers. The varieties that are mostly grown in Rwanda include Kinigi, kirundo, mabondo, kuruza and sangema. The average yield is 9 to 10 tonnes per hectare. In 2014, farmers were motivated to join cooperatives for better gaining trainings on best farming practices to reach at least 40 tonnes per hectare in coming seasons (MINAGRI, 2018).

1.3 Irish potato consumption

Potatoes have become a very popular food source in Rwanda, more important than some other food products such as maize in the urban areas. In the production regions the consumption is reported to reach as much as 250kg per person per year and is on average significantly higher than other regions or urban areas. The average consumption in urban areas is 80kg per person per year. In the key potato growing regions the average yield for consumption potatoes is about 12MT/ha, but better farmers achieve as much as 30MT/ha.

The production is limited; the commodity is consumed throughout the country. EICV3 data indicates that urban consumption in 2010/11 was approximately 125,000 MT, while rural consumption was 640,000 MT. Total domestic consumptions is therefore estimated at 765,000 MT. A further 120,000 MT was used for seed, bringing total domestic utilization in 2011 to approximately 885,000 MT. The figure below indicates that in the study conducted by NISR (2010/11), Irish potato was the first purchased commodity in Rwanda.

Figure 2: Twenty most important items of food purchases

EICV3			
Commodity	Total spending (in million RWF)	Share of: Food purchases	All purchases
Irish potato	57,100	7.6%	3.3%
Dry beans	53,400	7.1%	3.1%
Beef meat	37,300	5.0%	2.2%
Restaurant food	35,200	4.7%	2.0%
Bar drinks	29,000	3.9%	1.7%
Peanut oil	28,700	3.8%	1.7%
Local rice	27,800	3.7%	1.6%
Corn (flour)	24,100	3.2%	1.4%
Imported rice	23,200	3.1%	1.3%
Banana (cooking)	21,900	2.9%	1.3%
Tomato	21,600	2.9%	1.2%
Cassava (flour)	21,500	2.9%	1.2%
Sugar (local)	21,100	2.8%	1.2%
Sweet potato	19,000	2.5%	1.1%
Commercial beer	16,100	2.1%	0.9%
Sorghum juice	15,400	2.0%	0.9%
Fresh milk	14,600	1.9%	0.8%
Bread	13,500	1.8%	0.8%
Palm oil	13,300	1.8%	0.8%
Local banana beer	12,700	1.7%	0.7%
(...)			
Total of the above		67.3%	

Source: National Institute of Statistics of Rwanda (NISR), 2010/11. EICV3

1.4 Challenges in potato chain

The needs for farming inputs in potato production are relatively high despite the frequent use of own seeds and little or no fertilizer. The costs are high mainly due to the fact that most farmers rent the land, the high usage of pesticides and labor costs, which are very significant in potato production. In most cases the farmer does not know the price he will receive for his potatoes before reaching the city market (BPR, 2012). The limiting factors for production are (i) the availability of suitable land, (ii) the high production costs, and (iii) the availability of potato seeds. Potato production is one of the most profitable business, however because of a tendency to grow potatoes without adequate rotation and limited use of organic matter, there is a real concern for soil degradation and loss of fertility over time. The issue of equipment for land preparation is being considered. The large number of stone and rocks present in the volcanic soils of the northern region make the use of mechanization difficult. There is no storage facility available for potatoes in Rwanda and the transport of the potatoes by trucks to the markets after harvest from small farmers is costly and sometimes irregular. Therefore, farmers have to sell their production soon after harvest.

1.5 Research problem

Musanze district is one of the four North-Western Districts that grow most Irish potatoes covering 80 per cent of total production countrywide.

For so many years, price of Irish potatoes has been determined by middlemen in this part of Rwanda, resulting in high price fluctuation and therefore poor investment return for farmers. The country has about 145 Irish potato cooperatives that are grouped in five zones of Gicumbi, Musanze, Burera, Nyabihu and Rubavu. The farmer members say that the long-standing exploitation by middlemen have closed opportunities for earning revenues (Tabaro, 2018)

As a considerable amount of farmers in Musanze district depend on the production of Irish potatoes for their income, there has been a high impact in their economy. This situation has urged the Ministry of Trade and Industry (MINICOM) to establish agreements with the farmers 'cooperative to modernise the entire value and supply chain for maximum profit (Mbonyinshuti J.D, 2015). MINICOM has put in place 126 collection centres countrywide with their managing staffs. "Ministry believed that this approach would reduce the influence of middlemen and other brokers who cut on farmers' profits" (MINICOM, 2015).

Despite the efforts made by the MINICOM such as bringing together different chain actors to get to the same understanding and strengthen their chain relationship (MINALOC New, 2017), smallholder farmers remain with losses and low income, inconsistent market access and high price fluctuation. Farmers identify problems in relation to the collection centres, where there is a lack of efficiency in solving the market issues with bulking the produce from farmers and seek for a profitable market. MINICOM have tried to solve this issue by appointing and giving mandate to the Agro Processing and Trading Company known as APTC Ltd. of organising and controlling the potato value chain. However, still up to present the problem persists.

1.6 Problem owner

The problem owners are Irish potato collection centres (PCCs) and the Ministry of trade and industry (MINICOM).

1.7 Justification of the study

Irish potato is the second important crop in Rwanda. It is consumed by large number of the population and it is among the major sources of income for farmers' households. The production of Irish potato is generally far from meeting local and regional demand. Musanze is among the four major districts that has highly production of Irish potato in Rwanda. However, even though all the production is sold, most producers hardly get the benefit from potato farming due to market instability. The price fluctuation has always been weakening the relationship between producers and buyers, which caused the chain to stagnate. The Ministry of industry and trade in partnership with MINAGRI has tried to organize the chain by establishing collection centers as solution to link farmers to higher markets, and fix the fair price and manage a constant balance of demand – supply.

However, the collection centers did not achieve the goal, and some farmers and buyers kept smuggling, which worsened this business' situation. This alarmed the government, which have imposed serious penalties to prevent smuggling. To avoid fraud in between, on January 1st 2018, MINICOM released a list of fines against traders who buy and sell Irish potatoes outside the legal procedures. Tabaro (2018) reported that in Kigali, disregarding the common price that was agreed upon in a given market would be fined with Rwf 30,000 (€30) while selling Irish potatoes without a written authorization of the Irish collection center or selling point would be fined with Rwf 300,000 (€300) and Rwf 100,000 (€1000) respectively. In the countryside, if a wholesaler disregards the accorded price for the farmer, he will be fined with the difference between the set price and the price he paid, multiplied by the tons that he purchased, plus a flat fee of Rwf200,000. If the wholesaler is caught selling potatoes without authorization from a collection Centre, they will pay a fine worth Rwf 300,000 (€300). Meanwhile, MINICOM and other institutions have put in place an inspection committee for Kigali city and the countryside. As the collection centers occupy a strategic position to govern the chain, it is of outmost importance to assess their operational and marketing strategies as well as their value chain relations to develop comprehensive and relevant recommendations to improve their efficiency in the Irish potato value chain.

1.8 Research objective

Assessing the efficiency of Irish potatoes collection centers (PCCs) in leveraging farmers' market access and propose suitable enhancement interventions for PCCs in Musanze District, Northern province of Rwanda

1.9 Research questions

Q1. What are the dynamics in the Irish potato value chain in Musanze District?

Sub-questions1

- 1) What are the stakeholders' roles, decision making and leading power in the Irish potato value chain in Musanze District?
- 2) What are chain relations affecting the efficiency of Irish potato collection centre (PCC) in Musanze District?
- 3) What do stakeholders find as challenges to Irish potato collection centre for improving its efficiency?
- 4) What is the distribution of shares among chain actors?

Q2. What strategies can be used by Irish potatoes collection centers (PCCs) in Musanze to link farmers to higher profitable markets?

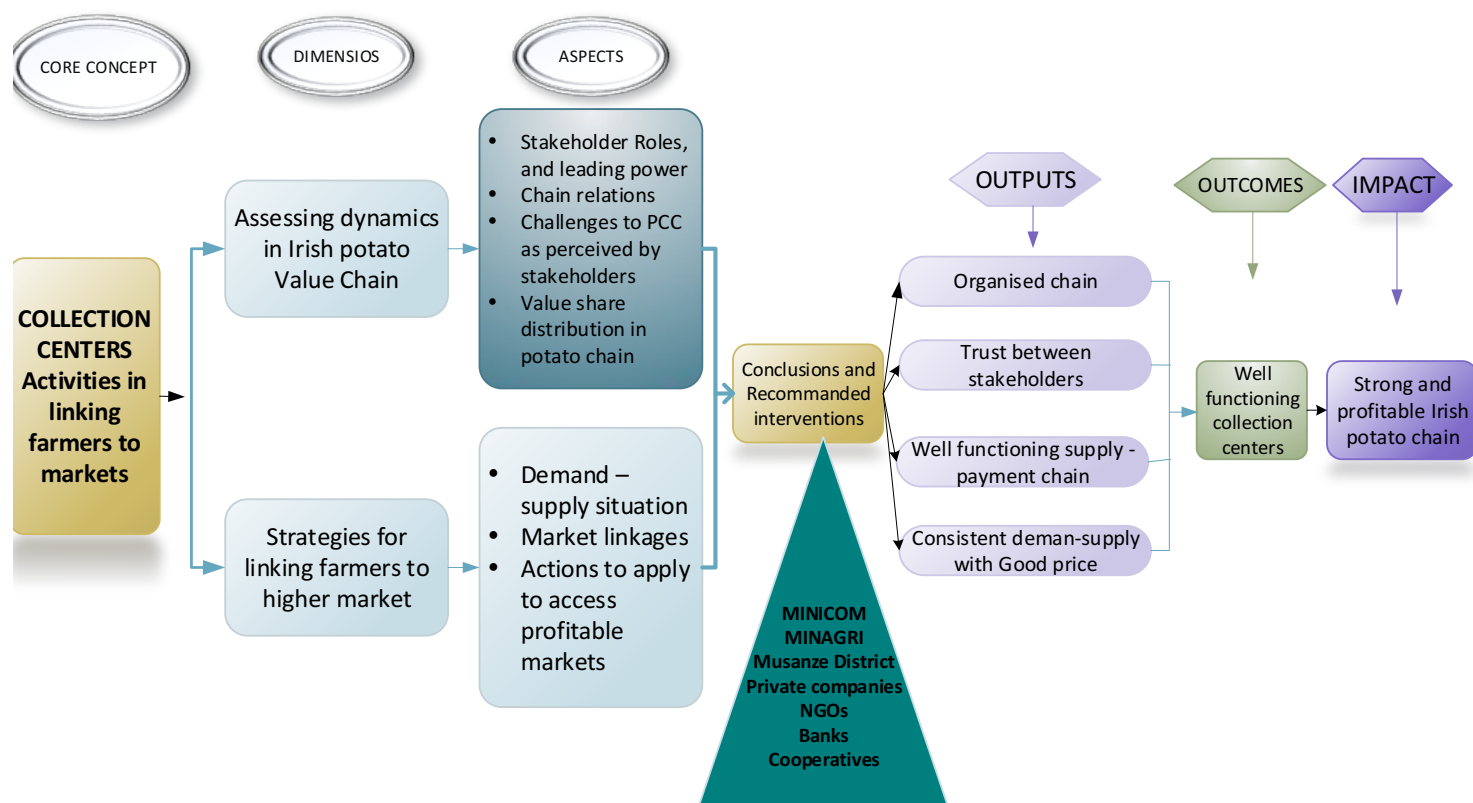
Sub-questions2

- 1) What is the situation of demand and supply in Irish potato markets in Musanze?
- 2) What are the types of market linkages that could play a role in the Musanze Irish potato value chain in increasing the efficiency of the supply to the buyers?
- 3) What set of actions can Irish potatoes farmers and PCCs apply to access profitable markets?

1.10 Conceptual framework

The conceptual framework was compiled based on the objective of the study, the mains questions and the sub-questions.

Figure 3: Conceptual framework



CHAPTER 2. LITERATURE REVIEW

2.1. Concepts

2.1.1. Stakeholders

Stakeholder stands for individuals or groups of people who have influence to react to, modify or adapt the strategic future of the organization or their association (Eden and Ackermann 1998 cited in Byrson 2004: 22). For every actor in the chain to make profit within a set enabling environment the purpose of making profit for every actor in the value chain environment, stakeholders need to adopt an inclusive business where relations are strengthened.

2.1.2. Cooperatives

A cooperative is an independent entity of women and men united voluntarily to meet their common, social, cultural needs and aspirations through a jointly owned and democratically controlled enterprise (RCA, 2018). Cooperatives aim to increase member's production and incomes by helping better link them with finance, agricultural inputs, information, and output markets (Agriculture for impact, 2018). A cooperative is an enterprise owned, managed and function by and for its members to achieve their common goals. Profits generated are either invested back again in the enterprise or return to the members (ICA, 2017).

Cooperatives laws and regulations are under the responsibility of Rwanda Cooperative Agency (RCA) which is a public institution in charge of regulating and promoting economic, social, and other activities of the general interest (RCA, 2018). Currently, with the government politic to organize Irish potato sector, every potato farmer has to join potato cooperatives. The aim is to make cooperatives more strong enough to manage PCCs. Within cooperatives farmers can easily get subsidies, best farming practices trainings, access supports and credits, and the production has insured marked. According to RCA, in potato value chain two categories are mostly found, namely production cooperative organizations and commercial and consumer cooperatives organizations.

2.1.3 Value chain

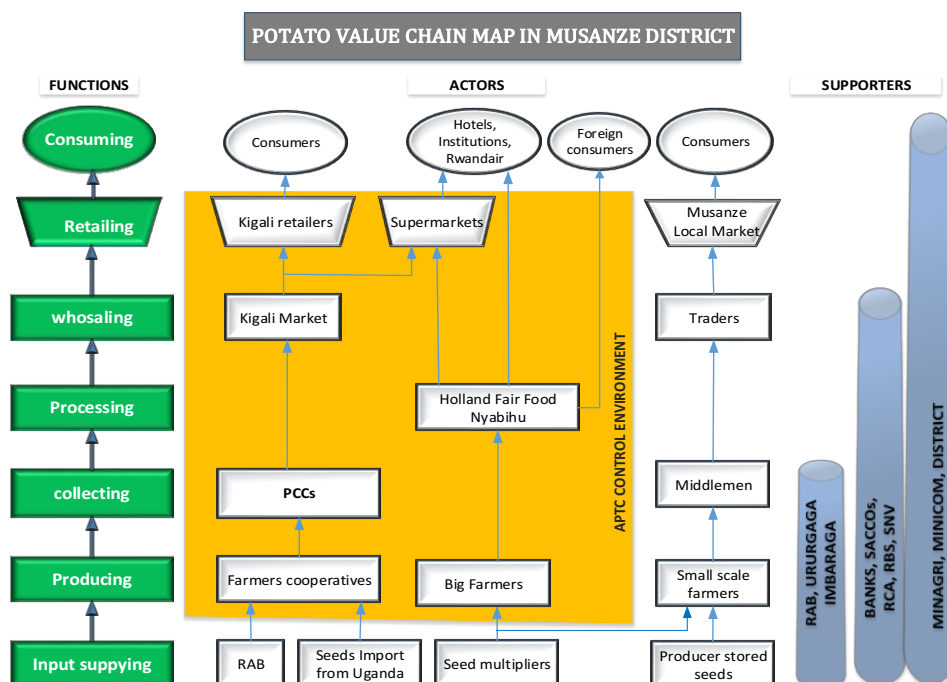
Raphael Kaplinsky and Mike Morris (2001) describes a value as the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use.

According to Schmitz, H., 2005 a value chain is the sequence of activities required to make a product or provide a service.

A value chain is a specific type of supply chain – one where the actors actively seek to support each other so they can increase their efficiency and competitiveness. They invest time, effort and money, and build relationships with other actors to reach a common goal of satisfying consumer needs, so they can increase their profit (KIT, 2006).

Within the value chain, actors make strong mutual interest interactions, which makes it easy for the transfer of useful information and skills exchange. The value chain analysis enables the decision and policy makers to realize the bottlenecks and align priorities for mainstreaming the chain (Schmitz, H., 2005:11). Below is illustrated the value chain map of Irish potatoes in Musanze district.

Figure 4: Value Chain Map



The value chain map helps us to understand different business interconnect to form one system. It is especially interesting when participant don't have the same level of information about value chain and its context (CIAT, 2014). According to CIAT, 2014, the value chain map enables us to visualise the following:

- ✓ Actors directly involved in the chain and their interconnections, roles and functions
- ✓ Indirect actors and how they support the functioning of the chain
- ✓ Links, breaches or blockages between the actors
- ✓ Product flow
- ✓ Information flow
- ✓ Price formation
- ✓ Distribution of benefits
- ✓ External influences on the value chain

2.1.4. Current Irish potato situation

Currently the number of potato farmers are 61,336 grouped into 116 potato cooperatives that are spread in five zones of Gicumbi, Musanze, Burera, Nyabihu and Rubavu. Farmers say the long-standing exploitation by middlemen denied their co-operatives from earning revenues, which meant most of them were not making substantial returns (Tabaro, 2018).

A Recently, recent farmers' co-operatives took over the management of collection centres countrywide, and together with traders and wholesalers determined the prices.

The government recently moved to determine maximum farm-gate, wholesale and retail prices after farmers complained about middlemen, popularly known as "chercheurs," making them sell their produce lower than their input costs.

The seasonal estimates of farmers' input cost is Rwf108 (\$0.13) a kilogramme. Farmers said that Irish potatoes had been selling at between Rwf80 (\$0.09) to Rwf120 (\$0.14) a kilogramme, despite prices in Kigali ranging between Rwf300 (\$0.35) to Rwf400 (\$0.47) in November and December. For instance, in the passed two weeks, Irish potato farmers were paid between

Rwf135 (\$0.16) to Rwf145 (\$0.17) a kilo, while buyers at collection centers paid between Rwf150 (\$0.18) and Rwf160 (\$0.19) depending on the variety. The Ministry of Trade set maximum retail prices at between Rwf215 (\$0.25) and Rwf220 (\$0.26) a kilo on December 29, 2017 (The EastAfrican, 2018). Irish potato remains one of the country's priority staple crops and it is widely cultivated in the Northern and Western regions (Tabaro, 2018). For Current MINICOM price for season B 2018 (see table 3).

2.1.5. Strategies for strengthening the chain with smallholder farmers

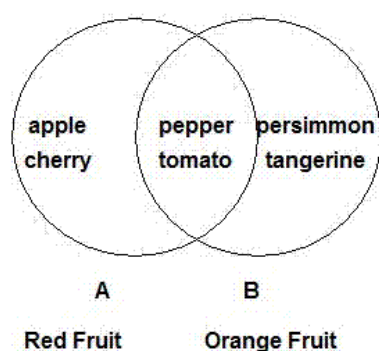
The chain strengthening requires effective integration of farmers into supply chain. This depends on the way the supply chain is designed, who has to do a specific task; who has what skills and capacities, where power should lie as well as the way organizational arrangements should look like. These aspects are applied depending on two broad dimensions within which farmers participate: *The types of activities that farmers undertake in the chain* and *the involvement of the farmer in the management of the chain* (KIT, 2006).

2.1.6. Venn diagram

'Venn diagram is an illustration that uses cycles, either overlapping or non-overlapping, to depict a relationship between finite groups of things' (Investopedia, 2018).

This diagram serves in illustrating the relations between different actors. The way the relationships between a stakeholder relates to another.

Figure 5:Venn diagram



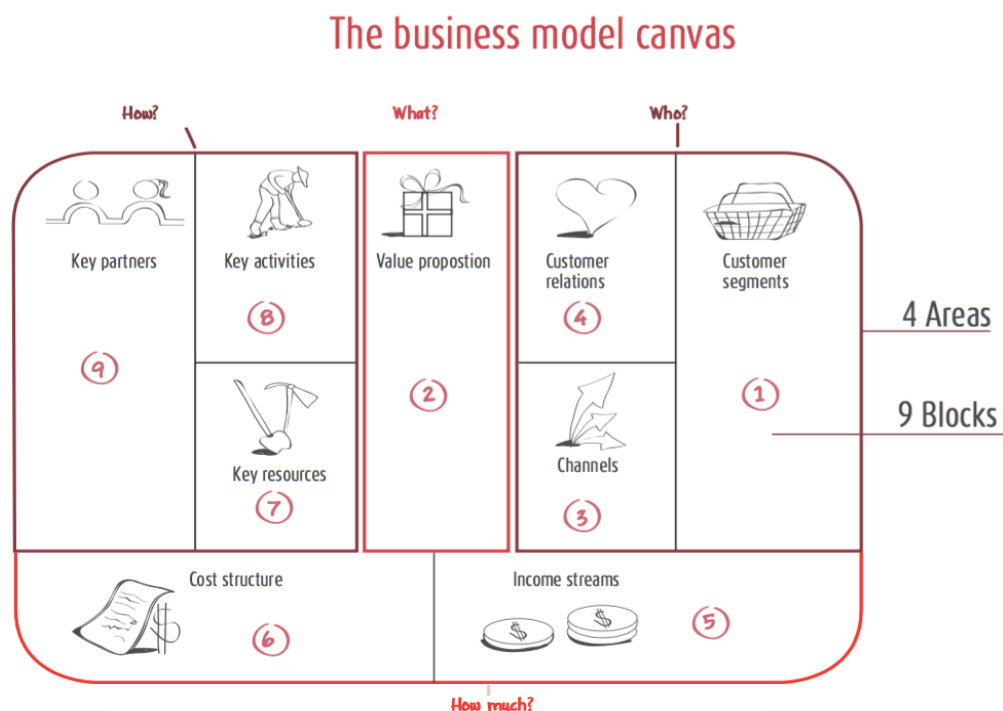
Source: Investopedia, 2018

2.1.7. Business canvas model

A Business canvas model is a tool that helps to understand a business model in a straightforward and structured way with leading to understand the client you serve, the value proposition you offer through what channel and how your institution makes money. It is a shared language to describe, visualize, assessing and changing business models. It describes the rationale of how an organization creates, delivers and captures value (Business Models Inc., 2018).

The business Canvas model comprises Key partners, key activities, Key resources, Value proposition, Customer relations, Channels, Customer segments, Cost structure and Income streams.

Figure 6: Business Canvas Model



Source: CIAT, 2012.

2.1.8. Agro Processing Trust Company (APTC)

APTC is a company appointed by the MINICOM to organize and controlling the commercialization of potatoes. Currently, it is an intermediary actor between farmers and buyers. APTC system has been subject to farmers' complaints and till now the issue is not yet solved. Details will be provided in results (see chapter 4).

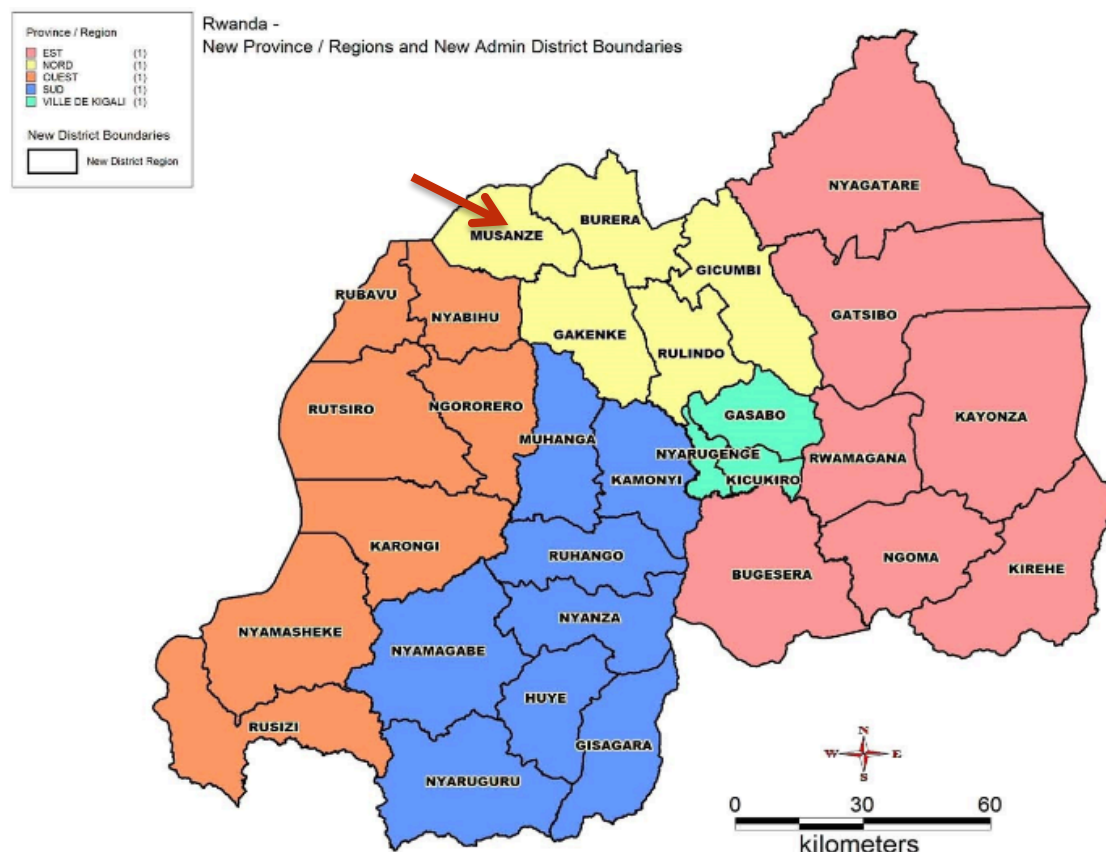
APTC is a private company that should organize potato business. According to CIAT 2014 "if the process is facilitated by a private company, it could be useful to involve (relevant) local development actors and groups of producers. This can sometimes be complicated, given limitations to developing good relationships and trust; however, it is essential to involve these actors, as they are the ones with knowledge of and information concerning market systems, rural development, business models, market opportunities and possibilities for innovation and improvement of the value chains. What a rural producer thinks is very different from what a city buyer thinks – but all viewpoints contain important information regarding the reality of the market chain or business model". In order to understand the market chain and the individual business models, their strengths and weaknesses, and the design of a shared strategy to build stable, durable and pro table trading relationships, it is necessary to listen to all voices equally (CIAT, 2014).

CHAPTER 3. THE METHODOLOGY

3.1. Study site description

The study was conducted in the district of Musanze, in the Northern province of Rwanda. Its chief town is the city of Ruhengeri also called Musanze. It is situated at elevation 1,849 meters above sea level.

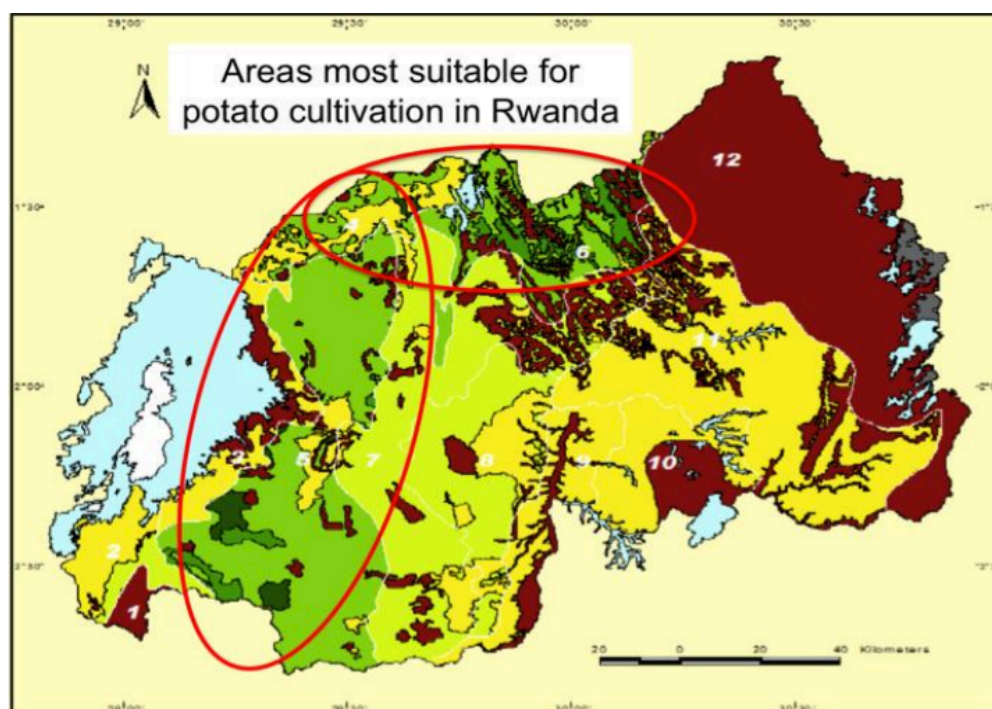
Figure 7: Illustration of Musanze district throughout Rwanda map



Source: www.africaahead.org/tag/usaid/

The district of Musanze was chosen to be the study area because it is the first potato producer amongst the four districts in the northeastern provinces that produce high quantity of Irish potato (Ktheisen, 2006). Irish Potatoes are principally cultivated at high altitudes, from 1800 to 2600 m, in the Northern and Western provinces, which are the main producing potato areas of the country (Ferrari L. et al., 2017). The population in Musanze district is predominantly rural: 72.3% of the resident population (266,185 inhabitants) lives in rural areas vs. 27.7% in urban areas. The population aged 0-17 represents 48.1 % of the total population of the district. The economically active population aged 16 to 64 years represents 53.5% (NISR, 2015).

Figure 8: Best areas for potato cultivation in Rwanda

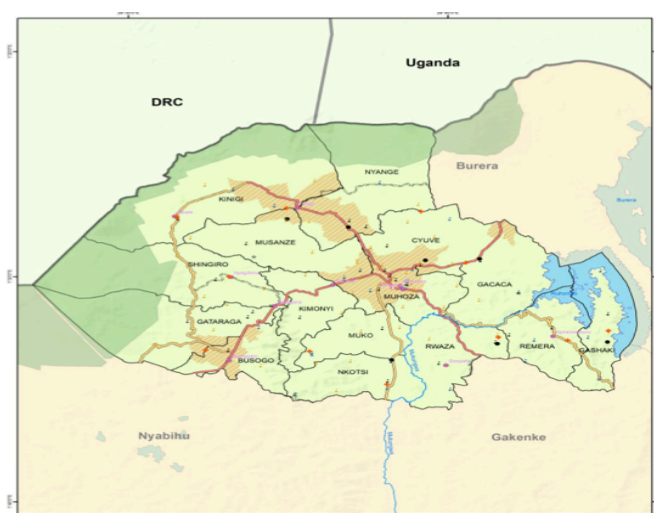


Source: BPR (2012)

3.2. Selection of the study area

In Musanze district comprises 15 sectors (NISR, 2012). However, the existing 20 PCCs in this district are located in 6 sectors namely Cyuve, Busogo, Gataraga, Kinigi, Musanze and Shingiro. This study was conducted in 3 sectors selected in the following way. Kinigi was selected as the first sector in potato production (1st), Cyuve in the middle sector in potato production (3rd) and Musanze the last sector in production among the 6 (6th).

Figure 9: Illustration of 3 selected sectors for the study in Musanze district



Source: Musanze district profile, 2012

3.3. Research design

Research started by doing a desk study to get an overview on potato sector and especially to

deeply understand different concepts that would help to efficiently analyse the problem hindering the good working of potato collection centres in Musanze district. The desk research was followed by a field study to collect data related to the research objective in the study area. Qualitative and quantitative data were collected, processed, analysed, discussed and conclusion and recommendations were provided. The research framework is illustrated in figure 10.

Figure 10: Research framework



3.4. Data collection

Primary data were collected using semi structure interviews supported by checklists; focus group discussions and direct observations. Secondary data were collected using different tools: secondary sources namely reports, journal articles and books, Internet, emails, telephone calls and national statistics. Findings were processed, analysed and discussed

3.4.1. Interviews

Semi-structured Interviews were conducted face-to-face with stakeholders using the checklist tool. Information was processed using transcriptions. The interviews were conducted with the following key stakeholders:

ACTORS

Amongst actors, 3 collection centre's managers (1 collection centre in Cyuve Sector, 1 Collection centre in Kinigi sector and 1 collection centre in Musanze sector) were interviewed; 3 potato

cooperatives leaders were interviewed. Almost all potato farmers are in cooperative; 3 Focus group discussions were conducted with farmers to collect information over their perception on the performance of the PCC system, the related challenges and opportunities; 1 APTC worker; 1 Wholesaler; 1 processor (Holland Fair foods: Winnaz factory); 2 Customers

KEY INFORMANTS

- 1 Agronomist of Musanze district
- 1 MINICOM worker

SUPPORTERS

- 1 MINAGRI worker
- 1 URAGAGA IMBARAGA
- 2 Banks (SACCO) respectively in Muhoza and Garagara sectors

RESPONDENTS STRUCTURE AND DATA COLLECTION METHOD

Table 1: Respondent structure and data collection method

Type of respondent	Number of respondent	Method of data collection
✓ PCC managers	3	Semi-structured interview
✓ MINICOM	1	
✓ AGRONOMIST	1	
✓ APTC	1	
✓ MINAGRI	1	
✓ PAPSTA	1	
✓ BANK SACCO	1	
✓ URUGAGA IMBARAGA	1	
✓ Traders	1	
✓ PCC Customers	2	
✓ Processor	1	
✓ Cooperative leaders	3	
Focus G. D with farmers	3 groups (17, 15, 14)	
TOTAL	64	

3.4.2. Focus Group Discussions (FGD)

The Focus group discussions were conducted to know the views of farmers on PCC concept, to know their perception about value chain system and their opinion on what to do to strengthen the PCC. The FGDs were conducted in three different sectors:

- ✓ In Cyuve sector, group discussions were done with 17 farmers (7men and 10 women)
- ✓ In Kinigi sector, group discussions were done with 15 farmers (7men and 8women)
- ✓ In Musanze sector group discussions were done with 14 farmers (6 men and 8women).

The age of respondents was ranged between 19 and 53 years old. All of them are smallholder farmers and the average of their farm size is 6hectares. Their average production per hectare is 1.2 to 2 tonne of potatoes. This yield is harvested from planting 100kilogrammes of potato seeds. The focus group discussions were expecting to be attended by different categories of stakeholders in the chain in order to gather a wider range of information. However, during taking the appointment with farmers, most of them expressed the wish to conduct farmers-only group discussions to talk freely about the potato value chain situation. That is why FGDs were only conducted with farmers. Other useful information was collected throughout interview with different stakeholders.



Photo 1: FGD with farmers in Cyuve sector

3.4.3. Observation

Observations enable the researcher to describe existing situations using the five senses, providing a "written photograph" of the situation under study (Erlandson et al., 1993. Cited in Kawulich, 2005). The transect walk along the field helped to understand more about the productivity of potato and land allocation in the area. As the primary data were collecting data from field, physical presence was very important for a thorough understanding of what respondents answer with regards to what is found on the field.

3.5. Data processing and analysis

After collecting data from field, transcription was done to assemble the collected information. The data processing was performed as follows.

Qualitative and quantitative data were processed and analyzed using analytical tools that lead us to the triangulation.

- The value chain map helped us to illustrate the position of actors and their functions as well as supporters and the area they exercise or provide their support. Overlays provide an understanding of shares and actors relations as well as information flow, cash flow and product flow.
- The stakeholder matrix helped to describe actors and their roles in the chain and supporters and their roles.
- The SWOT analysis helped to visualize the challenges and opportunities of the PCC in Musanze operating environment.
- Venn diagram helped in illustrating stakeholder relations.
- The Business canvas model provided a thorough picture of the PCC showing show customer relations and segments, key activities, key partners, key resources and channels.

CHAPTER 4: RESULTS

The main focus of the study was to assess the efficiency of the PCC in leveraging potato smallholder farmers access to potential market towards providing suitable enhanced

interventions. The presentation of results was built on the findings obtained from field data collection. Throughout this perspective, data were considered with respect to we used the research framework aspects.

1. Stakeholders' role, decision making and leading power in the potato value chain
2. Chain relations affecting the efficiency of the PCC
3. Stakeholders' perceptions as challenges to improve the efficiency of the PCC
4. Distribution of value share in Musanze potato value chain
5. Demand and supply situation in Musanze district
6. Market linkages
7. Actions to apply to access profitable markets

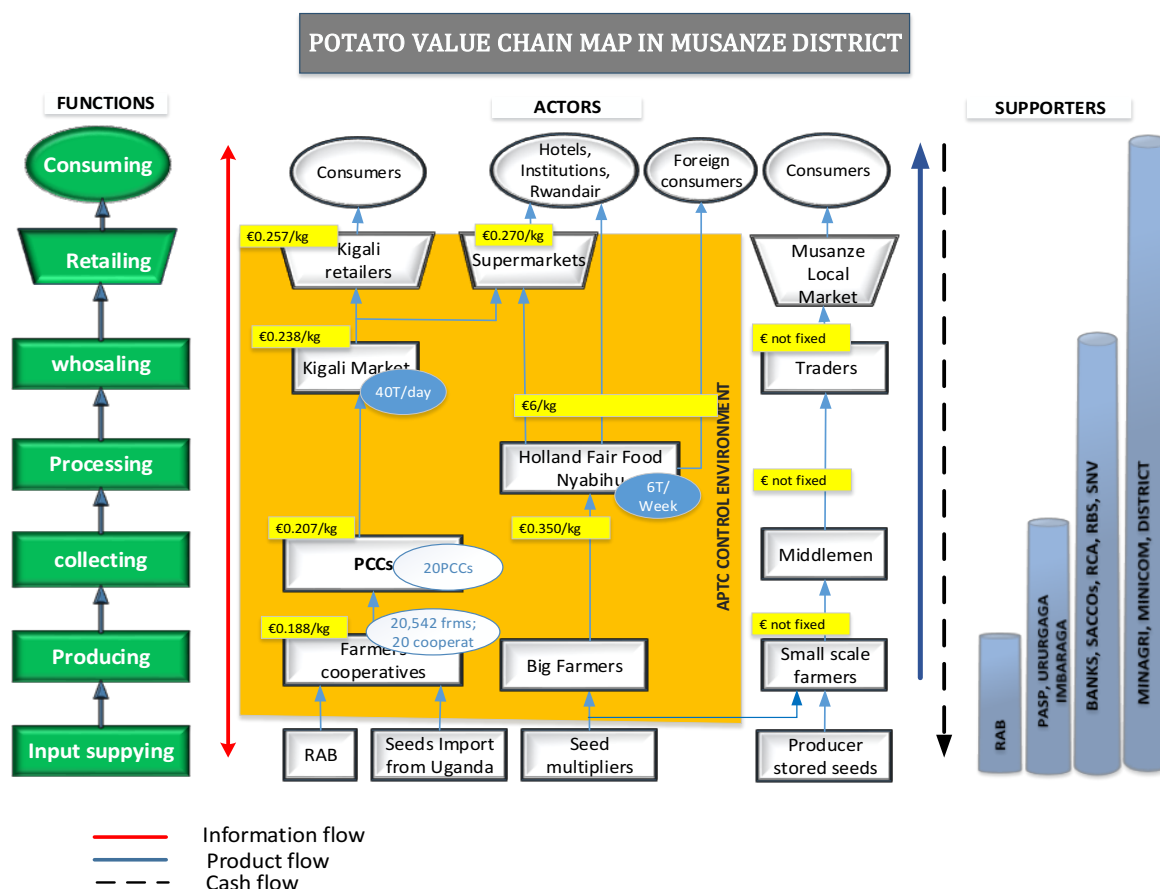
Results are based on findings from data collected directly in line with the 7 aspects of the conceptual framework.

4.1. Stakeholders' role, decision making and leading power in the potato value chain

4.1.1 Stakeholders and their role in the chain

The picture of stakeholders and their position in the chain with different functions are highlighted by the value chain map. It illustrates how potato value chain is organised in Musanze and provide the information flow and overlays that provide insight on price per stage and payment flow.

Figure 11: Value Chain Map of Irish Potato in Musanze District



The above value chain map illustrates the stakeholders' functions on the left side, actors in the

middle and supporters on the right side. It highlights a three chain situations of Irish potatoes in Musanze as explained by the key informant from agriculture department in Musanze district and an informant from MINICOM:

First chain: This chain starts from RAB along with seeds import from Uganda, providing seeds to farmers' cooperatives. After harvesting, farmers transport their production to the PCC. The PCC supplies potatoes to Kigali wholesalers who in their round, sale to retailers and the latter sell to customers. In this chain, PCC exports potatoes abroad as well.

Second Chain: Seed multipliers sell seeds to big individual farmers selected by Holland fair food factory as a processing unity. Some processed products are sold to supermarkets, hotels, restaurants and Rwandair. Others are exported outside the country

Third chain: This is an informal chain where seed multipliers and producers' own stored potatoes for next season seeds are sold to small scale farmers who after harvest, sell potatoes to middlemen. The latter sells potatoes to retailers. This is a smuggling channel as stated by MINICOM.

Information flow in the value chain

The map highlight that the APTC exert the control from producing up to retailing. Buyers inform the PCC and/or APTC that they need potatoes. APTC communicates the PCC the selling price and selling procedures; and tells the farmer the farm gate price. Farmers reported during discussions that they send their colleagues to instigate the real price at the market. Therefore, they get the updated information about the flow of potatoes at the market. They realise whether potatoes flooded or are scary on the market and claim for price change.

The stakeholder matrix below shows the stakeholders and their role in the potato chain captured from interviews conducted with them.

Table 2: Stakeholder matrix

STAKEHOLDERS		ROLES
ACTORS		
RAB,	Seed	<ul style="list-style-type: none"> - Seed production - Distributing potato seeds to cooperatives - Training farmers on best farming practices
multipliers		
Farmers		
		<ul style="list-style-type: none"> - Potato production - Supplying potato to PCC for collection
PCC		<ul style="list-style-type: none"> - Collecting potatoes from farmers in the area it covers - Advocating for farmers - Paying farmers in time - Communicating the current price to surrounding customers and market - Reporting to the cooperative - Training of farmers on farming practices and communicating planting schedule - Giving a credit to farmers to solve their urgent household needs (school fees, medication, fertilizer, etc.) - Selecting improved seeds for cooperative members
APTC		<ul style="list-style-type: none"> - Organizing potato value chain in Musanze - Ensuring the good working of potato commercialization system

	<ul style="list-style-type: none"> - Seeking for Potato markets - Buying potatoes collected at the collection center and sell them to customers - Issuing trading authorization to potato suppliers and buyers - Distributing operating and running fees to potato cooperatives - Supervise the implementation of seasonal prices set by MINICOM
Middlemen	<ul style="list-style-type: none"> - Purchasing potatoes from farmers - Supplying potatoes to local buyers
Processor	<ul style="list-style-type: none"> - Supervise the potato production processed for getting quality potatoes - Process potatoes to different types of crisps
Wholesalers	<ul style="list-style-type: none"> - Buy potatoes from PCCs - Transport potatoes from PCCs to direct mass customers or to retailing points
Retailers	<ul style="list-style-type: none"> - Retail potatoes purchased from PCC and/or wholesalers to consumers
Consumers	<ul style="list-style-type: none"> - Hotels, restaurants and supermarkets demand the supply of potatoes directly from wholesalers - Individual consumers buy potatoes at retail points
SUPPORTERS	
MINICOM	<ul style="list-style-type: none"> - Set PCC policy and control - Develop potato value chain system and control the implementation of trading strategies - Set potato commercialization policy
DISTRICT Agronomist	<ul style="list-style-type: none"> - Mobilization from the preparation of land and use of inputs (mineral fertilizer, organic matter, improved seeds) - Training farmers on good farming practices in order to increase productivity (plantation, weeds, pest and disease management) - Working closer and training agricultural cooperatives and Collection centers - Harvesting and postharvest and handling: <ul style="list-style-type: none"> ✓ <i>Harvesting to market purpose</i> ✓ <i>Harvesting for seeds</i> ✓ <i>Leaving potatoes in the ground to target good market season</i>
MINAGRI	<ul style="list-style-type: none"> - Develop Irish potato sector policy and regulations - Supervise the implementations of development processes - In collaboration with RAB, provides training and workshops for capacity building of producers and production stakeholders.
Urugaga Imbaraga	<ul style="list-style-type: none"> - Advocacy for farmers to government, NGOs and International organizations - Providing training to potato value chain stakeholders
PASP	<ul style="list-style-type: none"> - Providing training to farmers - Capacity building for cooperatives members
SACCOs (Banks)	<ul style="list-style-type: none"> - Saving farmers revenues - Providing loans to farmers

4.1.2 Leading power and decision making in the chain

The perspectives on leading and decision making in potato value chain was stated by stakeholders throughout focus group discussions with farmers and interviews actors and supporters. This approach was described by respondents throughout four angles:

- *Production (farming practices)*

- *Season and harvesting schedule*
- *Setting the selling price*
- *Supplying or selling situation*

Farmers

Farmers' results are based on findings from the total number of farmers (46 = 100%) in three focus group discussions. Throughout these, 70% of farmers said that potato production is their principal activity and their main household income.

Looking at the leading and decision making point of view in the production, all farmers said that they have power in production because they purchase the inputs and they do all activities themselves independently. They decide as well which quantity to sell and which to take home for consumption. Therefore, they have power to decide on their production. Every potato farmer should join a potato cooperative as stated a cooperative leader in Kinigi sector. The respondent added that for an individual farmer to sell, needs to pay 10,000 rwf for authorisation.

However, during the harvesting period, farmers are organised on a harvesting list and follow order depending on potatoes availability on the market. To harvest, a permission from APTC is required as explained by all farmers in discussions.

The farmers don't influence the setting of farm gate price. Prices are set by MINICOM and are announced every beginning of the harvesting period.

In regard to selling, 70 per cent of farmers sell their production through PCC. They said that they prefer PCC because it is a safe way of selling while 30 per cent prefer to sell to middlemen in an informal way. They said that middlemen pay cash and they need to solve directly their household problems

Middlemen

The middlemen participate in the potato chain in an informal way. The middleman interviewed said that during harvesting period he attracted farmers with a better price than PCC's. He said that he always has customers because he pays cash directly to the farmers and supply directly to the buyer. Once they are caught, they fined with €20 to €200 depending on the smuggling situation.

Potato Collection Centre (PCC)

Three PCC's managers were interviewed. All of them said that they sensitize farmers to bring their production to the PCC because with it, the market is sure and safe. They said that even though the principal price is set by the Ministry, depending on the market situation. However, they said that they negotiate the change with APTC and the price is implement on APTC authorisation. About selling and supplying to customers PCC sells potatoes to the customer but the payment is done through ATPC account. So, PCC has to notify at APTC for the selling to get a go ahead. One PCC leader said that at the time of the research APTC was flexible and PCCs could sell and get money directly from the buyer. This was due to the fact the the yield was very low during 2018B season.

Agro Processing and Trading Company (APTC)

The APTC coordinator stated that APTC controls farmers' production and organise the harvesting schedule during the harvest time. He added that prices are set by MINICOM and the company coordinates and controls their implementation. The coordinator said that in order to organise the chain, farmers supply potatoes to PCC and buyers go to take them at the PCC. However, the payment passes by APTC account and get to the producer after deduction of the €0.015 per kilogram of potato sold as operating cost for APTC and PCC. The coordinator provided details

about how the €0.015 are distributed:

- Ibidongi (strings): €0.001
- Bags: €0.002
- Manpower: €0.002
- APTC: €0.004
- Cooperative + PCC: €0.006

Buyers

Two buyers expressed their wish to directly get connect to farmers to quick the payment on a cheaper price and load potatoes directly from the farm to market. However, they find efficient in purchasing from the PCC because there the supply is regular and the business is formal there are no risks to penalties. They emphasized that although the Ministry set prices, they prefer to buy and sell according to the market situation. But, APTC fixes the prices and control the smuggling. One buyer mentioned that when he paid money to purchase potatoes at the collection centre and he got potatoes the following day afternoon which disturbed a lot his selling day. He advised to let buyers pay direct to farmers account or to PCCs offices or accounts because they get potatoes from its store.

Key Informants

The keys informants comprise MINICOM and Musanze district agronomist. The key informant from MINICOM said that PCC was established to support farmers in good farming practices in order to increase the production in quality and quantity. However, MINICOM gave APTC mandate to control potato value chain and assist in implementation of MINICOM regulations. Therefore, APTC carries out potato marketing and link up customers to PCC and authorises supplying to any demand. Moreover, even for individual farmers who want to supply to the market report to APTC and provide the remuneration share of the €0.015 per Kg as do other farmers who sell through the PCC.

A key informant from the district said that the district supervises the good working of every function of the chain. The district creates a conducive environment for supporters to access farmers and farmers to access supports. However, it does not set the price but it can fine those who are caught in the smuggling of potatoes as reported by APTC. The district informant added that APTC is currently controlling the commercialisation of potatoes. He finally said that the district heard farmers complaining that they don't get their payment from APTC on time and that a small part is deducted from the payment of the producer.

Supporters

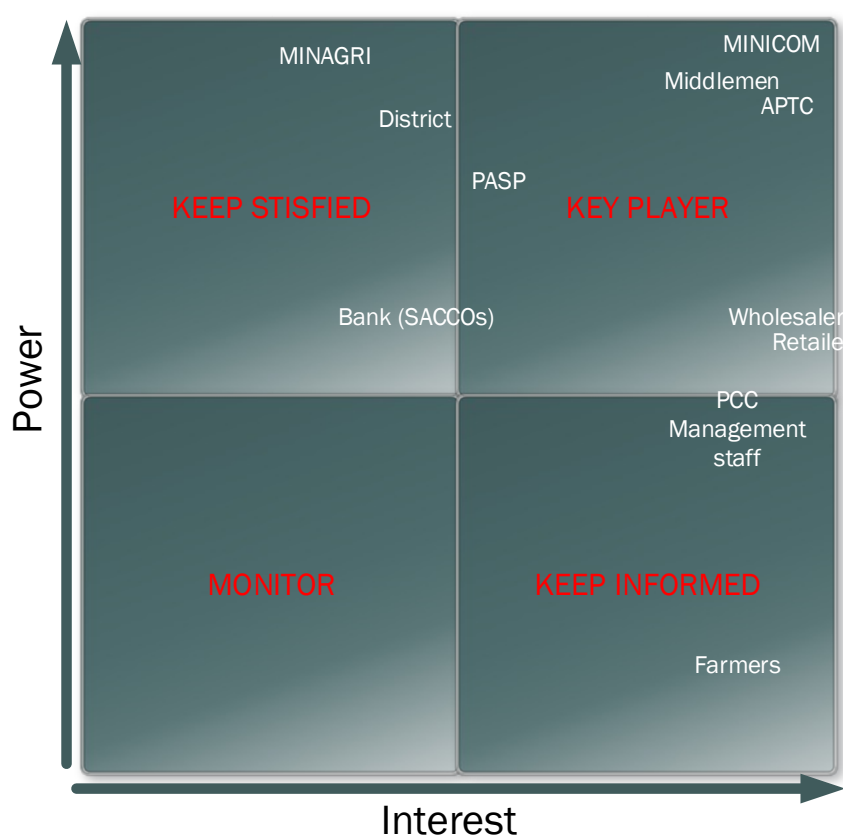
The interviewed supporters during this study are: MINAGRI, URUGAGA IMBARAGA, PASPA and SACCOs (Bank).

A respondent from URUGAGA IMBARAGA mentioned that farmers decide independently the part of yield to consume and the part to sell after the harvest. He emphasized that when farmers take their potatoes to collection centres, they are sure to get their return. However, he mentioned that some farmers reported to this organisation that they get their money too late from APTC. He said that as the organisation advices for farmers, they interact with other stakeholders one different farmers' issues but APTC is nowadays mandate by MINICOM to control the chain and to make decisions at every stage in the value chain. A respondent from MINAGRI said that trainings and field demonstrations were given to farmers which enable them to produce more than before. They have increased the supply and through their cooperatives and PCC they have had power to bargain. They can suggest seasonal price according to their

production and what they have invested. However, the supplying process is under APTC control. Therefore, they need a strong collaboration with APTC. The respondent from PASPA mentioned that many producers are small scale farmers who live from farming. Potato is their main source of income. They eat one part of around 60% and sell the other. In this regard, they struggle to obtain direct cash because they cannot wait even 3 days. They harvest in the first days of harvesting period without waiting for a full maturity of potatoes. As consequences they sell on a very low price to middlemen.

A respondent from SACCO stated that farmers don't have power to influence the price to change because the price is set by the market or by the trade ministry. In case, the market price changes against farmers' profit, farmers are incurred into loss and therefore they cannot pay for the loan they have been given. Usually, SACCO discusses with the PCC about prices and seasonal production flow to market and tolerate farmers' payment terms.

Figure 12: Power and interest grid with stakeholder



4.2 Potato chain relations

Throughout this study, the collected data about leading and decision making focussed on the interaction between the four main actors in the chain: Farmers, PCC, APTC and Buyers.

4.2.1 Chain relations regarding farmers

In the group discussions, farmers mentioned that they mostly interact with the PCC, APTC, Buyers and Middlemen. Farmers highlighted three major relations:

- Farmers and PCC;
- farmers and APTC;
- Farmers and buyers.

Around 50% per cent of farmers mentioned that they have a good relation with the PCC. They said that PCC seeks good customers and sometimes PCC is involved in transportation of potatoes from field to PCC store. Ten farmers in Musanze sector discussed that they don't like to interact with PCC because it does not pay directly whereas many middlemen are around to directly pay and go to sell the closer market. They said that PCC staff are not qualified. They don't support them in farming processes. All farmers stated that they are not happy to work with APTC because it does not honour agreements and does not help them to adjust the price in line with the instant change of the market, which has deteriorated their trust.

For instance, it pays very late up to two weeks instead of 3 agreed days. They add that APTC they don't understand why APTC deduct €0.015 per kg from their potatoes sold while it didn't participate into any farming activities.

Nowadays 50% of farmers prefer to smuggle with middlemen. They mention that even though the risk of loss is high - for example stealing them in kilos through guessing weight with a blank eye or using distorted weighing machine - they get direct cash and most of the time on a higher price better than PCC's.

4.2.2 Chain relations regarding PCC

The three PCC leaders highlighted three major relations in which they are involved.

- PCC and Farmers: The three respondents from PCCs responded that they interact well with farmers. They said that farmers are happy in selling through PCC and they like to seek market information from PCC. One respondent added that some farmers sell directly to middlemen, but that is a risk because it is not allowed and it disturbs the price situation in the chain. He advised all potato farmers to sell through the PCC for safe and sure income.
- PCC and buyers: The three respondents from PCC confirmed that buyers are happy to buy from PCC because they can find the quantity they want they can select the quality they want. They said that the price at the PCC is reasonable. So, buyers are happy to work with the PCC. However, many buyers are about the supply that delay because of payment processes as money has to first pass by APTC account and then APTC confirm the delivery.
- PCC and APTC: The three PCC leaders mentioned that there are interferences in PCC and APTC duties. For instance, PCC does the marketing and brings customers as APTC does but PCC cannot decide to sell without the permission of APTC. PCC interacts with farmers and sometimes follow up them up to harvest while APTC seeks to know which farmers is ready to harvest in order to inform customers about the time of coming to purchase. Two respondents from the PCC mentioned that sometimes PCC negotiates and agrees with a customer on the quantity and price, and when reporting to APTC, contradictions occur, and finally APTC impose the final price.

4.2.3 Chain relations regarding middlemen

One middleman mentioned that he has a strong link with 5 retailers whom he supplies regularly potatoes. He added that they shared much trust which helps them to smuggle efficiently, especially with night deliveries. He confirmed that there is no relation between PCC and middlemen because they are competitors and PCC is formal.

4.2.4 Chain relations regarding the Agro Processing and Trading Company (APTC)

The respondent from APTC indicated the triple major relations in which the company is involved and it controls.

The relation APTC and Farmers: The respondent from APTC mentioned that the relationship with farmers is good as most farmers like 75 per cent the current commercialisation system

although others complain because they don't adapt fast.

The relation APTC and PCC: The respondent from APTC stated that APTC communicates with PCC at every stage in regard to production, collecting and selling. He added that APTC help PCC to implement the price set by MINICOM and sometimes adjust the price to the situation. H said as well that they try to develop strategies that can facilitate PCC and farmers to get profit. He finds the relationship with PCC very good. However

The relation APTC and Buyers: The APTC respondent mentioned that buyers are happy because they get faster the information about the price and availability of potatoes; and their payment is safe as they pay at APTC account and the latter accelerate the process to get quickly potatoes.

4.2.5 Chain relations regarding Buyers

Buyers and PCC: One buyer mentioned that the relation between buyers and PCC is good because they get potatoes at a good price. However, he added that sometimes there is a shortage of potatoes at PCC and the price increases without communication beforehand.

Buyers and APTC: One buyer mentioned that they cooperate with APTC to find potatoes because it is the only formal way to get them. He said that they negotiate the price with APTC but they are limited because APTC take the decision. And because potatoes are their business, buyers have no choice other than buying potatoes from Musanze. Importing would not be advantageous. He said that a good relation with APTC is a must to continue the business.

Buyers and Farmers: A buyer mentioned that they cannot easily access farmers. He said that when a relation is established with a farmer, it is good because a farmer sells at a cheaper price. But the risk is high to be caught by APTC or the local government and get fines. However, he added that sometime building a good relationship with middlemen is profitable as potatoes are supplied directly and the business goes on.

4.2.6 Chain relations regarding Key informants

A key informant from MINICOM said that APTC is helping to implement strategies established. The informant added that the relation between APTC and PCC is good. They work together to help a producer to sell to a good market at a good price. A key informant from district pointed that The relation between farmers and middlemen is getting more and more strong because farmers want direct cash. He added that APTC is a decision maker in the chain because it authorises farmers and PCC to sell and supply; and authorize buyers to purchase and load potatoes to their point of sell.

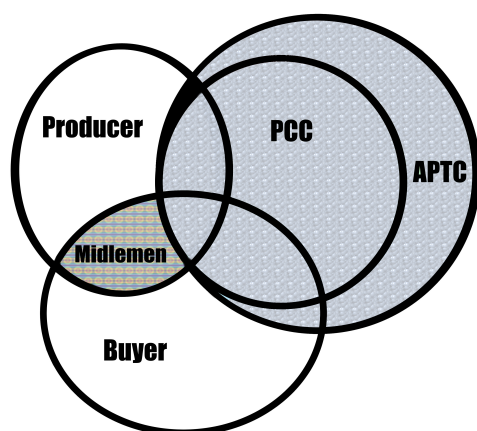
4.2.7 Chain relations regarding supporters

A Respondent from MINAGRI mentioned that the relation between farmers and PCC is current good because farmers are willing to sell their production through the PCC. He added that that was the big reason of the institution's motivation to finance different PCCs in helping them to build their offices. The respondent discussed about what is seen as interference and confusion of duties between the PCC and APTC. A respondent from bank (SACCO) mentioned that the relationship between PCC and buyers currently is not good because buyers delay to get potatoes after payment. Another respondent from PASP said that producers accuse the PCC to be weak to negotiate with APTC to set practical and profitable approaches. A respondent from URUGAGA IMBARAGA mentioned that the relationship between PCC and APTC is very weak because APTC does business as well instead of controlling only. The respondent added that in many cases he observed, APTC link the farmer to the buyer and the latter pays on APTC account which will pay the farmer. So, the respondent discussed about not seeing PCC in that chain which tends to show PCC is no longer important.

The figure below shows the combined expressions about chain leading and decision making view.

The major relations that affect the efficiency of PCC

Figure 13: Illustration of the major relations that affect the efficiency of PCC by Venn diagram



The figure above illustrates the relation between the producer and the PCC. The intersection between Producer and PCC means the part that the producer takes to the PCC, while the remaining part is taken home. The producer has possibilities to sell to the buyer through a middleman as shown by a hashed area. The buyer gets potatoes from the PCC fully controlled by the APTC. APTC controls all activities done by the PCC and the latter operates thanks to the €0.005 given by APTC to the PCC managing cooperative. However, the relations between producer – middlemen – customer are out of control of APTC. Those relations are informal and are fined once caught by APTC or the district.

4.3 Stakeholders' perceptions as challenges to improve the efficiency of the PCC

Stakeholders interconnect to make the chain work. The following findings are based on data collected on stakeholders' point of view regarding challenges that hamper the PCC from achieving its efficiency.

- The respondent from URUGAGA IMBARAGA mentioned that PCC has lost the power to be act independently, to make decisionthe. APTC has been given the mandate by the government to take decisions regarding the potato chain organization. The insertion of the APTC in the Irish potato value chain has brought unexpected situations that are hampering the efficiency of the PCC's and thus the market linkages.
- One farmer during the focus group discussions pointed that the the PCC doesn't have enough funding to buy all the production of farmers as well as to pay directly. Therefore, delays on farmers 'payment arise because most of the time the PCC waits for the customer to pay. Sometimes it may take 2 to 3 days depending on the agreement with the buyers.
- A respondent from PASP mentioned that it will be difficult for the PCC to be stable if cooperatives are not kept stable. For instance, in the beginning APTC held a meeting with RCA and MINICOM and cooperatives were merged and restructured. Yet the cooperative is currently the engine of the PCC.
- One buyer stated that middlemen are still a change to PCC because currently they are

active. The respondent explained that the middleman purchases potatoes of farmers on a fair negotiable price even better than PCC price and pay them direct cash. Moreover, the middlemen supply directly to the buyer who pays him directly and get potatoes.

- A key informant from MINICOM mentioned that PCC management team has limited skills. The informant added that the PCCs are challenged by renting offices and most of the case they don't have enough space for storage. The infrastructure is still a problem. Many of them lack the equipment too (computer or Laptop and standard Weighs).
- A key informant from the district agriculture department mentioned that PCC doesn't have a full established clear policy to follow. It is the reason why its activities interfere with APTC's.
- The respondent from PCC management team pointed that transport is challenge. PCC doesn't have fund to procure a truck that would facilitate farmers to bring their production faster and time to PCC store.

4.4 Distribution of value share in Musanze potato value chain

4.4.1. Current prices published by MINICOM

The key informant from MINICOM mentioned that currently MINICOM set the prices that have to be implemented throughout the chain in order to enhance chain relations with strengthening equal value share. The informant explained that at the end of the season, MINICOM invites potato stakeholders for a workshop to set prices. Stakeholders gather all the information about what the farmers invested in potato production, buyers' potential and current market situation. Then, after the workshop, MINICOM releases an announcement of current prices. The informant provided a release with season 2018B prices after harvesting.

The following table highlights current prices as released by MINICOM throughout the announcement.

Table 3: MINICOM prices release for agriculture season 2018

Potato varieties	Farm gate price (in €/Kg)	Price at PCC (in €/Kg)	Wholesaling price at Kigali market (in €/Kg)	Retailing price (in €/Kg)
KINIGI	0.186 – 0.191	0.204 – 0.209	0.235 -0.240	0.255 – 0.260
MABONDO, Kuruseke, T-58, Kuruza, Kirundo, Rwashaki, Makoroni, Sangema, Rwangume and Victoria	0.148 – 0.153	0.166 – 0.171	0.195 – 0.200	0.215 – 0.220
PECO	0.141- 0.142	0.159 – 0.160	0.188 – 0.189	0.208 - 0.209

Source: MINICOM, 2018

4.4.2 Value share with respect to MINICOM current prices in Musanze potato value chain

Table 4: Value share with respect to MINICOM current prices in Musanze potato value chain

Chain actors	Current price/kg in €	Added value/kg in €	Value share
Farmer	0.188	0.188	73%
Potato Collection Centre	0.207 (included 0.015 for APTC&PCC)	0.019 (-15 of APTC) = 4	7.4% (with 5% for APTC)
Wholesaler	0.238	0.031	12.2%
Retailer	0.257	0.019	7.4%

The above table indicates the market value share in potato chain based on prices released by MINICOM.

4.4.3 Real Value share on current market Musanze potato value chain

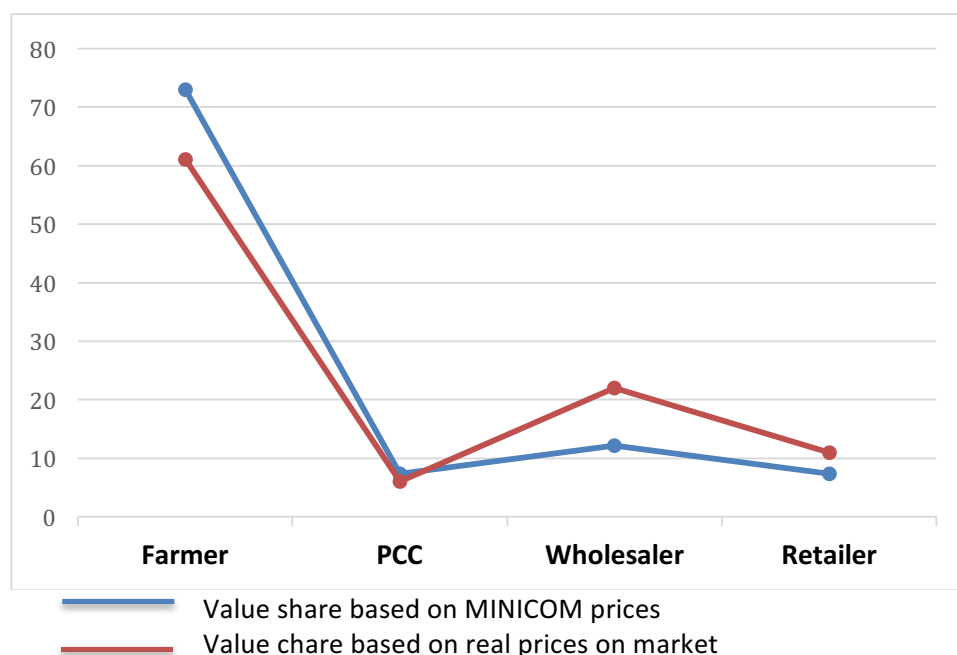
Table 5: Real Value share on current market Musanze potato value chain

Chain actors	Current prices/kg in €	Added value/kg in €	Value share
Farmer	0.190	0.190	61%
Potato Collection Centre	0.209 (included 15 for APTC&PCC)	19 (-15 of APTC) = 4	6% (with 5% for APTC)
Wholesaler	0.275	0.066	22%
Retailer	0.310	0.035	11%

The Table 5. is based on the real prices in the chain collected by the researcher. The farm gate price and the collection centre price were collected from respondent in Cyuve, Musanze and Kinigi sector, while wholesaling and retailing prices were collected from respondent of Nyabugogo market in Kigali.

4.4.4 The comparison between MINICOM set prices and real prices found on the market

Figure 14: The comparison between MINICOM set prices and real prices found on the market



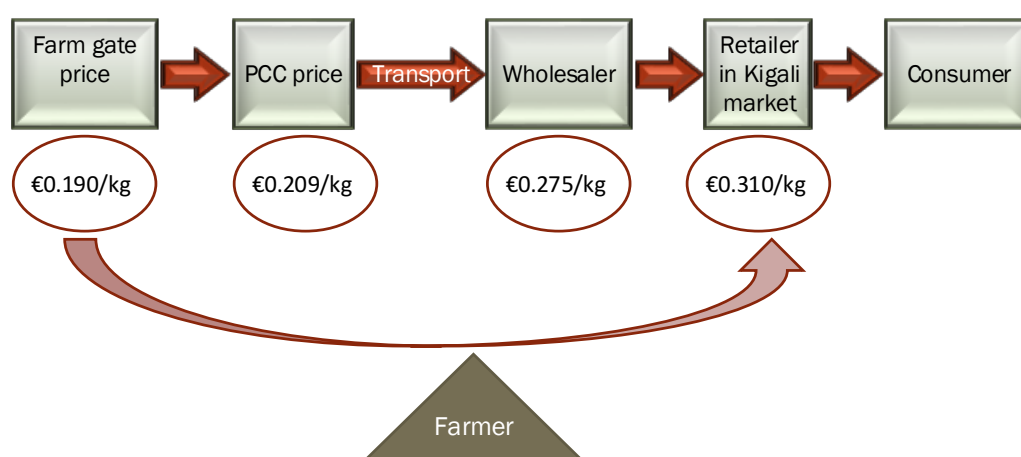
The figure above illustrates the comparison the two tables (Table 4 and Table 5) that indicate the

value share in MINICOM set prices and real prices as collected on the market.

Although MINICOM has set the above prices, the reality of their implementation is different. There is conflict of price between farm gate price and Kigali price. Farmers seek for Kigali market information especially about availability of potato and current price. They feel that Kigali retailing price is very attractive and they attempt to pack trucks and deliver to Kigali customers. They don't understand the value chain processes and tend to smuggle to retailers. However, because it is forbidden, they supply potatoes to buyers in the night.

For instance, considering Kinigi variety as a case, if the farmer realises that the farm gate price and PCC price are respectively €0.189 and €0.206 in Musanze as set by MINICOM, while the wholesaling and retailing prices are respectively €0.270 and €0.310 at Kigali market, he is attempted to load a truck and goes to retail in Kigali streets at that attractive price. One cooperative leader mentioned that the same case happened where the farmer packed a truck and went to retail in Kigali street on an attractive cheaper price of € 0.290 per/kg. He was caught by APTC agents and got a fine of €100. He added that this kind of selling in a disorganized way rises the conflict between actors as well as price fluctuation. Some farmers don't want to respect chain steps.

Figure 15: Farmer's temptation to ignore value chain steps



If farmers apply the above path (farmer to retailer) the past situation will repeat again the same problems that MINICOM wants to solve will be reproduced. To collect the production through the PCC is important because it organises the value chain and gives more bargaining to farmers which is a chain integration success.

4.5 Demand and supply situation in Musanze district

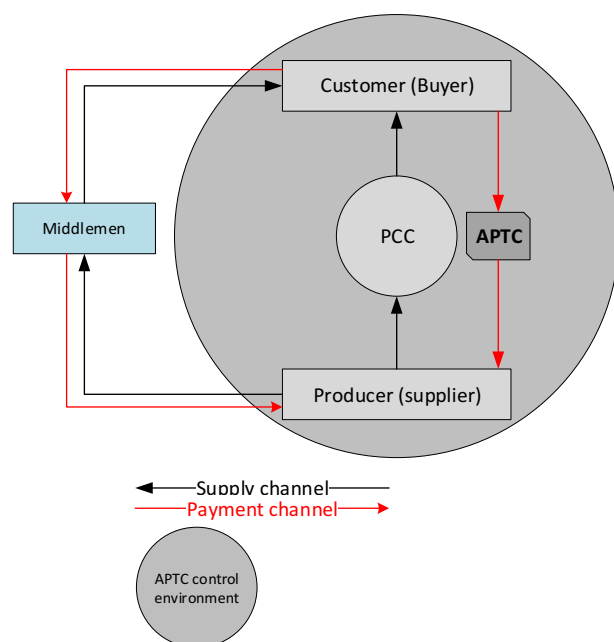
Potato demand is very high and Musanze production is far to satisfy the market as mentioned by Kinigi PCC respondent. The three respondent from PCCs respectively Kinigi, Musanze and Cyuve sectors mentioned that their biggest market is Kigali that purchase around 70% of Musanze potato production. Wholesalers purchase potatoes and load trucks every day. Musanze centres and markets purchase another considerable part of the potato production that is spread to clients in different localities. Two retailers said that most retailers use bicycles for transportation of potatoes from collection centres to the retailing points. They added that it has been a common mean of transport even for farmers to use bicycles since the distance they travel is not very long as it generally varies between 3 to 7 kilometres. The key informant from the

district in the department of agriculture stipulated that the following potato market comprises neighbouring cities such Rubavu, Huye, Muhanga; and a small part is exported to Kisoro in Uganda and Bukavu in Democratic Republic of Congo. The flow of potato par day from Musanze varies between 37 to 50 tonnes. After harvesting, around 60% of potatoes are brought home by farmers for household consumption. 40% are brought to market.

The two figures were established based on a respondent from APTC explained below channels of payment and supply the producer and the buyer have to passed by to realise their objective as systematized by APTC.

The supply and payment channels

Figure 16: The supply and payment channel



As highlighted by the above (fig. 16), the respondent explained that the supply channel is where the producer harvest and transport potatoes to the PCC. The latter being informed that a customer wants potatoes and has paid to the account of APTC, notifies to the APTC that potatoes are available. Then APTC authorises the customer to come to pick potatoes at the PCC.

The figure above illustrates the payment scenario as explained by APTC respondent where to get potatoes from the PCC, the buyer firstly pays on APTC's account and receive the authorisation slip to take to the PCC for packing potatoes. APTC deducts from the payment 0.015 per kilogram sold and gives the rest part to the farmer who supplied potatoes.

All farmers in focus group discussions discussed that they don't appreciate the current supply and payment channel. They suggest that the customer should pay directly to the PCC and packs potatoes and go. Then, PCC directly pay cash the farmer or deposits money on the farmer's account at last the following day. The same statement was supported by the retailer in the Musanze market. The retailer added that the collection centre and APTC should have an office and a store in the market or appoint their representative agents who are always available closer, this would reduce smuggling with middlemen but also would help in quickening payment and supply.

4.6 Market linkages

Most respondent mentioned that currently in Musanze District, there exists two types of market linkages: formal market linkage and Informal market linkage.

Formal market linkage: The producer is linked to the customer through PCC in environment

controlled by APTC Ltd. company which is an actor as well. According to the APTC respondent, this is the organised linkage that has strategies and regulations. This linkage is supported by the central and local government NGOs and private organisations as mentioned by all key informants.

Informal market linkage: Throughout this linkage the producer is linked to the customer by the middlemen. Most respondents said that this linkage has been forbidden by the MINICOM to chain actors because it is not controlled. Taken as smugglers of potato business, middlemen are officially not allowed to work. Whenever caught by APTC agent, they pay the penalty ranging from €20 to €300 depending on the smuggling situation found. One middlemen mentioned that although they sometimes corrupt controllers with money and they live them selling.

4.7 Strategy for PCC to access higher profitable markets

4.7.1 Characteristics of higher profitable market for Musanze potatoes

The respondent from URUGAGA IMBARAGA explained that 80 per cent of the existing Musanze higher profitable markets are located in Kigali. These markets are among others the supermarkets, some restaurants, hotels, government institutions and private institutions. The respondent added that these markets are very selective. They seek for quality potatoes with good quality aspects. A respondent from APTC mentioned that they get orders from hotels and supermarkets with specific selection criteria that potatoes must comply with. Among those criteria the respondent mentioned that potatoes must have been matured enough during their production; they must have a regular oval shape and weight must comprise between 175 to 190 grams per unity potato. According to the PCC respondent the Kinigi variety is the preferred one about taste and long storage. The respondent added that even though it is not easy to comply which higher potential markets, they offer a competitive potato price compared to the one on ordinary market or set by MINICOM. In addition, they like consistence in delivery which ensure a regular market therefore a regular income.

4.7.2 Existing strategies the PCC uses to sell to higher profitable market

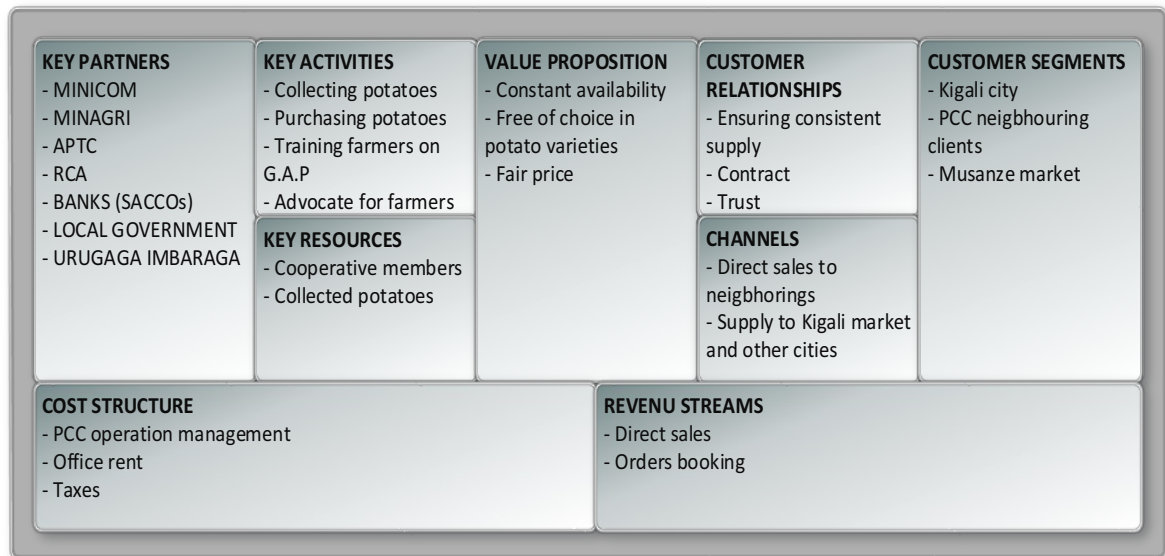
According to a respondent from 'Twizamure Cyuve cooperative' PCC does do much because it has normal market of wholesalers and retailers who always come to pick potatoes. The PCC have not yet satisfied these clients because most of the time the production is not enough. According to the respondent from APTC, when the season is good, the harvesting is organised in different days. Therefore, there is a balance in availability of potatoes that flow to market even though they stay insufficient. However, farmers were told not to mix the yield. They were told to harvest and grade and pack separately different potato varieties. Therefore, the collection centre can sort the best quality and supply to hotels, supermarkets and other high profitable institutions on a higher price. If the strategy succeeds, the PCC will the focus on consistency.

4.7.3 Current Business Canvas Model for PCC

The following Business canvas model describe the situation of PCCs in Musanze district. It provides an insight on key partners, key activities, key resources, value proposition, customer relationships, channels, customer segments, cost structure and revenue streams.

Current Business Canvas Model for PCC

Figure 17: PCC Business Canvas Model



CHAPTER 5: DISCUSSIONS

This section is concerned with the discussions based on the analysis of the results obtained from data collected. Different interaction between actors and supports within the value chain enable the PCC to achieve its objectives while others constrain it. Based on results obtained on stakeholders, the analysis was conducted by using a stakeholder matrix.

5.1 Stakeholder Analysis

Table 6: Stakeholder Matrix

Stakeholders	Level of influence (Low, Medium, High)	Interest of the stakeholder in the chain	The support the stakeholder to the chain	The constraints of the stakeholder in the value chain
Farmer	Low	Making profit	Production	<ul style="list-style-type: none"> - Low price - Shortage of quality seeds - Insufficient good farming practices - Payment delay by APTC - Poor farming practices
PCC management staff	Low to Medium	Profit making	Collecting and supplying	<ul style="list-style-type: none"> - Lack of freedom to sell and making decision - Lack of enough funding to purchase farmers' production - Insufficient storage capacity - Limited skills for PCC managing staff - Unclear responsibilities between PCC and APTC - Poor storage skills
Middleman	High	Making profit	<ul style="list-style-type: none"> - Bulking and Direct selling to buyers - Direct payment to farmers 	<ul style="list-style-type: none"> - Fixed price - Standards weighing - Environmental regulations
APTC	High	Making profit	Organising, Controlling, marketing and selling	<ul style="list-style-type: none"> - Inadequate fulfilment on agreement

				<ul style="list-style-type: none"> - Unclear responsibilities between PCC and APTC -
Wholesaler	Medium	Making profit	Wholesaling	<ul style="list-style-type: none"> - Insufficient supply - Price fluctuation
Retailer	Low	Making profit	Retailing	<ul style="list-style-type: none"> - Delay in supply - Long payment process
MINICOM	High	<ul style="list-style-type: none"> - Organised chain - Increased productivity 	<ul style="list-style-type: none"> - Setting price - Setting commercialisation environment 	<ul style="list-style-type: none"> - Insufficient funding - Insufficient concern of local government in monitoring value chain - Inadequate implementation of prices
MINAGRI	High	Increased production	Supporting farmers and PCCs	<ul style="list-style-type: none"> - Insufficient training - Insufficient inputs for farmers
LOCAL GOVERNMENT (District)	Medium	Good working environment	Supervising	<ul style="list-style-type: none"> - Smuggling in the chain
PASP	Low	Capacity building of farmers	Supporting in training farmers	<ul style="list-style-type: none"> - Slow adoption of farming practices by farmers - Insufficient funding for trainings and supports

From the table 6. It is indicated that farmers have low influence. This is because they are not involved in setting the prices since it is MINICOM that set prices that farmers implement in selling their production.

Although farmers invest their own money and follow up their potatoes from the planting up to harvest, to harvest they have to notify to the collection centre and the latter notify to APTC that farmers are ready to harvest. They harvest following the list on different days according to the market situation. The same view is supported by USAID-Inma (2011) in which harvesting time is influence by the trend of market, and farmers wants to harvest early when the market is profitable. On the other hand, they want to keep potatoes in the ground when the price is low. However, farmers explained that potatoes delayed longer rote underground. A number of constraints as the low price, shortage of seeds, insufficient farming practise and payment delay hinder farmers to achieve the higher production to satisfy the market demand.

The analysis show that the PCC has low to medium power. This is mean by the fact that as it is

managed by farmers organised into cooperative. It can advocate for them and negotiate about the fair price depending on the price situation on the market. However, PCC cannot decide because this power was being given to APTC that has a role of organising the value chain. APTC implement the prices as set by MINICOM.

Results indicate that APTC is leading the chain because it decides the harvesting schedule for producers to avoid the over flow of potatoes at the market. According to the analysis made in the table 6. APTC has high influence in the chain. All buyers have to pay to APTC to get the authorization of packing potatoes from the PCC (as highlighted in the figure 14). KIT and Faida Mali (2006) explained this situation in the '*chain empowerment*' where actors in the chain integrate in increasing activities, gain the management of the chain and reach the stage of '*chain co-owner*'. Although APTC does process potatoes it controls processors and whenever they purchase potatoes they pay to APTC the 0.015 Euro per every kilogram bought. However, some customers contact directly the PCC for direct purchase to avoid delay in delivery and payment processes but because the PCC does have the power of receiving money and authorize the supply, it has to forward customers to APTC in order to follow the formal commercial strategy set by this company.

On the other side, the middlemen are taking advantage of the current unorganised chain to sell and attract more customers. Middlemen are not influenced by the law. They operate in an informal environment. They have more power over farmers because they decide their price, they cheat farmers by not using the standard instrument. As they pay direct cash they take over the decision power of farmers and sometimes buy on a lower or higher price compared to PCC's depending on their target market. In addition, they sell on a higher price to customers who don't want to go to delay in APTC payment process and who need directly potatoes. However, APTC controls the chain such that in case a smuggling situation is present, actors are fined from 20,000 rwf to 300,000 rwf.

5.2 Relations

Results shows that there is strong relationship between Producers and the PCC. This is because the PCC is managed by the farmers' cooperative and through the PCC they interact with buyers. Another reason is that it is the responsibility of the PCC the train farmers on good practices and to support them in the use of improved seeds to foster the production. However, the study show that some respondent mentioned that PCC management staff are not skilled enough. Therefore, they don't support efficient in training farmers.

The study indicated that the relationship between the farmers and APTC is not good because APTC does not quite honour payment agreement. APTC is supposed to pay the farmer not later than 4 days after delivery. But in most cases farmers complain that they get the payment later after many days up to 2weeks, yet they need quick cash to solve their problems. They complain that customers should pay directly to the PCC where they pack potatoes, therefore farmers could get their money early. This situation dives farmers into commercialise with middlemen who pay directly as mentioned in results.

PCC mainly focusses to satisfy the normal market. Since customers come to load their trucks and supply potatoes to Kigali market constantly, the managing cooperative of the PCC seek apply good farming practices to improve the productivity. Targeting higher profitable market is the PCC aim but it is at early stage. So far, the PCC management staff has told farmers to harvest, grade and pack separately different varieties potatoes so as to target hotels and restaurant demand and negotiate better price.

5.3 PCC SWOT Analysis

Table 7: PCC SWOT Analysis

<p>STRENGTH</p> <ul style="list-style-type: none"> - Many potato producers which enable consistent production and supply - Constant availability of potatoes - Consistence in potato supply 	<p>WEAKNESS</p> <ul style="list-style-type: none"> - Slow adoption because is a new system that is not yet well integrated - Cooperative working instability due to frequent changing and merging into new ones - Lack of enough fund - Lack of efficient standard storage of potatoes - Small storage place compared to quantity to be collected - Limited skills of PCC's management staff - Lack of PCC own office - Limited access to loan - Limited decision power
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> - High and consistent demand - Ensured market - Favourable climate conditions which allow the PCC to work throughout the full year - Favourable land - Stable prices set buy MINICOM - Support from MINICOM, MINAGRI, PAPSTA and district - Local government support 	<p>THREATS</p> <ul style="list-style-type: none"> - Lack of PCC policy - Resistance of farmers when potato prices decrease - Enter-PCCs competition in the market - Smuggling of middlemen - Slow adoption of APTC system - Climate change

5.4 Market analysis

Results indicated that the production does not satisfy the demand. Currently the biggest market is Kigali followed by Musanze centres and neighbouring cities. The collection centre tries to collect the available quantity but still the shortage remains sensible on the market. This is the reason prices increase on the market. Farmers production changes as well due to poor quality seeds and poor farming practices resulting into potato shortage on the market.

Prices are set by MINICOM and their implementation is controlled by APTC which is an actor too. Results shows that PCC has medium power in in the chain. The relationship between PCC and ATPC is not good because the latter does some responsibilities that were supposed to be PCC's. APTC is the leader and decision maker in the chain.

The value share in potato chain is not stable. As price changes, the value share changes. The comparison between the value shares indicated by the figure 13 shows that thee price increased in Kigali market and remained stable in Musanze, which increased profit on wholesaler and retailers side and reduced the market share of farmers. Therefore, farmers were attracted by higher prices and tended to supply informally on Kigali market. The demand of potatoes is very high. Sometimes there is flood of potatoes other times there is shortage. However, one a respondent mentioned that with the current production PCC is far to meet the market demand.

Results showed that the

5.5 Market linkages

In the formal market linkage in Musanze potato value chain, where the producer is linked to the customer through the collection centre controlled by APTC, the link is not much strong neither very profitable to PCC. This is due to the confusion of the customers about the current commercialisation process. That is to say that, some customers want to buy from PCC others want to buy from APTC. However, all of them are sent to pass by APTC and pay. Then go to get potatoes at the PCC. This channel would be strong and profitable if customers could go where potatoes are and pay directly, then take their potatoes. In addition, many farmers and some supporters indicated that adding on the farm gate price the operation fee for two organisations increase the selling price not on farmer's advantages nor on customer's. This makes potatoes to be expensive on the market and raise consumers' complaints.

CHAPTER 6. CONCLUSION

This section presents the conclusion with respect to the objective of this research that aimed at assessing the efficiency of Irish Potato Collection Centres (PCCs) in leveraging smallholder farmers to markets in Musanze district through answering two research questions. For this reason, this conclusion will cover the dynamic in the Irish potato value chain in Musanze District and strategies the Irish potato collection centers can apply to link farmers to higher profitable markets.

The Irish potato value chain in Musanze comprise several stakeholders but the study focused on the most important and that have a direct relation to the collection center. The picture of stakeholders' role and positions in the chain was illustrated by the value chain map (see fig. 10). Among the three chain situations, the third involves the middlemen who are currently allowed to be in the chain. However, due to the fact that the chain is not organized, they take advantage of the disorder and strengthen their relation with farmers and buyers throughout an informal chain.

Although they study focused on the most important, their power in the chain are not equal. Results showed that the Agro Processing and Trading Company was mandate to organize and control the value chain, from the production up to retailing. Moreover, even though the harvested yield is collected and stored at the collection center, APTC gives the permission to farmers to harvest following the list of harvesting order made by APTC to avoid the overflow of potatoes on the market, which result into the fall of prices. So, the APTC is the decision maker and leader in the potato value chain in Musanze district. Nevertheless, the leading power of APTC, its relationship with farmers is not good. Results indicated that farmers are not happy with the payment delay incurred by APTC against the agreed payment time. This spoils the trust of famers to work with APTC and stimulates them to think of other alternatives of selling of which the best is selling to middlemen.

The relation that mostly affects the PCC is the one between PCC and APTC (see Fig. 12). PCC's tasks and duties need the APTC permission to be accomplished. Therefore, the PCC management staff as well as the managing cooperative don't find it good to see that their potato collection selling point cannot sell directly to the customer. It doesn't have that power. This is one of the biggest challenge realized by PCC as well as some of other stakeholder in that regard. Another challenge mentioned by stakeholders that hampers the efficiency of the PCC is the lack of funding. With enough funding the PCC could buy the production of farmers and pay them direct cash with would increase the relationship with them and increase the confidence of PCC in price bargaining. Without funding, the PCC cannot solve the transport issue where results showed that PCC should purchase a truck for transporting potatoes from farm as well as delivering to different buyers which would strengthen the relations and bring more profit.

Prices in Musanze potato value chain are set by the Ministry of Trade and Industry and they are implemented by stakeholders in control of APTC. However, farmers complain that most of the time price don't match with the present situation on the market depending on whether potatoes have flooded or there is shortage and MINICOM doesn't respond quickly to this situation. Therefore, some farmers prefer to take risk and sell to middlemen who sometimes offer good price and pay direct cash. Even though MINICOM wants the set prices to be fully implemented, the reality is different. Comparing the situation where MINICOM prices have been well implemented, farmers have a good and big value share in the chain, whereas in the real life, the price at wholesaling and retailing are very high in Kigali which attract farmers to bypass the PCC and attempt to supply directly to retailers in Kigali or to retail themselves. The consequence is that when they are caught they are seriously fined.

The biggest market of potatoes from collection centers in Musanze is Kigali. Other customers are Musanze centers and neighboring cities. The demand of potatoes is very high and PCCs are far to satisfy it. One of the reason is that the production does not tangibly increase due to the sensible shortage of good seeds as well as poor farming practices. The supply and payment channel in potato value chain have been a controversial topic. Different stakeholders discussed that the payment channel is a long process. Most the farmers complain to get their money after many days (7 to 12) while the agreements state that APTC would pay the farmer not later than 4 days.

Farmers are linked to buyers by the PCC through the formal chain organized and controlled by APTC with set prices, while the alternative chain is controlled by middlemen who buys the potatoes from farmers and sells to buyers directly on a negotiable price.

Finally, the PCCs' large market is normal which has a high demand that cooperatives that manage PCCs are always trying the best to increase productivity. Farmers were told to harvest, grade and pack separately different potato varieties in order to facilitate the PCC to sell the best quality to high potential market with higher price.

CHAPTER 7. RECOMMENDATIONS

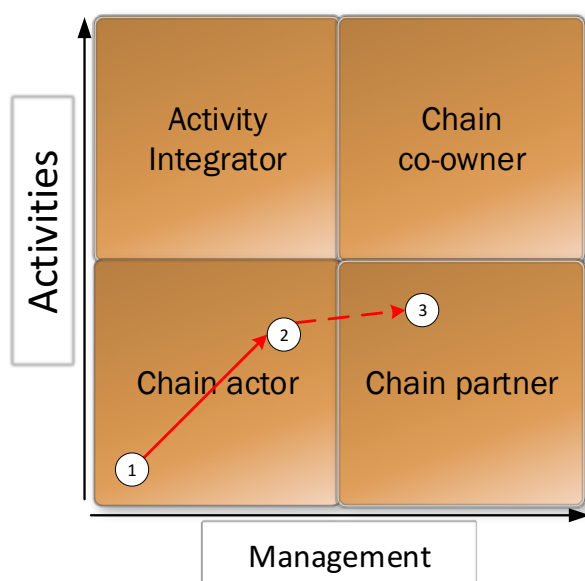
This chapter presents recommendations for strengthening the chain. They provide strategies to mitigate weaknesses and threats that impeded collections from leveraging farmers' access to higher potential markets. The implementation of these recommended strategies will strengthen the chain and enhance the activities of Irish potato collection centers which will lead to potato smallholder farmers' cooperatives' development, and therefore impact the efficiency and sustainability of potato value chain in Musanze district.

7.1 Establishing PCCs clear policy and allowing them the power to sell

- Setting a clear policy that defines clearly the PCC and indicated the tasks and duties of the PCC in the value chain. The policy must define well PCC power and limitations. The study showed that there is interference between PCC's responsibilities and APTC's which bring farmers and buyers into confusion of where to go for information, where to pay, where to find the potatoes, when to harvest, etc.
- Giving the Irish potato collection centers the power to sell and making decisions. PCCs are farmers' cooperatives' business points. Through PCCs they expect to find customers in an easier way as well as receiving their payment without delay. However, the study found that PCCs are not allowed to sell directly. They provide potatoes to the wholesaler to be paid at APTC account and they are given €0.006 by APTC on every kilogram of potatoes sold. This system does not give them confidence or the motivation to work hard to innovate or create ways of satisfying the inexhaustible market demand.
- Revising the responsibility of APTC and the mandate it was given to control the chain in a way it becomes a controller and supporter rather than inhibiting the working of the PCC

7.2 PCCs chain integration

Figure 18: PCC vertical and horizontal integration



On the above figure, 1 represent the current position of PCC where the production is normal and sometimes stagnates in quality and quantity. 2. Represent the PCC after integrating with specializing in quantity and quality production then, undertaking a level of processing activities such as sorting, grading, washing and packaging. 3. Represent the level on which PCC will have had the bargaining power on deciding the price and involved in chain management.

- The PCC main objective is developing farmers in the cooperative that own the PCC. To integrate its activities skills are needed. The study stressed the limited skills of PCC's managing staff as well as family relationships in some cases. So, as recommendation, PCCs need to recruit skilled and qualified staff that will train practically farmers on good farming practices, developing their knowledge on financial issues so that they will further big loans for processing activities or big investment in potatoes. The skilled staff will be efficient and committed than facilitators from supporting organizations. They will be able to strengthen PCCs for the availability of their wages.
 - ✓ Qualified staff will touch critical angles such as knowing such as procuring high improved seeds suitable for the environment and that yield high production.
 - ✓ With the quality and quantity production the PCC will start integrating activities such as sorting, grading, washing and packaging in different sized bags.
 - ✓ The PCC will segment the market and target all level of customers especially higher profitable ones that offer the best price.
- Finally, with high production and different qualities in different varieties of potatoes in an almost monopolistic market of high and inexhaustible demand, PCC gain the bargaining power and raise into the management of the chain.

As impact, the chain will be organized and relations will be strong. This will attract investors in building factories for potato processing -like Holland Fair Food factory which is currently the only one – and the chain will be complex and grow with goal of winning regional to international potatoes and potato products markets.

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ANNEXES

ANNEX 1. PCCS in Musanze District

No	Name of PCC	COOPERATIVE NAME	SECTOR
1	Terimbere PCC	KOABIMUSHI	SHINGIRO
2		KORUMISHI	SHINGIRO
3		KOHAMU	SHINGIRO
4		KOUSHI	SHINGIRO
5		DUKOMEZUBUZIMA MUDENDE	SHINGIRO
6	COOAPAI PCC	KJMIG	GATARAGA
7		KOJYAMUGA	GATARAGA
8		COOAPAI	GATARAGA
9	Duhe agaciro umuhizi PCC	TWUZUZANYE GATARAGA	GATARAGA
10	Busogo PCC	KOAIBU BUSOGO	BUSOGO
11	Bingalo PCC	TUZAMURANE NYABIGOMA	KINIGI
12	Nyonirima PCC	KOPERATIVE Y'ABAHINZI B'IBIRAYI NYONIRIMA	KINIGI
13	Kinigi PCC	CPB NYEJORO	KINIGI
14	Bunyenyeri PCC	KOPERATIVE Y'ABAHINZI B'IBIRAYI BUNYENYERI	KINIGI
15	Bisate PCC	KAPB/BISATE	KINIGI
16		COOMIKI	KINIGI
17		UCOOPAMU	KINIGI
18	Kazi PCC	KOTEMIK	KINIGI
19	Rukore PCC	KAZMIRU	KINIGI
20	COABIKI PCC	COABIKI	KINIGI
21		HVSPC Ltd	KINIGI
22		ICYEREKEZO	KINIGI
23	Umutuzo PCC	GIRUMURAVA MUHINZI W'IBIRAYI/GARUKA	MUSANZE
24	Cade PCC	KOTEMIKA	MUSANZE
25		IMYUGARIRO	Musanze
26		IMBEREHEZA NYARUBUYE	MUSANZE
27	Dukore CC	ABAHUJUBUMWE-MIGESHI	CYUVE
28		INDATWA KU KIRAYI MIGESHI	CYUVE
29	Rutemba PCC	IBISUBIZO	CYUVE
30		TWIZAMURE	CYUVE
31	Kabeza PCC	KABUKA	CYUVE
32	Kwa binyavanga PCC	KODUMUIMU	NYANGE
33	Kagano PCC	COAPB	NYANGE
34		KOP ZAMUKA MUHINZI NYANGE(KOZAMU)	NYANGE
35		KOP KORUKIRE NYANGE	NYANGE
36	Twitezimbere PCC	KOOTTUBUMU	All District

Source: District agronomist report 20

ANNEX 2. Irish potato Cooperatives in Musanze district

No	COOPERATIVE NAME	SECTOR
1	INDATWA KU KIRAYI MIGESHI	CYUVE
2	IBISUBIZO	CYUVE
3	TWIZAMURE	CYUVE
4	KABUKA	CYUVE
5	KJMIG	GATARAGA
6	KOJYAMUGA	GATARAGA
7	COOAPAI	GATARAGA
8	TWUZUZANYE GATARAGA	GATARAGA
9	TUZAMURANE NYABIGOMA	KINIGI
10	KOPERATIVE Y'ABAHINZI B'IBIRAYI NYONIRIMA	KINIGI
11	CPB NYEJORO	KINIGI
12	COOMIKI	KINIGI
13	COABIKI	KINIGI
14	HVSPC Ltd	KINIGI
15	ICYEREKEZO	KINIGI
16	GIRUMURAVA MUHINZI W'IBIRAYI/ GARUKA	MUSANZE
17	KOTEMIKA	MUSANZE
18	IMYUGARIRO	MUSANZE
19	KODUMUIMU	NYANGE
20	COAPB	NYANGE

Source: Musanze district report, 2017

Checklist for interview
MINAGRI/RCA/SACCO

Interviewer: MBARUSHIMANA JEAN PAUL MAURICE
Master Student at Van Hall Larenstein
Netherlands

Date:.....

Respondent

Name:.....

Organisation:.....

Position:.....

District:.....

Sector:.....

Cell:.....

1. What is your role in Irish potato value chain?
2. How do you work with Irish Potato Collection Center (PCCs)?
3. What support do you provide to PCCs?
4. What do you find as challenges for PCCs?
5. What do you see as opportunities for PCCs?
6. What strategies do you suggest for the better working of PCCs?

Checklist for interview
AGRONOMIST

Interviewer: MBARUSHIMANA JEAN PAUL MAURICE
Master Student at Van Hall Larenstein
Netherlands

Date:.....

Respondent

Name:.....

Organisation:.....

Position:.....

District:.....

Sector:.....

Cell:.....

1. What is Irish potato background in Musanze?
2. What is your role in Irish potato value chain?
3. Who are stakeholders in Irish potato value chain?
4. How is Musanze demand and supply of potatoes organized?
5. Who has more power in decision making in potato value chain?
6. How do you work with collection center?
7. What is the current number of PCCs in Musanze?
8. What support do you provide to collection centers?
9. What do you find as challenges for PCC?
10. What do you see as opportunities for PCC?
11. What strategies do you suggest for the better working of PCC?

Checklist
Interview to PCC Manager

Interviewer: MBARUSHIMANA JEAN PAUL MAURICE

Master Student at Van Hall Larenstein

Netherlands

Date:.....

Respondent

Name:.....

Organisation:.....

Position:.....

District:.....

Sector:.....

Cell:.....

1. What are collection center's activities?
2. Who are PCC stakeholders? What is their roles?
3. How does collection center work with Irish potato farmers?
4. What is the Irish potato market demand and the quantity the PCC collect per season B?
5. Who are Musanze PCCs customers?
6. What is farm gate price per season for potatoes you collect?
7. What is the selling price per season for potatoes to PCC customers?
8. What is the selling price for potatoes wholesalers to their customers?
9. What is the selling price for the potatoes retailing market?
10. What are advantages for farmers to work with collection centers?
11. What are advantages for potatoes buyers to buy from PCC?
12. What are challenges Irish potato collection center meet?
13. How are those challenges overcome?
14. What are Musanze Irish PCCs opportunities?
15. What strategies Irish potato collection center use to identify higher profitable market?

NB: completing a Business Canvas model for the PCC

Checklist

Interview to FARMERS

Interviewer: MBARUSHIMANA JEAN PAUL MAURICE

Master Student at Van Hall Larenstein

Netherlands

Date:.....

District:.....

Sector:.....

Cell:.....

Cooperative: yes, or not, if yesname of cooperative

1. What is your role in Irish potato value chain?
2. How do you work with collection center? (relations: trust, contract basis,...)
Are relations good or Bad? Explain
3. What quantity of Irish potato do you sell to PCC per season?
4. What is your production cost per kilogram in the season B 2018? (Inputs, land, labor, postharvest, transport,...)
5. What is your selling price per kg potato during season B to PCC?
6. What is the selling (distribution) channel your potatoes go through to reach the consumer?
7. Do you sell your production to others out of PCC, yes or not
If yes, who/where, at what price?
8. What is the selling price for the potatoes retailing market?
9. Do you find that PCCs are a solution to the existing Irish potatoes market problem?
Yes/No. If yes, why?.....If Not, why?.....
10. What do you find as challenges in supplying to PCC? (transport, storage, price, payment,...)
11. What do you see as advantages/opportunities in working with PCC?
12. What strategies do you suggest for the better working of PCC?
13. Do you have any question?

Checklist for interview
MINICOM

Interviewer: MBARUSHIMANA JEAN PAUL MAURICE
Master Student at Van Hall Larenstein
Netherlands

Date:.....

Respondent

Name:.....

Organisation:.....

Position:.....

District:.....

Sector:.....

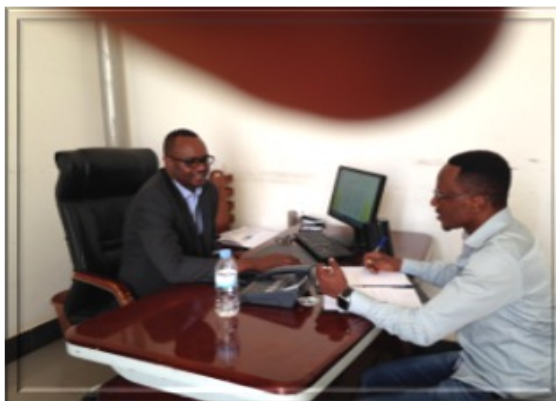
Cell:.....

1. What is Irish potato collection center? (policy and the problem it has come to solve)
2. How many collection centers are currently?
3. What are collection center's activities?
4. How does collection center work with Irish potato farmers?
5. What are advantages for farmers to work with collection centers?
6. What strategies Irish potato collection center use to identify profitable market?
7. What are challenges Irish potato collection center meet?
8. How are those challenges overcome?
9. What are Irish potato collection center opportunities in Musanze district?
(SWOT/PESTEC)
10. Business Canvas model of Collection center

COLLAGE
GALLERY FOR THESISFIELD DATA COLLECTION



Researcher Interviewing a Wholesaler



Researcher Interviewing a Key Informant



Researcher Interviewing a PCC Manager



July–August
2018