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**Sweet potato value chain in Rwanda: Understanding actors and Interaction
Challenges in a context of food and livelihood security.**

A case study of Muhanga District

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List of Acronyms

CAADP	: Comprehensive Africa Agriculture Development Programme
EDPRS	: Economic Development and Poverty Reduction Strategy
FAO	: Food and Agriculture Organisation
GDP	: Gross Domestic Product
IMF	: International Monetary Fund
IPC	: International Potato Center
Kcal	: Kilocalorie
Km	: Kilo meter
MDGs	: Millennium Development Goals
MIDIMAR	: Ministry of Disaster Management and Refugee Affairs
MIFOTRA	: Ministry of Public Service and Labour
MIGEPROF	: Ministry of Gender and Family Promotion
MINAFEP	: Ministry of Financial and Economic of Planning
MINAGRI	: Ministry of Agriculture and Animal Resources
NGOs	: Non- government Organisations
NISR	: National Institute of Statistics Rwanda
RAB	: Rwanda Agriculture Board
SASHA	: Sweet potato Action for Security and Health in Africa
SUSTAIN	: Scaling up Sweet potato Through Agriculture and Nutrition
USAID	: United States Agency for International Development
WHO	: World Health Organization
YWCA	: Young Women Christian Association

Abstract

There are several crops cultivated in Rwanda to fighting food insecurity. In that regards this study was conducted to understand actors involved in the production of sweet potato which is one of the most popular crops grown in Rwandans. This is because the crop has the potential to effectively contribute to address poverty through income generation for producers and other involved in the value chain.

This study attempted to examine the interaction between actors involved in sweet potato value chain. The study focused on sweet potato farmers' cooperatives, Indyo Inoze bakery as sweet potato processor, government and researchers (public and private) institutions located in Muhanga District as a case study. It cover all 15 professional groups that are in the 5 sweet potato farmers' cooperatives representatives of NGOs, Government and other institutions. The study used mixed-methods approach for data analysis. In that respect stakeholders mapping and stakeholders' analysis were conducted to know the actors in the sector and to understand their roles and relations. Venn diagram and Network diagram were used to describe the interactions between actors and shed light on power relations. The results from research show the importance of stakeholders in the chain and how the Government influences other actors due to its power and capacities through agricultural policy. The study revealed that the issues holding back sweet potato production are based on good land that have been taken for priority crops and also agricultural policy operation as well. Networking between stakeholders is still an issue and that does not favor an effective collaboration for improving sweet potato production that is very important crop in the daily life of farmers and affect their livelihood. The study recommends a change in the current policy to guaranty farmer's participation during the formulation of policy that affect directly their livelihood.

Relevance to Development Studies

Development is a contest concept and has different meaning in different field of studies. It understood as how economic, natural environment, political and social relations are restructuring over the world where we are living. Therefore, this research aims to understand how Rwandan livelihood, food security, natural resources are influencing and reshaping by political power to sweet potato farmers. Rwanda as developing country is facing by poverty and people are living under subsistence life particularly those who depend on agricultural sector. There is no enough availability of food, people are not able to access to food that holding back their livelihood and refrain them to achieve development goals.

Moreover, most of people are engaged in agriculture sector for sustaining their livelihood. Also sweet potato is one of crops considered as the crop can improve their livelihood, food security as well as to contribute to gross domestic product. Therefore this study is applicable and relevant to development studies because it study the power relations between sweet potato actors that can hold back the improvement of the crop once the stakeholders have not the same common goals to change the household livelihoods. Furthermore, this research suggests the solution to gaps have seen and recommendations on how the issues can be resolved in order to achieve the development.

It provides that the modification of agricultural policy and inclusion of sweet potato crop in priority crops are the fundamental basic to encourage farmers and their participation to the formulation of policy is a space to the Rwandan's people to address their interest needs for better living.

Keywords

Sweet potato value chain, food security, livelihood security, stakeholders, power relations

Chapter 1

Introduction

In line with the Millennium Development Goals (MDGs), eradication of extreme hunger and poverty is one of the main pillars in developing countries; and poverty is still faced by humankind of a large proportion where more than 40% of population in Sub Saharan Africa lives in extreme poverty (United Nations 2015: 1). In developing countries, agricultural productivity growth has been the major source of sustainability in food security (Mozumdar 2012: 62). To provide suitable adaptation strategies to hunger and poverty to African countries, agricultural productivity growth needs some transformation, from subsistence farming to a commercial form of production (Kostov and Lingard 2002: 93).

Hence, the transformation of agriculture from subsistence to commercial agriculture has been considered as an important part of the agrarian transformation of income and an economy of country (Pingali 2007: 27). Thus, “once production has been available there is an increased motivation in the household’s to sell the excess beyond food needs” (Kostov and Lingard 2002: 85). Furthermore, subsistence agricultural crop production is considered when farmers grow only enough food to nourish the family and to cover the needs at the household level and none is sold what Wharton called self – contained and self – sufficient (Wharton 1969: 13). At this level, the farmers look at what they have to see if it is enough to feed them through to the next production season, which does not ensure food security. The shifting from subsistence crop production to commercial production can open up ways for farmers to be able to move up the vertical integration of the value chain where they will also have access to better markets and have an opportunity to sell finished products which can ensure food security.

In light of the development above, there are two critical approaches to be considered to eradicate extreme poverty. The first approach is food security as it is clear in McKeon, *sufficient availability* of food whereby people access to food from their stocks either from imports or aids; *sufficient access* to food for households and individuals which can be from their production, markets or transfer between communities; *utilization* means the nutrition people take from food and properly using it which incorporates the idea of food quality (McKeon 2015: 75).

This approach leads to the common definition by FAO which asserts that, “*food security occurs when all populations, at all time in the country have physical, social and economic access to adequate and safe nutritious food that meets their nutritional needs and food preference for an active life*”(McKeon 2015: 75).

This means that people should have food available all the time (from own farm or aid or somewhere else), access to food (it should be easily accessible when needed), utilization of food (using food properly and make sure that it cover all needs), finally, stability of food (Woller et al. , 2013).

The second approach is livelihood security and it is similar and closely related to food security. Conway and Chambers 1992 defined livelihood as a combination of capabilities, assets which includes (human asset, physical asset, social asset, financial asset, natural asset and political asset) and activities required for living. It is sustained when it can deal with and recover from stresses and shocks, maintain or improve its abilities and assets, while not weakening the natural resource base (Conway and Chambers 1992 cited in Scoones 2015: 6).

Accordingly to the definition above, it defines how access to the needs of mankind can be sustained by way of ensuring the availability of resources both in quantity and quality to meet the basic needs of human. Livelihoods also are secured when households have adequate resources and incomes from their produce that enables them to cope with their existing situations. Therefore, there is a relationship between food security and livelihood security means that are interlinked and ensured livelihoods leads to food security.

In the case of Rwanda there is challenges of food security and livelihood security between sweet potato farmers and the government. The issue is based on disagreement of different logics between state and the farmers about the importance of sweet potato production for improving food security in Rwanda. This is because, from government perspectives, food security is taken as political and diplomatic policy which is difficult now to explain how household livelihood will be sustained through food security. It is possible to be food secured but in worse conditions or under dictatorship (Patel 2009: 3) without human rights people may not be food secured since they are excluded from the production process. For instance the government of Rwanda is promoting food security with some crops of which sweet potato is not part and the farmers are not in agreement.

Some farmers see sweet potato as key in ensuring food security. Some Non- Governmental Organizations and researchers institutions also considered the importance of sweet potato in household's life and provide to them inputs and skills such as improved vines and other agricultural inputs to support their production. Their objectives is to improve food security, nutrition and to generate income (International Potato Center, n.d.). The sweet potato value

chain is a point to research into this issue to investigate why there are different views amongst the actors (Government, NGOs and Farmers) on the importance of sweet potato in ensuring livelihood and food security; and how can they be reconciled.

1.1. Background to the study

Agriculture has been the mainstay of the people and it is considered necessary when it has been done intensively (Mbonigaba 2013). Long-term food security and nutrition in the country is key. However, sweet potato is considered to have a great potential for improving the wellbeing of peasants but it is left out of the mainstream support of crops for improved food security. Moreover, 80 percent of the populations are involved in agricultural sector, which contributes between 32 – 34 percent of Rwanda's Gross Domestic Product (GDP). It contributes to over 70 percent of export value and to 90 percent of national food needs (Mbonigaba 2013).

Moreover, 80.3% of Rwandans use sweet potato in auto consumption¹ at home level, means households produce for them (NISR 2015: 15). With this large percentage of Rwandans involved in this crop, sweet potato is an important crop in Rwanda. It is for this reasons there was a need of improving its level of production. One of the improvements done is the introduction of orange flesh sweet potato². In 2009, through the national research institution, Rwanda Agriculture Board (RAB) undertook a research on sweet potato crop in collaboration with NGOs namely International potato center through their projects SASHA and SUSTAIN projects which are undertook their activities in Rwanda for improving sweet potato production. This research introduced orange flesh sweet potato as a new variety in order to improve the sweet potato production, nutrition and income generation for the farmers (International Potato Center, n.d.).

The new variety of sweet potato has made success³ in Rwanda in terms of high productivity and different processed products (Magnaghi et al. 2015). However, the market for the product and

¹ Auto consumption means in this contest that sweet potato is home produced crop and consumed food at home level.

² Orange flesh sweet potato is a new variety introduced and provides vitamin A and is important in sustaining food security and livelihood for many of the small-scale farmers in Rwanda.

³ International Potato Center 2012 with their partner launched sweet potato biscuit namely Akarabo Golden power biscuits in Rwanda.

the dissemination of the new variety persist as a barrier to handle food security and nutrition problems among the large number of people whose livelihoods depend on agriculture.

1.2.Importance of focusing on sweet potato

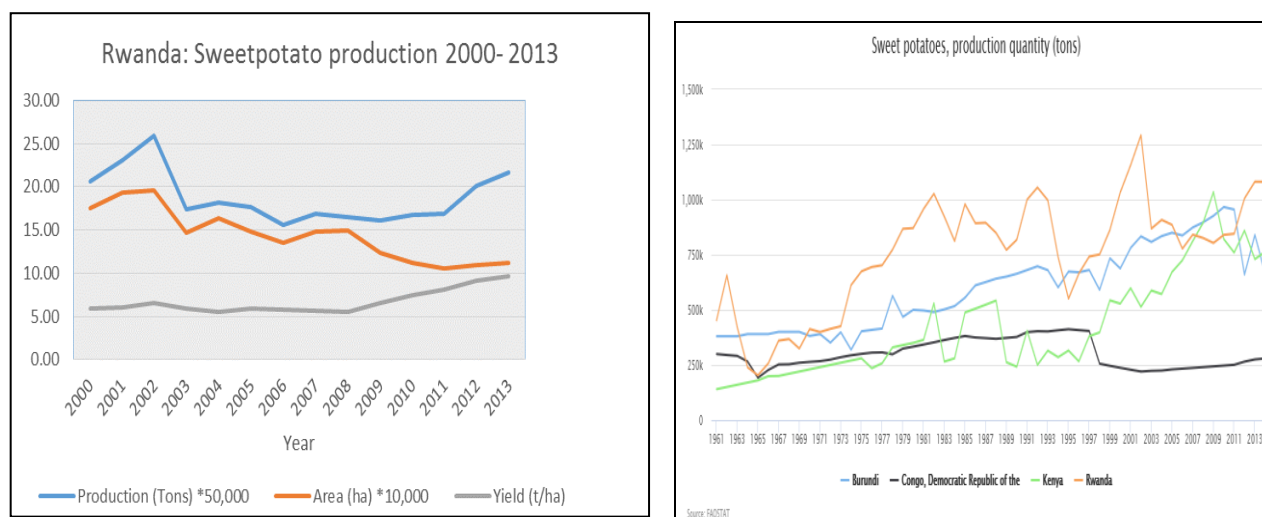
This study focuses on sweet potato because it contributes to food security, nutrition, and social development of Rwanda. It is vital in human nutrition and it contains Vitamin A, which is important to children and pregnant women. This is affirmed by FAO that “Vitamin A is an essential nutrient which needed by humans for the normal operative of the visual system; it also plays a role in growing, developing; and maintenance of different cellular, reproduction and immune function” (Joint, FAO and WHO 2005: 17).

Sweet potato is nutritious and has a higher level of b-carotene between 100 – 1600 mg /100g and it is a source of energy where it contributes 465 kJ (111 kcal) / 100g to humans (Woolfe 1992: 121). It is also less labor-intensive compared to the other staple crops and can be planted even in poor soils (Low et al. 2007: 1321). It can be grown with inexpensive inputs. As a subsistence crop, sweet potato is grown in almost all agro-ecological zones of Rwanda. Sweet potato grows well under harsh conditions and highly resistant to droughts and can survive where other crops cannot and has a short growing season (Kapinga et al.1995: 1). It is the first most important root and tuber crop in the country.

It is also primarily grown for home consumption, thus in some areas, it is produced for the markets in both rural and urban areas (Kapinga et al. 1995: 1) and serves as source of various foods for human and livestock (Scott 1992: 191). In addition, sweet potato is easy to prepare and does not require much effort. In developing countries, there are several reasons for growing sweet potatoes: Firstly, it used for medicine, secondly, it is food for farmers and finally, is a source of money. Though, it is regarded as the food for unprivileged people (Jayasinghe et al. 2003: 85). All these characteristics make sweet potato to be relevant in food security as well as to secure their subsistence and source of nutrition than other roots crops. “The importance of sweet potato may have been lost as official priority crops, but their production is increased due to Non-governmental programs supports (USAID 2010: 15). From these functions alone, make us to see the importance of the crop in the life of the peasants and for Rwanda as a whole. Figure 1 shows data that illustrates as shrinking of the total land area for sweet potato due to the crop intensification program from government which was to replace sweet potato in marshlands by priority crops like rice for food security. However, the production has increased

due to the effort from Non- Government Organizations and researchers where they encourage farmers to use the available land they have.

Figure 1: Sweet potato production in Rwanda Compared with neighboring countries



Source: FAOSTAT, 2014

1.3.Problem statement and study justification

This section presents the empirical problems that informed the research questions in this study and moreover it explains why it is worth undertaking this research in the context of food and livelihood security in Rwanda. Rwanda has an estimated population size of 11,533,446 according to (NISR 2014) distributed over 24,700 sq. km² of which 446 km² of human settlement, 2,294,390 Ha of agricultural land (Mbonigaba 2013). Land typology distribution indicates that agriculture in Rwanda is done over a limited arable land surface in comparison to the other types of land occupation. The population is expected to increase to 16 million by 2020 as reported by (MINAFEP 2000: 6). As a key pillar of the national economy, the agricultural production is running on the existing arable lands and has been contributing to the country's food security arable land. Considering that the agricultural lands are limited, the Government has national land management policy, including agricultural lands management and crop production policy (Bizimana et al. 2012: 23).

Rwanda deals with the challenges of food security by using crop intensification program through EDPRS⁴ I and II with the target and focuses more on increasing production and to compete at regional markets. The purpose of this program was to strategically increase agricultural productivity and commercializing production “so as to enhance rural income and decrease poverty by changing from food production to training skills and business” (MINAGRI 2013: 10). Increasing GDP per capita, reducing poverty and extreme poverty rate are to be achieved not later than the end of 2018 (IMF 2013). The policy designed are also to improve the country agricultural sector as one key strategy to fight poverty and one possibility to continue to reduce poverty, changing the impact of the global economy, reducing unemployment and increasing export incomes (MINAGRI 2013: 10).

In that respect, one of the strategies was to select the priority crops depending on suitable agro-ecological zone through Crop Intensification Program which started in September 2007 with six priority crops that are maize, wheat, rice, Irish potato, beans and cassava. Peasants were encouraged to specialize in these crops. The crops are recommended as food security crops to increase production surplus that will enable the country to export food crops to markets in the region (Kathiresan 2012: 3-6). In this process, sweet potato was excluded from the priority crops and no one was allowed to cultivate sweet potato in marshlands. The policy was to make farmers specialize and diversify in different priority crops except sweet potato. However local citizen are accustomed in using sweet potato in their daily life as a hunger fighting crop. Hence a tension arise as the exclusion of sweet potato among priority crops is seen as a threat to the livelihoods of many peasants.

In this process of challenging the policy, led by some farmers and stakeholders, those who resist the Government decision consider that some crops, namely sweet potato, that should not be excluded as those crops contribute to their livelihood even if they were done at subsistence level and not for export to national or regional markets.

More specifically, sweet potato producers seems to indicate that they want to diversify their production but not limited exclusively to crops listed by the Government for marshlands. They also complained about the exclusion of sweet potato crop among priority crops while it is considered as a main staple food to the life of Rwandan's. Despite the above strategies of

⁴ Economic Development and Poverty Reduction Strategy (EDPRS) is Rwanda government' strategy in medium-term for economic growth, poverty reduction and human development (IMF 2007)

introducing the six priority crops, sweet potato is considered by the population as a crop in ensuring livelihood security and its importance for poverty reduction and achieving nutrition objectives (CAADP 2015: 3).

Rwandan peasants have been producing sweet potato at subsistence levels for many years, and all the production is meant for consumption at the household level. It has been considered by the people as one of their staple food and for livelihood security. Peasants do their farming incorporating off-farm activities to secure their livelihoods. They also develop a diversification culture to spread the risk of failure by planting different crops.

For some time now, the peasants and the Rwandan population as a whole took sweet potato as one of the main staple food and livelihood security strategic crop. Unfortunately they did not see it among the priority crops and there is also no clear plan of government to integrate it among the selected priority crops. Only the Non – Governmental Organizations and researchers appreciated its importance, and regarded it as a target crop for research and improvement in terms of yields and value chain integration. Research was undertaken with new and better variety: orange flesh sweet potato and the idea was supported by Non- Governmental Organizations in order to do research and provide extension services to adopt the higher yielding varieties, which could produce from 4 to 10 tons per hectare (FAOSTAT 2014). From a processing perspective, there is only one bakery in Rwanda which is processing sweet potato into products like biscuits, cakes, and breads and enjoying monopolistic profits.

In this context, two perspectives clashes namely the Government on one side and the farmers and more largely the sweet potato value chain actors on the other side. But from a more detailed perspectives, the problem is three folds as agricultural researchers and some private sector including NGOs actors found a great potential for sweet potato, it is not clear to them what are the constraints faced by farmers to enable them producing more and more sweet potato as they already regard it as a food and livelihood security crop. In order to get a full insight of this problem, this research is designed and carried out to assess and analyze the interaction between the actors in sweet potato value chain and its possible impact on food and livelihood security in Rwanda.

It is also meant to analyze what drive farmers not to produce high quality and quantity of sweet potato and turn their harvests into food processing industry. Thus, this study will focus on conducting sweet potato value chain analysis to examine the interaction between the main actors in

sweet potato production and clarify existing bottlenecks preventing farmers from venturing full swing into sweet potato farming and processing. The value chain approach is also useful in studying power relations⁵ in the production process so as to ascertain the politics on which section of the chain will be influencing production. It will identify those who will be benefiting more in the system and coming out with gaps which need to be addressed for efficient production and integration.

Apart from filling the existing research gap, the findings of this study will help the local value chain players and supporters to improve performance of sweet potato farmers in the study area, but will also lead partners and planners in development to better target investments in sweet potato sub-sector. Furthermore, it will contribute in getting information needed in development programs and in fixing strategies useful to improve the efficiency of sweet potato marketing system. The findings of this study would also be of benefit to sweet potato farmers, processors, governmental and NGOs that have a key role in sweet potato marketing systems. Finally, researchers who are planning to undertake further study on sweet potato may equally benefit from the results.

1.4. Research objectives

The overall purpose of this research is to study the contribution of sweet potato value chain to food security in Rwanda. As such, the focus of the study is to understand the actors and challenges around their interactions. More specifically, the research questions are listed as followed:

- 1) Who are the stakeholders and what are their roles in sweet potato value chain?
- 2) What are the interactions among actors and what are their power relations, importance, influence and capacities in shaping the role of sweet potato in the food security strategies?
- 3) What are the technical issues that producers face to increase production of sweet potato?
- 4) What are the adaptation strategies to cope with the challenges related to the interaction between actors in sweet potato value chain in Rwanda?

⁵ Power relations is how different groups are able to interact among them and control other groups

Chapter 2

Literature review

This chapter clarifies the main concepts used and circumspect the analytical framework that guided the study. Concepts such as value chain, food security, livelihood, power relations and sweet potato value chain analysis are discussed.

2.1. Concepts

2.1.1. Value Chain

Porter (1985) demonstrates in competitive advantage book and developed the concept of value chain that is defined as a web of activities that an institution carries out to add value for its clients. Porter suggested that value chain for companies could utilize to inspect all of their activities, and see how they are linked, and the way in which value chain activities are achieved in their performance determines costs and that affects income (Porter 1985). Similarly, from Kaplinsky and Morris value chain is define as the full range of activities, which are necessary to bring a product (a combination of physical change and the input of several producer services), and delivery to final consumers, until the end of process (Kaplinsky and Morris 2001: 4). They continue by indicating that a value chain is strong and effective when all actors operate in a good way and take advantage of value generation along the chain.

From a different perspective, Webber and Labaste (2010: 1) defined value chain as “a key framework to understand how a product can be achievable through a combination of inputs and services that are brought together to be one thing and then it used to grow, transform, as well as manufacturing”. In addition, the author pointed the importance of “how the product moves physically from producer and customer and how the value rises along the system” (Webber and Labaste 2010: 1).

Also, the World Bank considered that it is also “a set of interconnected, where the activities are valued and undertaken by an enterprise or group of enterprises to improve, increase, generate and also to distribute a product or service to the beneficiaries” (World Bank 2006: 21). Furthermore, value chain is defined by (KIT et al. 2006 cited in Harcourt 2012: 64) as “a specific chain where stakeholders actively pursue to support and help each other to make a change in their activities therefore that they can rise their competitiveness”. With this reason, those stakeholders invest

time, effort, money and build relations with other stakeholders to reach a communal goal of satisfying consumers' desires (Kashindye 2011: 12) in order to compete at market. This is leading by good coordination and functions amongst actors and partners.

Will then asserted the existence of value chain when operators share a common vision and goals for managing the chain processes, sharing risks and benefits thus allowing for mutual decision-making on how to connect production produced with markets (Will 2008: 17). The better all value chain partners cooperate, at every stage of the chain, the better will be the value generated for the individual operative in sweet potato value chain.

In this study different perspectives of the definition presented above are accounted for as they are not mutually exclusive and moreover sweet potato value chain in Rwanda is actually not seen as an enterprise under one leadership or management. The specificity of this case is that government, community of producers, civil society including NGOs and private sectors are all concerned and involved in the Rwanda sweet potato value chain.

2.1.1.1. Rwanda sweet potato Value Chain Analysis

Rwanda value chain was built on the sustainability of sweet potato (Ndirigwe et al. 2013: 1). This value chain was also developed to assess the change in consumer acceptance of orange flesh sweet potato, which is a new varieties to know the acceptability of those new varieties that can enhance the improvement of sweet potato production (2013: 1). It was conducted in three major districts, namely Muhanga, Rulindo and Kamonyi, where sweet potato are abundantly grown. The value chain was developed around varieties and high-quality seeds from Rwanda Agriculture Board (RAB) and postharvest support. It showed that farmers who used quality seeds have an increase of their productivity (Ndirigwe et al. 2013: 1).

Sweet potato value chain studied by Sweet Potato Action for Security and Health in Africa (SASHA) was focusing in linking farmers to market. In that study the importance was first to link farmers to one bakery by contract, and the bakery was identified, trained and financed by the projects. The second step was to create farmers groups that could supply produce to the bakery or supply the processed sweet potato products to local markets (International potato center, n.d.).

The report produced by USAID in 2009 on the staple foods value chain analysis discussed how farmers are linked to the market for crops selected as a priority in Rwanda. The USAID report showed that the rice has increased their production due to the increasing of cultivated area

(marshlands) where the sweet potato was cultivated. Also, this report showed that there is increasing and change in production as maize, cassava, Irish potato, rice, beans and wheat due to the interventions of Government and Non- Government Organizations (USAID 2009: 28-40). However, the sweet potato is not included in those kinds of staple foods in Rwanda as it is not a priority crop.

From all those studies done in Rwanda on value chain, there was little focus on the need to find out the potential of sweet potato value chain and how it can improve income and food security. They have not also focused on interaction among actors and power relations with respect to sweet potato. Similarly, constraints with respect to sweet potato production adoption for commercial purpose are not covered. In that regards, this study is designed to understand sweet potato value chain analysis through mapping of actors, how they interact, constraints faced by farmers and identify possible gaps that prevent sweet potato to be used to its full extent.

2.1.2. Food security

According to the (FAO) and WHO, the right to food security invokes four food security pillars as cited in McKeon: “*food sufficient available* where people access to food from their stocks either import or aids, *sufficient access to food for households and individuals* which can be their production, from markets or transfer between the communities , *utilization* means the nutrition people take from food and properly using which incorporating the idea of food quality and *stability of food*” (2015: 75).

Also, as asserted by Maxwell 1988 (cited in Maxwell 1996: 159) in their argument that “ food are available and secured in a country and also it is achieved when people and vulnerable groups have secured and access to the food they need at all times”. There is different definitions of food security to different authors criticism but the new definition which is using by World Food Security is cited in McKeon in italic sentences. Food security definition as he wrote that “*it occurs when all persons have physical (economic infrastructure), social (connection between households) and ability to access to sufficient food, safe and nutritious food at all times that has required nutritional needs and its preferences for healthy life*” (McKeon 2015: 75). In this definition it incorporates livelihood of household.

Rwanda has improved its food security status but the people still face some challenges with respect to food insecurity and malnutrition. This is shown in the report from WFP in 2013 which indicated that in Rwanda “one out of five households have unacceptable food consumption and this explains food insecure” as pointed by (Sesonga 2013). WFP report indicated that children aged between 6 months and 5 years, 3.6 percent faced malnutrition and 12 percent in that group are

underweight, and 43 percent faced chronic malnutrition stunting. This situation may be explained by the limitation of land access and household poverty level as 61% of farmers farm on less than half hectare land. Those challenges led to food insecurity and malnutrition in the country (Sesonga 2013). Diversity in activities and crops could be a solution to sustain farmers' livelihood as Sesonga also indicted that people who do not depend on farming are better than those who depend exclusively on agriculture.

2.1.3. Stakeholders

Stakeholder is define as “any one or groups who can affect or is affected by the achievement of the activities of any association or company” (Freeman 1984 cited in Stieb 2009: 402). Stakeholder is also “ the peoples or some groups who have power to respond to, and change or modify the strategic future of the organization or their association” (Eden and Ackermann 1998 cited in Byrson 2004: 22). Stakeholders as also been defined in Johnson and Scholes definition as “ the people, who have in their mind the interest on the association, company or organization to fulfill their own goals and also the organization depends to that group or individual (*ceteris peribus*)” (Johnson and Scholes 2002 cited in Byrson 2004: 22).

In this research the stakeholders in sweet potato chain are those who are really involved in the value chain. In this case they are farmers who would specialize in sweet potato crop activity more than other crops and sell the surplus in order to purchase other products needed. They use the available inputs to produce sweet potato, which they supply to market. They are organized into farmer cooperatives. One may also mention sweet potato processors, research institutions such RAB and IPC. RAB do their research on sweet potato breeding especially new varieties that are resistant to disease and quality seed that produce higher yield. IPC plays as a sponsor on the introduction of new varieties in Rwanda, understood as varieties that contain vitamin A, which have a strong potential to decrease the malnutrition and additionally, to enhance rural farming productivity. Lastly, the Government formulates agricultural policy and lead the agenda on regulation in the sector.

2.1.4. Power relations

Power relations are the power or authority some group have over other groups in the chain or their organizations. It means different groups which are able to cooperate and control other groups. According to Cartwright, Dahl as cited in Mitchell and Moore emphasized that “power is when somebody or some leaders have able to get someone to do something that he/she otherwise

would not do (Cartwright 1965; Dahl 1957 cited in Mitchell and Moore 2012 : 12). It is defined also by Emerson 1962 “as the ability and capacity to overcome the resistance of others: this means the power of actor A over actor B and is equivalent to the value of resistance on the part of B over A that can be potentially and possibly overwhelmed” (cited in Mitchell and Moore 2012 : 12). Thus, Power relations are defined as “ when one is able to shape available choices network relations between stakeholders as it does with the real and actual capacity to make a choice”(Dator et al. 2015: 19).

In the context of this study, the concept of power will be addressed with respect to how sweet potato value chain is governed by the actors. It determines the authority and their capacity to influence each other and that has an impact on the outcomes of the crop.

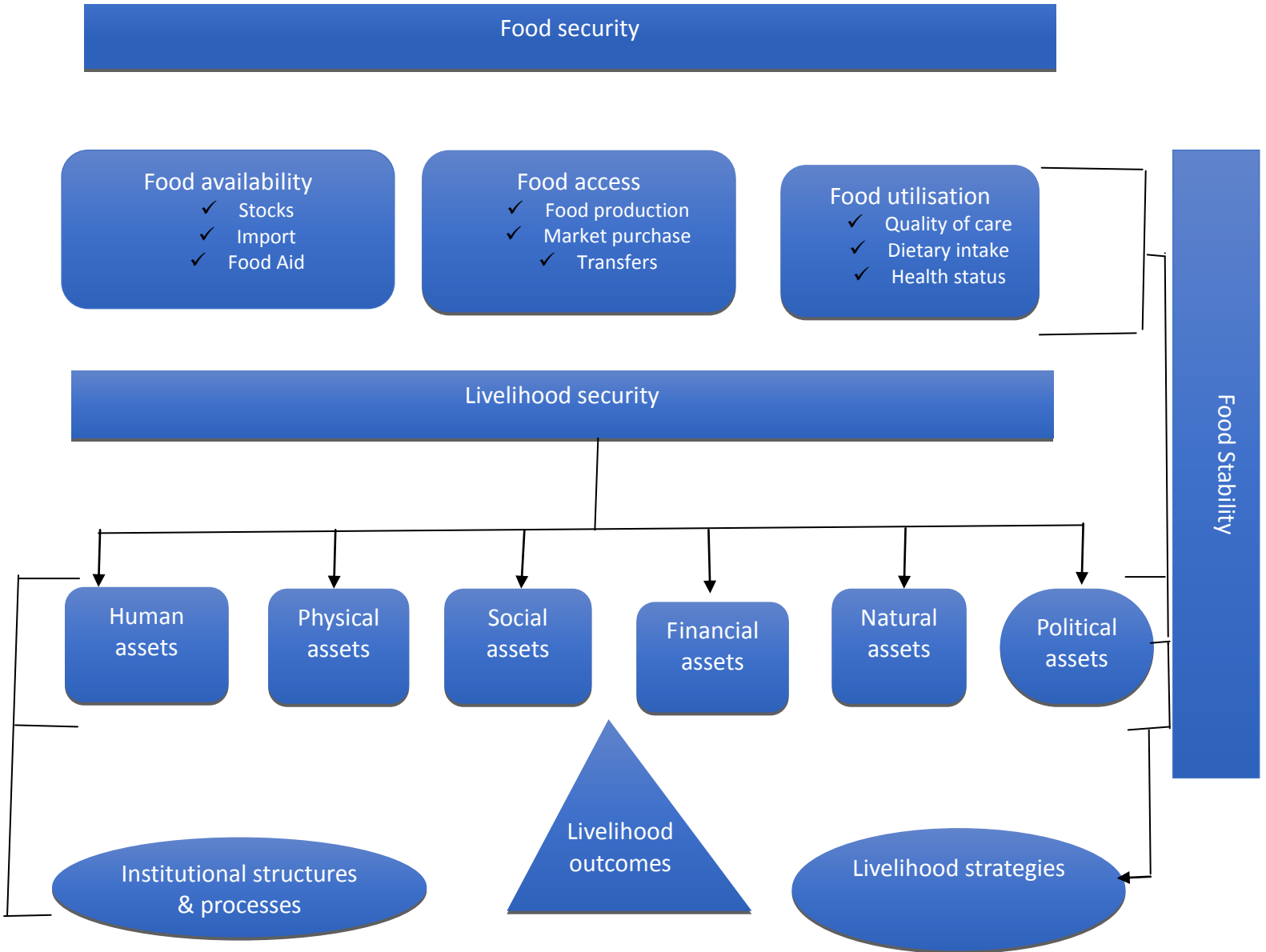
2.1.5. Livelihood analytical Framework

To understand Sweet potato value chain actors and interaction challenges in a context of food security in Rwanda, a livelihood framework is used. In that respect, livelihood is simply defined following Chambers and Conway 1991 cited in (Scoones 2015:6) as means of gaining a living, this comprises the capabilities and assets (both material and social resources). Livelihood is achieved and secured when outcomes are fulfilled; whereby focus is on the individual and maximization of what Scoones called utility. That is the freedom to choose their life value, happiness and satisfaction and psychology wellbeing (Scoones 2015:17-18). The livelihoods framework is the combination of livelihood resources (different types of assets such as human assets, physical assets, social assets, financial assets, natural assets and political assets) result on the ability to follow the mixture livelihood strategies from the list of agricultural intensification/extensification, livelihoods diversification and migration (Scoones 2015: 34).

Rwanda has experienced an improvement in agricultural productivity through intensification of different crops to sustain food security and also through the generation of income that allows people to buy the food. However, the challenges of food insecurity is still facing the population as revealed by the report from WFP.

On the basis of the livelihood framework and in the context of security described earlier, it is arguable that in Rwanda improving agricultural sector through efficient production and market competition could be a way of increasing food security in general without excluding any crop which can help to sustain households' livelihoods. As one of the crop with high potential to contribute to an improvement in livelihood and food security, sweet potato is however also classified as not a priority crop by the Government. In order to understand that tension, the role of actors will be analyzed in reference to the livelihood framework as presented in figure 2 and food security context of Rwanda.

Figure 2: Food security versus Livelihood security



Adopted in (Woller et al. , 2013) ; (Scoones 2015: 36)

Chapter 3

Data collection and Methodology

This research was conducted in three main phases using different methodological approaches: research design, data collection and data analysis and reporting of data analysis.

3.1. Research design

As far as the research design phase is concerned, an in-depth review of the literature was conducted to clarify key concepts that the study engages on, refined the research questions, decide on appropriate research methods for data collection and analysis, and design data collection instruments. In that same phase, through consultation with senior researchers and also contact persons in the field in Rwanda, the research area and sample size for interviews was decided taking into account time available, budget constraint, and any other practical challenges. The research design phase was also an important stage to select a pool of data analysis tools. In that respect, both quantitative descriptive statistics and qualitative data analysis tools were combined to best answer the research.

3.1.1. Documentary review

Documentary sources used, obtained from secondary data that included: Journals, Text books, Internet research, MINAGRI reports and other written materials about Sweet potato cultivating activities. Such documents allowed the researcher to acquire relevant information to support the research findings. However, it is important to note that these research instruments are not equally limited; rather, they serve to complement each other.

3.1.2. Questionnaire and Interview guideline

Data were collected using different tools: secondary sources namely reports, journal articles and books. Primary data were collected using semi structure interviews and direct observations. The questionnaire comprised of two sections as follows: The first section consisted of socio-demographic data such as age categories, marital status and education level. The second section was a set of questions about sweet potato value chain and food security policy and strategy in Rwanda.

In addition to questionnaire, a short interview guideline was also developed to get a better understanding of any sensitive or subtle issue that might be of interest to discuss with respondents and the stakeholders we engaged with. Semi structured interview was adopted and conducted as conversation between the researcher and an individual interviewee (DiCicco-Bloom and Crabtree 2006:315).

3.1.3. Selection of the study area

The study was carried out in Rwanda, specifically in Muhanga District, which is located in Southern Province. Muhanga is one of four districts where new sweet potato varieties of orange color were introduced by NGOs. Muhanga is divided into 12 sectors. It is ranked eight position among the poorest Districts of Rwanda. In addition, in the districts there is the case of food security and power relations between the main actors in sweet potato value chain. The Shyogwe and Nyamabuye Sectors are located in Muhanga District in Southern Province of Rwanda; they were chosen with the fact that especially in Shyogwe sector, the economy and livelihood is based on agriculture especially on sweet potato, it is in Shyogwe sector among the 456 sectors of Rwanda where four cooperatives that cultivate sweet potato are found.

It is the first largest producer of sweet potato, followed by Nyamabuye sector of the same district of Muhanga in Southern Province. These two sectors were chosen due to the fact that they produce most of sweet potato consumed in Muhanga district come from there. Furthermore, Muhanga district is one of the areas where RAB, IPC and YWCA have interventions with farmers organization. Hence the area provide the right institutional setting, crop production characteristics and food security traits necessary to study the contribution of sweet potato value chain to food security in Rwanda namely by understanding the actors and challenges around their interactions.

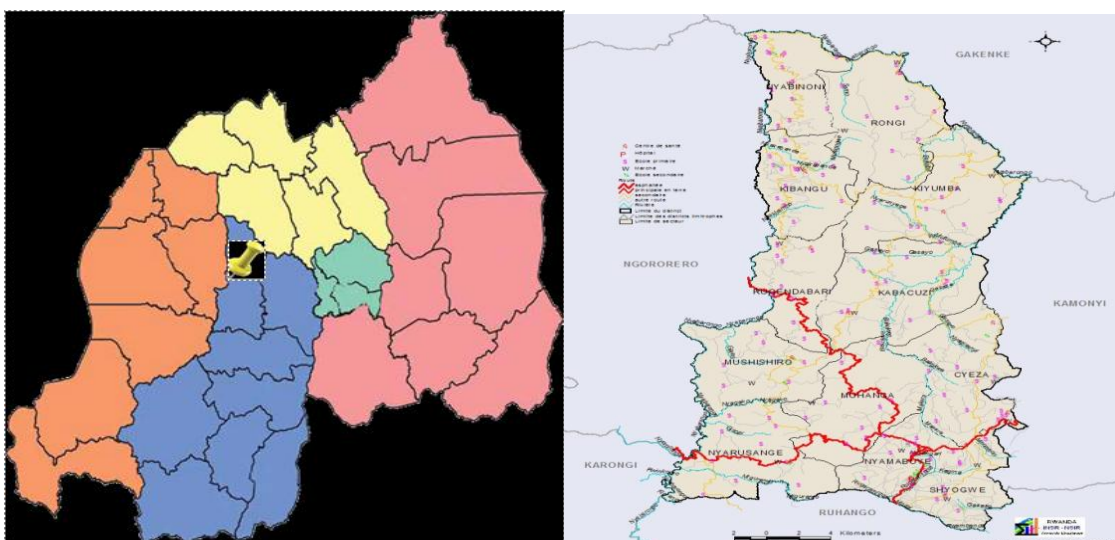
3.1.4. Description of study area

Muhanga is a new District split from the former Gitarama province in 2004. It is located in Southern Province and at fifty kilometers (50km) from Kigali the national capital. It is situated in the central part of the country with topography of hills types and also located on the road between Kigali, the Southern Province, Western Province, the Republic of Burundi and Eastern of the Democratic Republic of Congo. Muhanga District is connecting directly to Ruhango in South, Ngororero in West, and Kamonyi in East and Gakenke in North (Muhanga 2013: IV).

The research was undertaken in Muhanga District which is one of the eight Districts of the Southern Province of Rwanda. Geographically, Muhanga District covers a total area of 647.7 square kilometers. Topographically, Muhanga District is found at latitude 02° 56' South and longitudes 29° 43.' It experiences four seasons divided into two rainy seasons and two dry seasons: A short rainy season covers from October to December; from January to February is the period of short dry season, a long rainy season from end of February to beginning of June and a long dry season from June to the beginning of September (Muhanga 2013).

The amount of rainfall ranges between 1100-1200mm (Muhanga 2013:5), which is best suited for sweet potato growing in Rwanda compare to some part of Northern zone with rainfall range between 1700mm to 2000mm which is good for tea (MIDIMAR 2012:12). The population in Muhanga District is 319,965 with 49% are male and 51% are female. 86.4% of the population are active, 13.4% are inactive population while 0.3% are unemployed. The main economic activity in Muhanga District is agriculture (crop and livestock). The main crops grown are beans (83.4%), Sweet potato (94.0%), Cassava (70.7%), maize (62.2%) banana (67.9%), soybeans (58.2%), rice (11.7%) and Irish potato (34.6%). In Muhanga District, the agricultural practice is still archaic and production is insufficient to get surplus for the market (Muhanga 2013:7).

Map 1: Map of Muhanga district



Source: NISR (2011), (www.muhanga.gov.rw)

3.1.5. Target population and Sampling

This study is essentially oriented toward Rwandan population in general from a food security perspective. But considering that the research aims at understanding actors in sweet potato value chain and their interactions, the study population is comprised of farmers, practitioners (RAB and IPC), Government officials and processors.

Purposeful sampling was used in this study and it includes respondents accessible to the research and who meet appropriate leadership and knowledge criteria namely a management position and considerable year of experience in their organization and in sweet potato sector (Kothari 2004: 15) characterized this as “convenience sampling”. In practice, the sampling process followed consists of selecting sweet potato farmers, Government representative in charge of food security, NGOs involved in the sector, Researchers and Processor that are involved in sweet potato value chain. The sample of farmers consisted of 15 leaders from each of the cooperatives managed by YWCA and sponsored by NGOs. The rest of the interviewees are: one processor representative from the sweet potatoes processor company in Muhanga District, one from the Ministry of Agriculture, one from the Research institution (RAB) and one from a non-government organization namely International Potato Center. Table 1 summarizes the sample distribution.

Table 1: Sample distribution with respect to stakeholders’ organizations

Name of Organization	Sample size	Position of interviewees
YWCA	15 farmers	Leader of farmers’ group
Ministry of Agriculture	1	Director
RAB	1	Researcher
NGOs	1	Agronomist officer
Indyo Inoze bakery as Processor	1	Manager
Total number of targeted respondents	19	

Source: **Researcher’ compilation**, July 2016

3.1.6. Sampling procedure

According to (Bickel et al. 2000: 40) said that sampling identifies geographic area of the community and the sample must represent the whole population. Furthermore, the target population must be closed to the research objective and related to the questions of the study (2000: 39). During the sampling technique for this study, the researcher tried to imitate also the ideas of (Lincoln and Guba 1985 cited in Patton 1990: 185-186) where they said that Purposeful sampling is ended by to maximize the information until when no new information emerging from respondents.

The methods of selection were based on the list groups among farmers' cooperative (5 cooperatives with 3 groups of each cooperative) of sweet potato that are beneficiaries of the project (from NGOs) producers and other stakeholders in the angle of government and private agencies involved in the sweet potato value chain . In order to reach to those categories of respondents, the researcher preferred to follow purposive sampling as sampling methods. With this sampling technique, the researcher target individuals believed to have reliable and validity information for the study and they were farmers group representatives, worker in charge food security in ministry of agriculture, researcher as head of sweet potato programme in RAB and in IPC and processor manager. After having a clear idea of how to find the respondents, the researcher took the ambition approaching those group leaders where it was easy through YWCA, leaders of farmers' cooperatives and then the leaders of groups.

3.2. Field work and data collection

The field work was conducted over 3 weeks from July to August 2016 in the district of Muhanga in Rwanda. Interviews and questionnaire were conducted by the student-researcher alone with no enumerator or interpreter as there was no problem with language translation or security. Identification of farmers was done through the NGOs. The questionnaire and interviews were conducted using face to face meeting in a form of a conversation between the researcher and the respondent. As far as farmers representatives are concerned, their interviews took place in their farms. Interviews were held with the Ministry of Agriculture in order to have an insight of how agriculture policy is designed around the issue of food security and also how sweet potato farming is considered; a researcher in RAB in charge of sweet potato programme, an agronomist officer of an NGOs that has sweet potato under its programme and finally the manager of sweet potato processor. Those respondents were in a good position to know what is going on in terms of food security or sweet potato value chain.

3.3. Data analysis

The process of analyzing data is meant to generate findings. A mixed-methods approach of data analysis was used in this study. In that respect from a quantitative analysis perspective, descriptive statistics analysis was run on amenable data. Also stakeholders mapping and stakeholders' analysis were conducted to know who are the actors in the sector and moreover understand their roles and relations. In order to do in-depth the analysis, Venn diagram and Network diagram were constructed to describe the interactions between actors and shed light on power relations. This analysis has been constructed and it appears in chapter four.

Following (Miles et al. 1994: 109) data collected were coded, developing a Category System as the major stage of qualitative analysis. As Biddle et al. 2001 suggested, the information from different interviewees which have common themes were grouped and coded into one unit (Biddle et al. 2001: 795). Data coding and analysis was conducted using analysis tools as statistical package for social science (SPSS@16.0) and also Excel@2007. In terms of statistics, descriptive statistics were produced to characterize farmers and shape other data collected from interviewees. The results are presented as tables contain objective, questions, frequencies and percentages.

“A stakeholder analysis is a process to provide insights into and understand the interactions between a project and its stakeholders” (Grimble and Wellard 1996 cited in Kennon et al. 2009: 9). Hence it is an appropriate tool to address the research question on actors and their interactions. In reference to (Kennon et al. 2009: 12), stakeholders analysis was presented in 3 steps. First stakeholders were identified from the interviews and a complete list of key actors who play a role in the sweet potato value chain was produced. Thereafter they were prioritize based on their role, and how critical they are in the sweet potato production and their use for food security in Rwanda.

A figure was then generated with two axis being “X=*influential*”, this referred to sweet potato stakeholders, how they have power over the success of the sweet potato production. Thus this power can be direct or indirect between stakeholders. It was included who have financial (money), stakeholders positional authority in order to categorize their influence in sweet potato value chain. Also “Y =*important*”, this referred to sweet potato stakeholders who have power over to delivery sweet potato outcomes. From here, this category included farmers opinions, their skills on sweet potato crop means that how they are experts on this crop, who is provider of new technology, and how it delivers to farmers. On one hand “X=*influencers*” referred to stakeholders categories depending on their authority position in the chain, their investment and how they influence other

stakeholders to take a decision in sweet potato value chain. Also “Y=enablers” referred to the sweet potato stakeholders that are *possessor of critical knowledge resources that can enable the project team over allocation of funds; Opinion leader in sweet potato community of interest; Provider of important enabling resources; Critical in delivery of sweet potato innovations* (Kennon et al. 2009: 12-15). Actors were then placed on the axis along a 3 points scale gradient to capture the following modalities: Not really (“Y= influential and X= important” - “X= influencers and Y= enablers”), Somehow (“X= influential and Y= important” - “X= influencers and Y= enablers”) and Very much (“X= influential and Y= important” - “X= influencers and Y= enablers”) as used in (Kennon et al. 2009: 1). Changing the words on the axis of the figure is to improve understanding of the interactions between the actors and the difference between them.

A third component of stakeholders analysis is through power relation assessment where stakeholders were listed and two questions asked with respect to one another: Question 1: Can stakeholder A influence/make stakeholder B, C, etc. do what it want or decide? Question 2: Can stakeholder A keep functioning if the other stakeholders do not collaborate with it? Possible answers to those questions is either yes (to earn 1 mark) or “No” to earn 0 mark. Then the sum of marks earned by each stakeholder determines the relative power of that stakeholder in the universe of stakeholders in the value chain. Results are presented in a figure of circles that represent stakeholders in chapter four; and the larger a circle the more powerful the concerned stakeholder.

3.4. Risks and Limitation Challenges

The stakeholders analysis was not done as a participatory approach due to limited means and power on the ground to bring together all the stakeholders involved in the sweet potato value chain. Nevertheless I collected data on them, their role and interactions with the rest to derive their power, importance, and whether they are enabler or disabler. The results of this analysis would have been much more valid if the actors themselves had produced the stakeholders analysis under minimum supervision. The challenges were how to get the information from government where the people are feared to explain what happened in order to secure their job and to protect the government policy. As a researcher, the challenges were not too much because I worked with the farmers in that area, which allowed me to get the real information on sweet potato.

3.5. Ethical consideration

“Ethical in research concerns and deal with voluntary participation, no harm to respondents, it allow also the researchers to make sure that participation was completely voluntary but sometimes

lead to low response rate which can in turn introduce response bias” (McNamara 1994 cited in Ngui et al 2014:9). In that respect, participation in the study was voluntary and participants’ identification was anonymized to avoid any risks that their opinion or contribution to data collection would cause them either directly or indirectly as the consequence of the study. The objective of the study was introduced as a fulfillment of a Masters’ Study program and not for any other hidden agenda by the researcher and requested the respondents to participate in the study on a voluntary. The researcher also assured the respondents of confidentiality of the information given and protection from any possible harm that could arise from the study, the data and findings would be used only for the purposes of communication.

Chapter 4

Sweet potato Value Chain Stakeholders Analysis and their Characteristics

4.1. Farmers and their roles

4.1.1. Sweet potato farmers: their story and logic

This chapter presents the stories of sweet potato farmers from different cooperatives under Young Women Christian Association (YWCA). I selected fifteen farmers' leaders for assessing and analysing their role and how they implement their responsibilities basing on their logic for food and livelihood security in Rwanda. The farmers are identified by gender, age categories, marital status, and education level as they are illustrated in the presentation in the figures from 4 up to 7.

The data collected and analysed show that the most farmer respondents 66.7% are female while 33.3% are male. This is supported by the fact that households have different strategies in order to sustain their livelihood. The majority of male migrates from rural area to urban area for searching other activities whether to generate income to bring and support their family at home. This corroborates with the analysis by Ministry of Gender and Family Promotion (MIGEPROF 2010:9) where they showed in their data that “in agriculture labor force the majority are women 86% as compared to 61.5% for men”.

With respect to age category, the majority of farmers engaged in sweet potato farming are between 30 to 45 years old. This suggests that those under 30 years are still at school or are into the other food security crops likewise those above 45 years who may also be engaged in other livelihood such as livestock rearing which is also a common activity in the area. Moreover, the data reveals that about 80% of the farmers' respondents are married. In this respect, 2015 Season A survey showed that in Rwanda, 67.1% of Agricultural Operators had attended primary level education, 27.% had no education, 5.2 % had secondary level education and only 0.8 % had attended tertiary level education (NISR 2015:17). Figure 7 shows farmers' educational levels where 40 % of sweet potato farmers attended primary school, 20% did not attend even primary school and only 13.3% attended secondary school. Among the respondents, there were 26.3% who attended other categories of schools including Technical and Vocational training Centres (VTCs).

From the data analysis, it also appears that farmers adopted the knowledge and skills got from researchers for improving the sweet potato production. Farmers who are members of association

get better inputs and technology technical material services; they diversify in different crops in order to secure their livelihood. Also their association provides them with opportunities to learn the process of sweet potato production from inputs to harvest using improved seeds (this is referred to as improved technology).

Despite this existing support structure, the number of farmers participating in the cultivation of the sweet potato to enhance food security are very limited. This is happening because some farmers fear to violate the Government's policy on priority crops.

As far as farmers' logics is concerned, they consider sweet potato as a crop which can contribute to food security and sustain their livelihood. Farmers are used to cultivate sweet potato in marshland and some time on the hills for many years. This agriculture system helped them to survive for long by fighting hunger. Before the appearance of inputs suppliers in the agricultural production system, sweet potato farmers used to share inputs and it was for free due to the local solidarity. In the process of cultivating sweet potato, the farmer used the traditional varieties and they indicate that they were satisfied with the harvest because the sweet potato was considered as hunger fighting crops. In 2007 the Government introduced crop intensification program for transforming agricultural from subsistence level to commercial level (MINAGRI 2012). This policy was to use improved agricultural inputs for some crops selected by government, however sweet potato was not among the selected crops. This was a barrier for sweet potato farmers because they exploited all marshlands for other crops they called "priority crop for food security" and sweet potato was not included while it was considered as main staple crop for the country's peasants. In 2008, the projects came and helped the farmers to move from subsistence agriculture to modern agricultural production to improve on their sweet potato production which will help them to sustain their livelihood as well as food security and income generation.

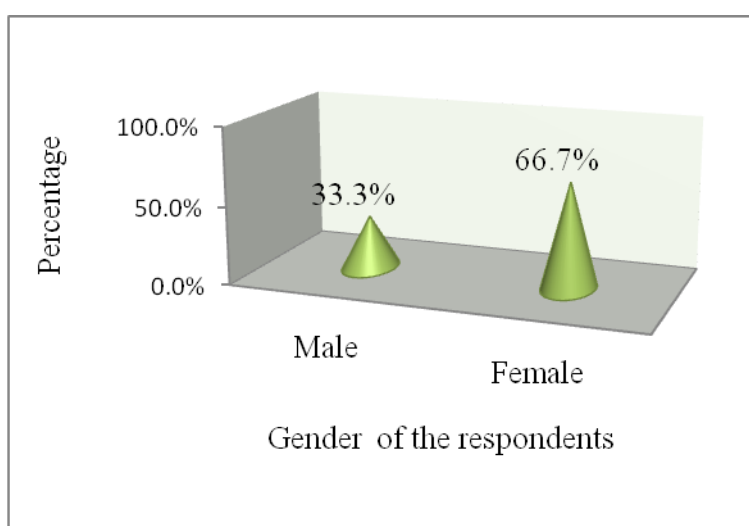
Farmers agreed that to sustain their livelihood it needs some transformation but it depends on how the Government approach process. This is in line with authors like Sumner, who also reported that farmers need some transformation from traditional mode of agriculture to modern agriculture such as the use of improved seed, availability of land, fertilizer, knowledge and skills about technology, motivation or incentive for producing more (Sumner 2008: 2). But during this study, farmers explained that they need incentives and motivation which include freedom to choose what is suitable for sustaining their livelihood as they know their situation and living conditions better. Note that farmers adopted the improved sweet potato technology even if land is still issue for them. They are not agreeing with the government about the policy to exclude sweet potato from

priority crop. In that respect, they are doing their best to increase the production of sweet potato with the expectation that it may motivate the Government to give favour to farmers for accessing to land especially marshlands for growing sweet potato. In this narratives, farmers also expressed serious concern about the issues of landless.

4.1.1.1. Characteristics of sweet potato farmers

Figures 4, 5, 6 and 7 present descriptive statistics with respect to the characteristics of farmers involved in sweet potato production in Rwanda.

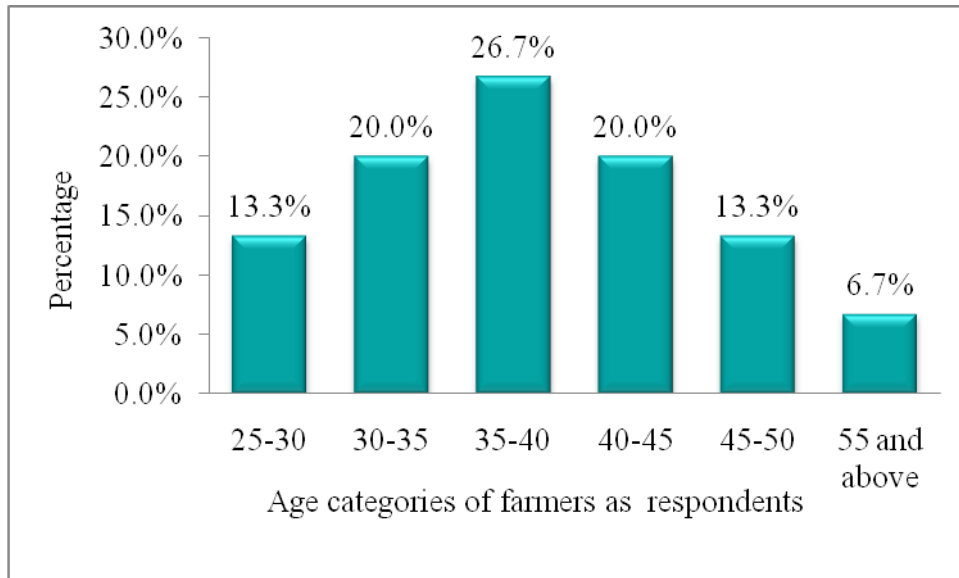
Figure 3: Gender of farmers (N=15)



Source: *Interview data from study (July, 2016)*

Figure 4 above, indicates that majority of respondents under sweet potato cultivation were female representing 66.7% whereas 33.3% were male among the respondents. This corroborates well with most sources including the national survey A.

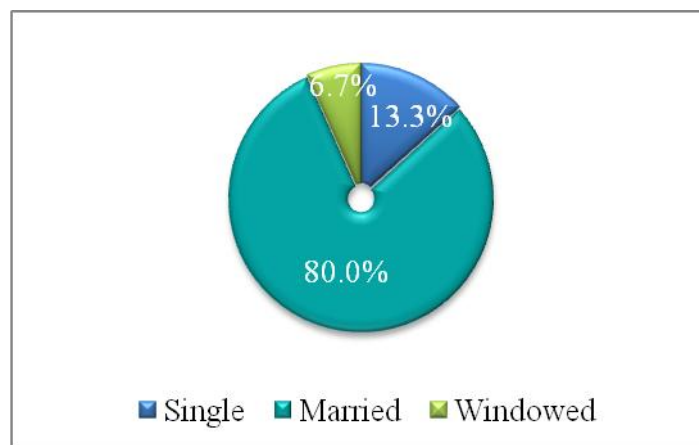
Figure 4: Age categories of respondents (N=15)



Source: *Interview data from study* (July, 2016)

With respect to farmers' age distribution, figure 5 showed that sweet potato farmers were dispersed in the different age categories from 25 to 55 and above. This shows which age group categories are interested in sweet potatoes farming. However, note that more than 6 out of 10 farmers are between the age of 30 to 45.

Figure 5: Marital Status of respondents (N = 15)

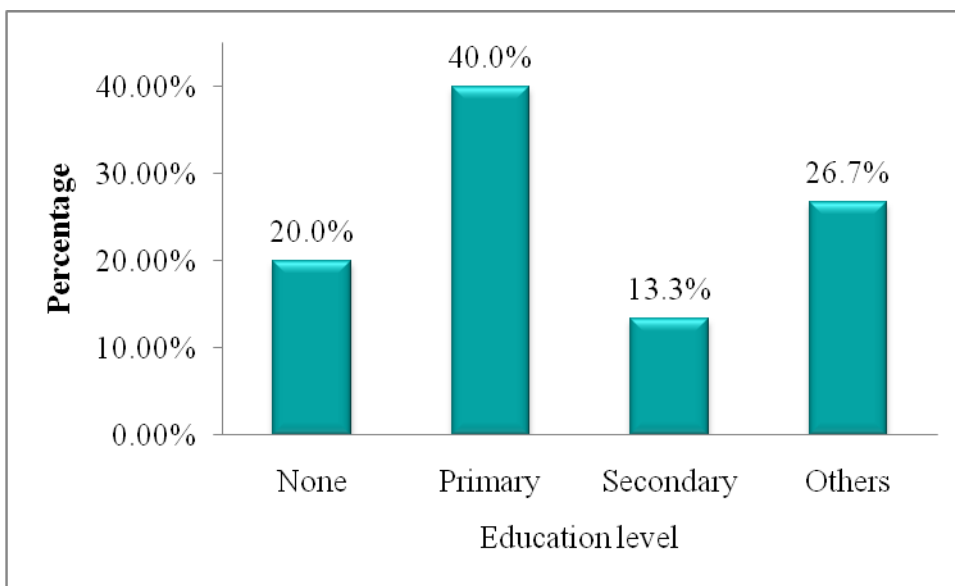


Source: *Interview data from study* (July, 2016)

The results show that 80% of respondents among the surveyed sweet potato farmers were married, 13.3% were single and only 6.7% were windowed. In line with the findings above, the married

people are in charge of their families and therefore the problem of livelihood sustaining is central to the farmers.

Figure 6: Education level of respondents (N = 15)



Source: *Interview data from study* (July, 2016)

Considering the education level of those farmers, the data indicate that in a large share (40.0%) of sweet potato farmers attend primary school, 20% did not attend primary school and 13.3% attended secondary school. Among the surveyed farmers, there were 26.7% who attended other categories of schools including Technical and Vocational training Centers (VTCs).

4.1.2. Roles of farmers in sweet potato value chain

This study identified farmers as the main actors in sweet potato value chain in Rwanda. Tables 2, 3 and 4 along with figures 8 and 9 present the role of farmers in the value chain as a result of this study. Actually table 2 emphasised on roles of farmers as the main actors in sweet potato value chain and shows that 33.3% of farmers were very attracted by the fact of being easiest crop to cultivate, 20% of sweet potato farmers were attracted and motivated by the fact of being considered as hunger fighting crops according to the traditional consideration among Rwandans; and 13.3% accepted the resistance of sweet potato plantation against different crop diseases than other crops. As reported in table 3, 40% of respondents preferred to hire labour to support their capacity during the process of cultivating, 20% preferred to be self employed by using their family members and only 13.3% are facilitated by the cooperative cooperation. The picture of getting

labors in terms of hiring process put the farmers in the situation of getting the sweet potato harvest in expensive way. For this reason the farmers said that the majority of their neighbors chose to keep quiet in expending the area under cultivation. Other than labor force issues, farmers also reported on their frustration with respect to the problem of non-possession of the land as illustrated in figure 9. In that respect, 53 % are used to rent for land whereas only 47% use their own land. The issue of land is a challenge to farmers because the good land which was used for sweet potato are occupied and have taken by other crops considered as food security by the Government. In Rwanda, all marshlands are kept for maize and rice which are promoted to improve their production in order to compete on markets in the region. Farmers are not agreeing with Government decision to take their land by force even if farmers don't have power or other option to resist to government. In that context, those who want to continue to cultivate sweet potato are obliged to hire to the others who have a big plot.

Hence land and labor have an impact on sweet potato production because farmers do not engage to invest much inputs because the land might not belong to them. In terms of adding the value to the cultivated sweet potato, farmers are supposed to use fertilizer, look for best varieties, respect the season of cultivation, to get best attractive harvests, respect customers' needs with respect to varieties produced. However, the level of application vary according to the understanding and ambition of each farmer.

Table 2: Incentive that motivate farmers to cultivate sweet potatoes (N = 15)

Reasons that pushes farmers to cultivate Sweet potatoes	Frequency	Percent
Very easy to cultivate	5	33.3
Hunger fighting crops	3	20.0
It does not require many things such as agricultural inputs	1	6.7
Try to resist to different crop diseases than other crops	2	13.3
More than two reasons	4	26.7

Source: *Interview data from study* (July, 2016)

Table 3: Source of labor (N = 15)

Source of labor for sweet potato cultivation	Frequency	Percent
Family members	3	20.0
Hiring	6	40.0
Cooperative members collaboration	2	13.3
More than one source of labor	4	26.7

Source: *Interview data from study* (July, 2016)

The assessment of the source of labor among the interviewed sweet potato farmers showed that 40% of respondents preferred to hire labors, 20% preferred to use their family members and only 13.3% are supported by their cooperative.

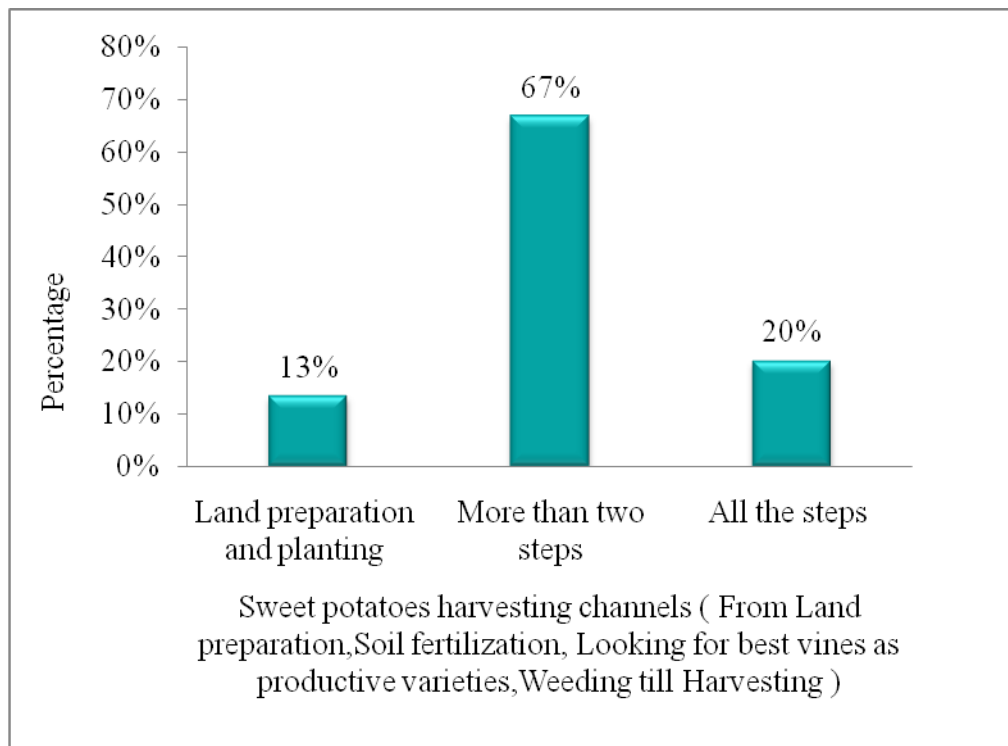
Table 4: The ways of increasing the value of sweet potato among the surveyed farmers (N =15)

Ways of increasing the value of sweet potato	Frequency	Percent
Use of fertilizer	2	13.3
Looking for best varieties	1	6.7
Respecting the season of Cultivation	1	6.7
Washing and sorting in order to get best attractive harvests	2	13.3
Respecting the customer needs varieties	5	33.3
More than two activities	4	26.7

Source: *Interview data from study* (July, 2016)

There is different ways for increasing the value of sweet potato, at this case 33.3% of the farmers preferred to respect the customer needs varieties. It followed by the use of fertilizer and washing and sorting in order to get best attractive harvests at the market where each variable occupied 13.3% among the surveyed farmers' preferences. Finally 26.7% used to do more than two activities so as to that their harvest would have a great increase in their values.

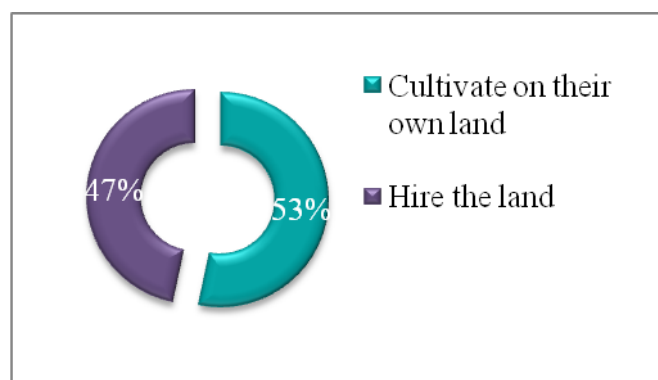
Figure 7: Farmers' sweet potato cultivation process (N = 15)



Source: *Interview data from study* (July, 2016)

As shown in figure 8, the majority (67%) of sweet potato farmers interviewed use only one step in addition to harvesting after land preparation, this means that they do land preparation, planting and harvesting. In the same vein, only 20% go through all the steps mentioned while 13% practice land preparation and planting and do not do anything during harvesting step.

Figure 8: Land Ownership among sweet potato cultivators (N = 15)



Source: *Interview data from study* (July, 2016)

Not only the issue of getting labor forced as seen in figure 8, the majority of farmers said that they are frustrated by problem of non-possession of the land. This is shown by the findings where the majority of sweet potato farmers at 53 % are used to rent for land whereas only 47% use their own land.

4.1.3. Processor and their roles

Indyo Inoze Bakery as Processor stories

Indyo Inoze bakery is a relatively small company that processes sweet potato into different other products in Muhanga Districts. Indyo Inoze moved in the region to collect farmers products in collaboration with research institutions (RAB and IPC). The region is one which produce more sweet potato. The business started in 2010 when an overproduction of sweet potato that researchers indicted that can be transformed into different products. With respect to sweet potato value chain, the bakery management indicated the critical role plays by Indyo Inoze bakery. It is an intermediary between farmers and consumers of different potato products and moreover it adds value to the raw product. In their daily activities; they targeted first of all to add value on sweet potato in terms of durable and direct consumable product without loss of the available vitamins at the stage of raw materials to process. The concepts of value chain from the perspective of Indyo Inoze bakery is regarded in terms of quality packaging assurance, respecting standard quality of consumable goods and physical appearance (hygiene, quantity and quality of delivered products). The spokesperson of Indyo Inoze processor stressed that the importance of partnership in the value chain, as indicating by Manager that “...our impression was enabled by the fact that there were projects from NGOs through their projects which offered new varieties of sweet potato in the region and also different trainings related to the transformation of the harvest of sweet potato into different sweets” (Interview with Indyo Inoze Manager July 2016). With respect to their challenges, the processor encountered issues such as the high cost of materials, the lack of availability of certain materials on the regional market, the understanding of local people which is still lacking information about the processed sweet potato products, the lack of Government subsidies in the process of sweet potato transformation.

4.1.4. Research institutions and their roles

Two important research institutions are involved in sweet potato value chain: Rwanda Agriculture Board (RAB) and the International Potato Center (IPC). These actors have done their activities of research on sweet potato and they are working together to improve sweet potato value chain.

4.1.4.1. Rwanda Agriculture Board (RAB) and their roles

Rwanda Agriculture Board (RAB) is a research institution under Ministry of Agriculture and Animal resources. RAB has different programs with different crops to research on. Their mission is to develop agriculture from traditional farming to modern farming, enhancing food security and market orientation. RAB provides research and extension services to farmers in order to train farmers the new technologies from research (MIFOTRA 2012: 10). From different programs of RAB, one of them is sweet potato program which is focusing on sweet potato research, how it can be improved for sustaining household livelihood, food security as well as generate income from that crop.

About sweet potato, RAB has their logic which is different as from government logic. As researchers, first, they don't want to lose the crop in their research as they know their importance. Secondary, they have different projects which have founded that crop to improve their importance. Third, the exclusion of sweet potato put the researchers who are in charge of sweet potato program to lose their job. Thus, the issues between government and farmers is beyond their activities. As they are familiar to solve technical issues, while sweet potato issue is a political issues that could need more participation to be handled. Therefore, from those logics RAB as research institution are continued to address the issues and search how it can be handled for improving food security without losing any crop.

As the mission of RAB are, the assessment of the role played by RAB as research institution in sweet potato value chain in Rwanda showed by the head of sweet potato program that “... *our research institution vision is to improve food security and livelihoods of all Rwandans in line with Rwanda Vision 2020⁶ by transforming subsistence agriculture into modern agriculture through the application of generated research and extension innovations which integrate sustainable crop production, animal resources and natural management as indicated by (MIFOTRA 2012: 10) in setting of RAB mission*” (Interview with the Head of the sweet potato Program, RAB, 13 August 2016).

To continue with, RAB plays a big role in sweet potato value chain like: Develop and improve availability of clean planting material of new sweet potato varieties along the chain, strengthen linkages between different sweet potato stakeholders/actors along the chain and building capacity of sweet potato stakeholders in sweet potato technologies. Farmers (Individual as well as farmers

⁶ Transforming the country into a knowledge based middle income country , reducing poverty , health problem and making the nation democratic

groups), Cooperatives, NGO's, Processors (Indyo Inoze/Bakery) and CGIAR (IPC) are stakeholders who collaborate with Rwanda Agriculture Board in the sweet potato chain.

RAB is committed to select and make available high yield sweet potato varieties with high nutritional value; to increase access to planting clean materials through rapid multiplication; to develop and release integrated pest management practices and to develop and announce better agronomic practices. RAB particularly targets the introduction of new varieties namely orange fleshed sweet potato varieties. Also RAB invests in the rapid multiplication and dissemination of clean planting materials through decentralized centres, the evaluation and promotion of sweet potato breeding lines currently in advanced stages of evaluation, immediate transfer for new technologies available through training skills and participatory research for easy adoption, and individual and group training in rapid multiplication techniques and agronomic practices. As I said previously, those activities are funded by NGOs for implementing their mission to the farmers.

From their perspective, RAB raises their voice and address the issue to government that “...*our logic is to maintain the crop in our research and this is other opportunity to continue to suggest to Government to consider and value the sweet potato crop among the priority crops, increase the visibility of sweet potato through value addition, develop sweet potato postharvest technologies and increase demand of sweet potato through awareness creation*” (Interview with Head program of sweet potato, RAB,13 August 2016).

4.1.4.2. International Potato Center (IPC) and its roles

IPC is an international organization that researches on sweet potato and plays various role in sweet potato value chain namely it develops new sweet potato varieties in collaboration with national agriculture institute, establishes a sustainable sweet potato seed system, creates a linkage between various sweet potato actors in Rwanda, develops sweet potato processed products in collaboration with IPC and its projects partners, contributes to market development for vines, orange flesh roots and processed products. They collaborate also with different stakeholders. Those can be listed as research institute and agricultural universities (e.g. RAB, UR), Local and International NGOs (e.g. YWCA), farmers organizations (e.g. IMBARAGA), farmers cooperatives, associations and groups, sweet potato seed multipliers, buyers: sweet potato vines, flesh roots and processed products, sweet potato processing units and bakery, consumers, health centers and schools.

The IPC collaborates with farmers and processors in relation with providing value chain services in the following way as affirmed by IPC researcher in their words;

“...to implement our mission, we deliver to farmers agricultural inputs such as seed multipliers and clean planting materials of promising sweet potato varieties for further multiplication and supply to the ordinary farmers for roots production, establish on-farm demonstration plots and research experimental trials for yield and other agronomic parameters evaluation , develop and train farmers on new developed technologies adapted to the farmers’ conditions, develop new processed products and train farmers and processors on processing aspects, create and link farmers and processors to the market. Although there is more effort in the promotion of sweet potato, there are also other factors perceived to have effect on the efficiency of sweet potato value chain such as behaviour change: familiarity with old crop management practices; un-familiarity with new and sweet potato processed products and Low involvement of government institutions (no subsidies from government to encourage farmers to cultivate sweet potato at high level)” (Interview with Researcher on sweet potato, IPC,16 August 2016).

From their perspective, IPC also suggests that *“...we need to ensure food and livelihood security through sweet potato value chain in Rwanda; develop a sustainable sweet potato seed system, develop a calendar for sweet potato planting and ensure its production the whole year round, expand the area under sweet potato (increase the number of Ha), create a value addition to the market of flesh roots, expand the market for processed products”* (Interview with Researcher on sweet potato, IPC,16 August 2016).

4.1.5. Government and its role in sweet potato value chain

Story of the Government - Ministry of Agriculture

By explaining the context of food security, the Director under Ministry of Agriculture in charge of food security narrated first the role of the Government about food security through crop intensification program in Rwanda. He said *“...in agricultural sector the Government’s target is to improve food security through different strategies to sustain agriculture program, and those strategies are: improved inputs, consolidation of land use, extension services, postharvest handling and storage. With those strategies, 80% of Rwandan households are secured. Also we encourage farmers to work as cooperative, land use consolidation, use improved seeds, fertilizers, plant one crop according agro ecology zone and all necessary for agriculture improved was seen as what has been done about what is being put in the place in order to ensure food security in Rwanda. Although, those are provided to the priority crops farmers”* (Interview with Director in Charge of Food Security, MINAGRI, 11 August 2016).

Their logic is different with the logic of other actors in the chain. Actually the Government focuses more on other crops called “priority crops” for food security and market competition rather than sweet potato to secure household livelihood. The aim of this policy is to envisage the future for “using high technology (improved seeds) and from conventional agriculture to modern farming

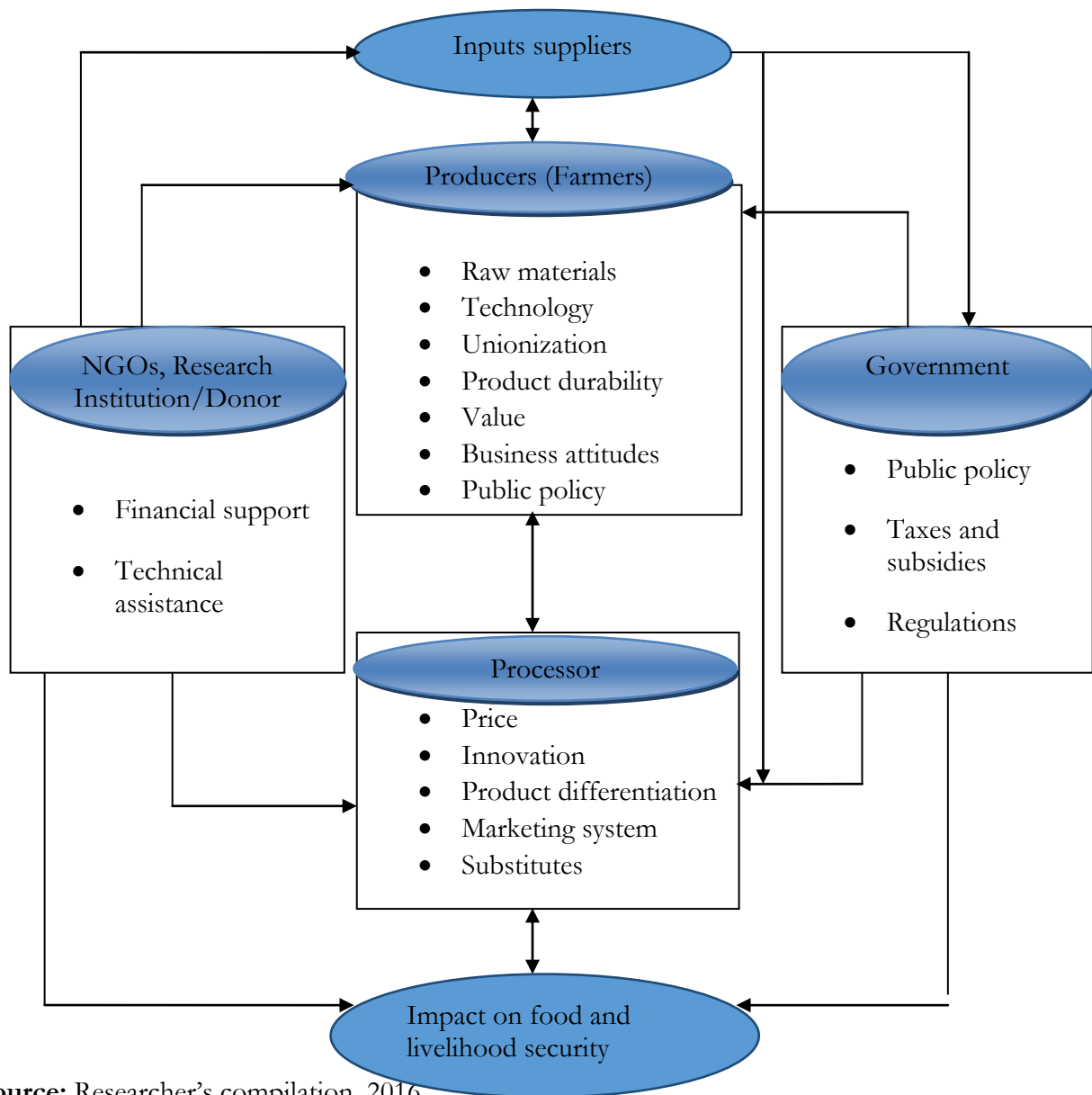
and also market oriented as one of the pillars of the country's long-term strategy”(Katherisan 2011: 10). For reaching the strategy, the Government selected some crops depending on agro ecological zone suitable for those crops and promote agricultural intensification which will result in food security. It is important to shed light on one of the Government’s argument about conservation. In that respect, the respondent indicates “...*sweet potato is still existing in Rwanda culture and cultivating in arable soil because marshland is for other crops for example maize and rice which contribute in food security. However, sweet potato is not first because it is not conservable like other crops like maize or rice which can be conserved long time*” (Interview with Director in Charge of Food Security, MINAGRI, 11 August 2016).

4.2.Relations and Interactions in Sweet Potato Value Chain

4.2.1. Network diagram analysis

Network diagram analysis was used to understand the interaction between actors in the value chain. In that respect, as presented in figure 10, producers are at the heart of the value chain of sweet potato. They interact with input suppliers, the Government, the processor, NGOs, research institutions and other donors. Different factors are engaged with depending on which actor interacts with the actor. In that respect, the Government deals more with policy while research institutions are much more involved in technical issues, etc. More details of the results are presented in figure 10.

Figure 9: Network Diagram of sweet potato value chain actors



Source: Researcher's compilation, 2016

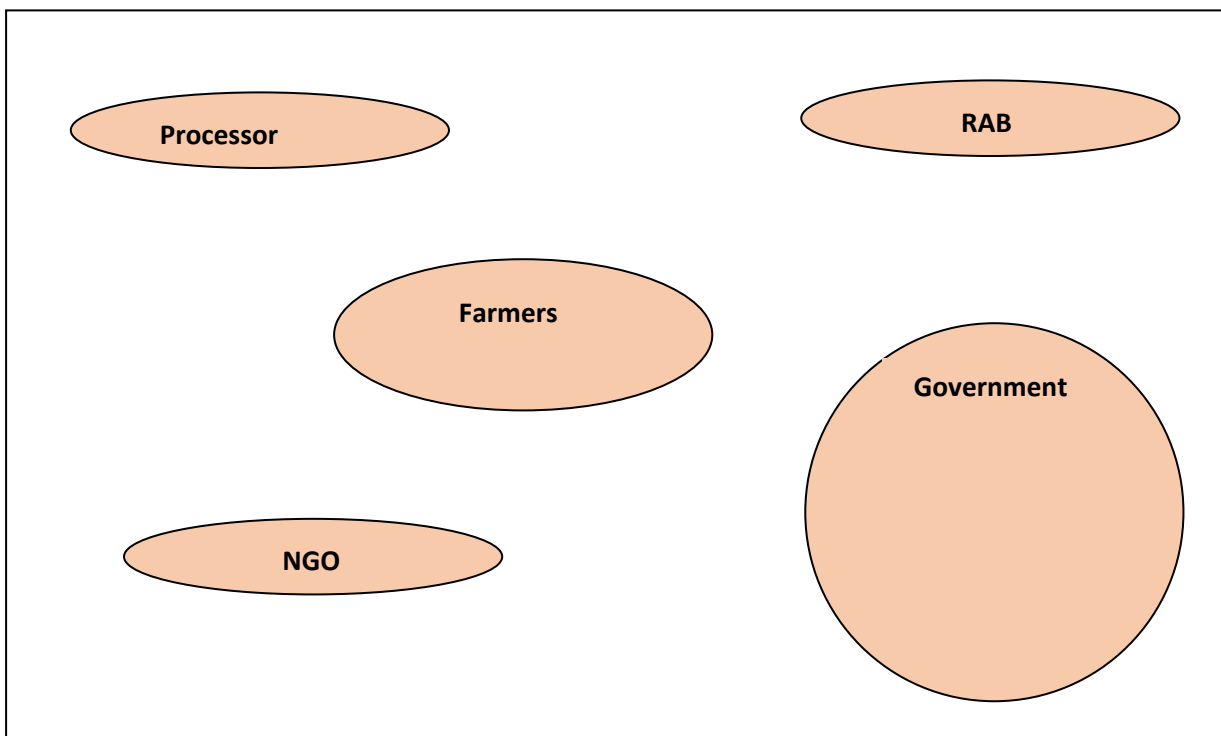
The interaction of the various actors as can be seen in figure 10 above, reveals some interdependency amongst them. The NGOs, and other donors support the farmers directly through the provision of productive resources (agricultural inputs) and indirectly through the government. Likewise the processors also benefit from the services of these other actors by way of financial assistance and capacity building on how to improve in their processing activities. This could also be either direct from the donors or through central government.

However, as the government is dealing direct with these other actors, they can influence them not to promote the production of sweet potato at higher level.

4.2.2. Mapping stakeholders' relative power in sweet potato value chain

This study considered power relations in terms of a factor that compels someone among the actors to work according to the conditions given by his/her next contributor to the channel of sweet potato value chain.

Figure 10:Map of stakeholders' relative power in sweet potato value chain



Source: Researcher's compilation, 2016

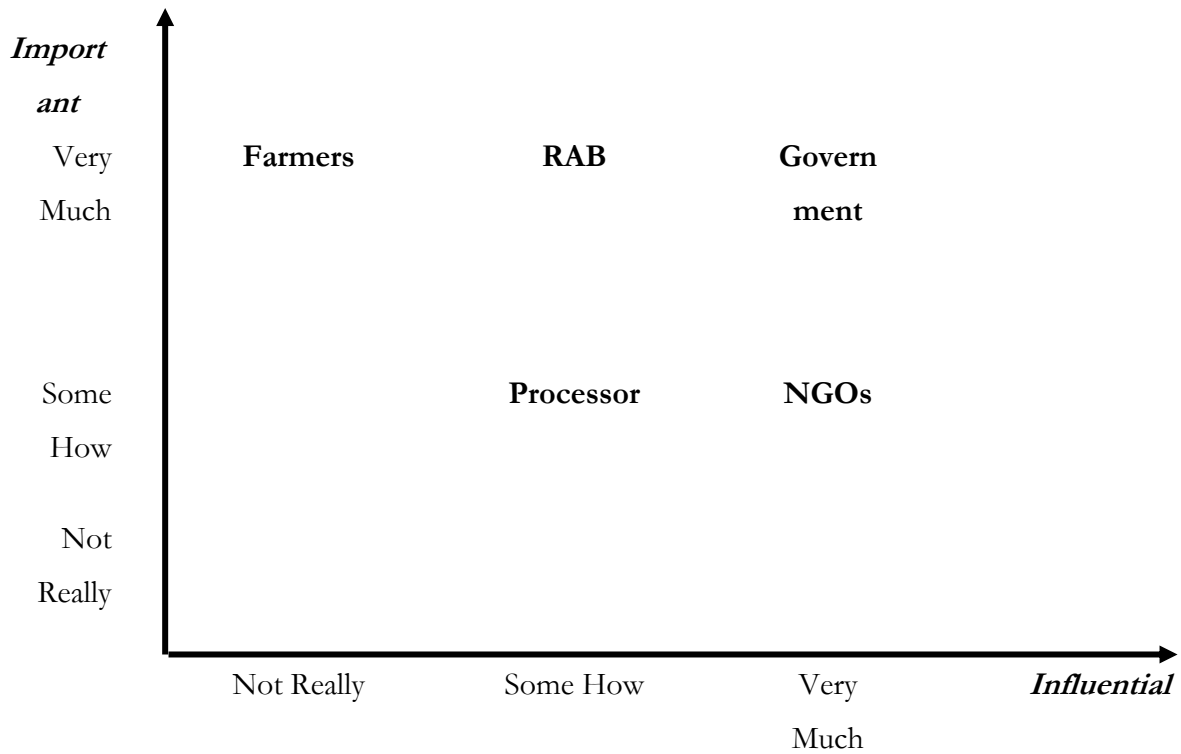
In reference to figure 11, power is measured with respect to the size of the circle representing each actor. It clearly appears that even though the government is not at the heart of the value chain, it is the most powerful, followed by farmers and thereafter come the other 3 main actors. In this figure the shape is not significant. Government is considered important hence represented by a bigger circle indicating its importance. This means that without the government the others cannot operate as state will provide the enabling environment for the others actors to function well.

With government and the farmers they can function but the others are also important to ensure the full functioning of the chain. In the methodology section, more details are provided in how power was measured for data analysis.

4.2.3. Stakeholders Analysis

4.2.3.1. Looking at importance and influence of stakeholders

Figure 11: Stakeholders analysis through importance and influence



Source: Researcher’s compilation, 2016

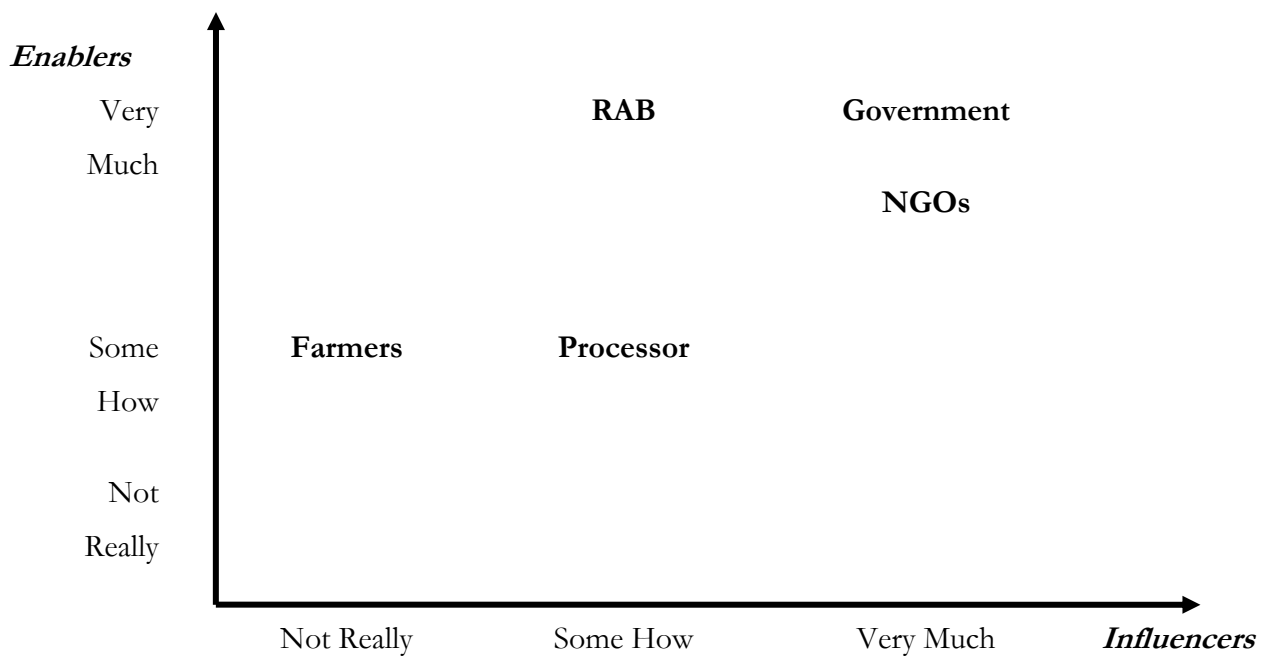
Figure 12 gives a visual analysis of the stakeholders mapped in figure 10 and figure 11. In that respect, it appears that, farmers are very important but not really influential in the chain, in that they are the weak in the chain and can only be seen as important if they are well organized. RAB as research institution is very important but somehow influential. It can recommend certain research findings to the government for consideration even though they cannot force government to implement what has been recommended. The processor is somehow important and somehow influential in this chain, because they play a major role in buying farmers produce and in the fixing produce price. NGOs is somehow important but it is very much influential due to their investment in the chain. They can influence due to their financial or affect the chain if they withdraw their support to the chain.

These results are well complementary of figure 11 in terms of the power that they hold each. Overall, stakeholder may be very influential, therefore they can affect the chain organization outcomes, but their importance is not necessarily high in the overall system. Government in this analysis appears to have a high degree of influence on the chain, along with a high importance as the success of the chain depends on how well the political environment is and the enabling environment created for this actors to operate. Any importance change regarding sweet potato needs therefore to take into account Government to ensure a successful process.

However, considering how critical enablers can be in a value chain analysis, the study continued with a stakeholders' analysis that combines enabling capacity with influence of actors to allow a deeper analysis.

4.2.3.2. Looking at enabling capacity and influence of stakeholders

Figure 12: Stakeholders analysis through enabling capacity and influence



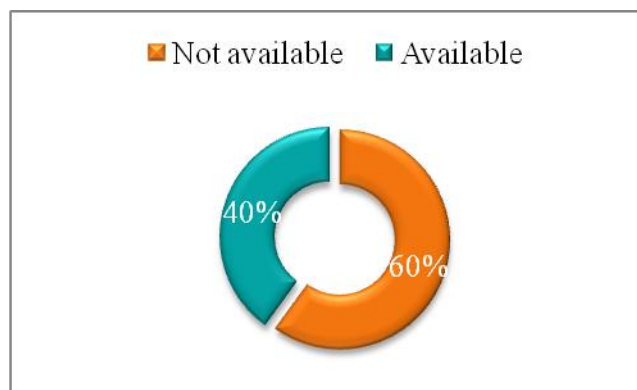
Source: Researcher's compilation, 2016

Figure 13 is a continuation of the analysis in figure 12 as it confirms the power of Government in this setting. However it is interesting to notice that NGOs who provide input and support to farmers gain more power with respect to their enabling capacity. They provide to farmers as well as to RAB financial to support research on sweet potato in order to help them to improve production. This suggests that other than the Government, NGOs represent an actors to take into

account and ensure that they do not refrain from the value chain. Otherwise farmers' effectiveness might be affected. To continue with, figure 13 suggests that farmers are somehow enablers but not really influencers; while the processor involved in the chain is somehow enabler and somehow influencer. Research institution is very much enabler but somehow influencer. NGOs and Government have a high degree of enabling capacity and at the same time are very influential. Government in this chain appears to have a high degree of influence on the chain as they are on top and everything is in their hands.

4.2.3.1. Interaction between Government and farmers in value chain

Figure 13: Availability of Government support during Sweet potato cultivation (N = 15)



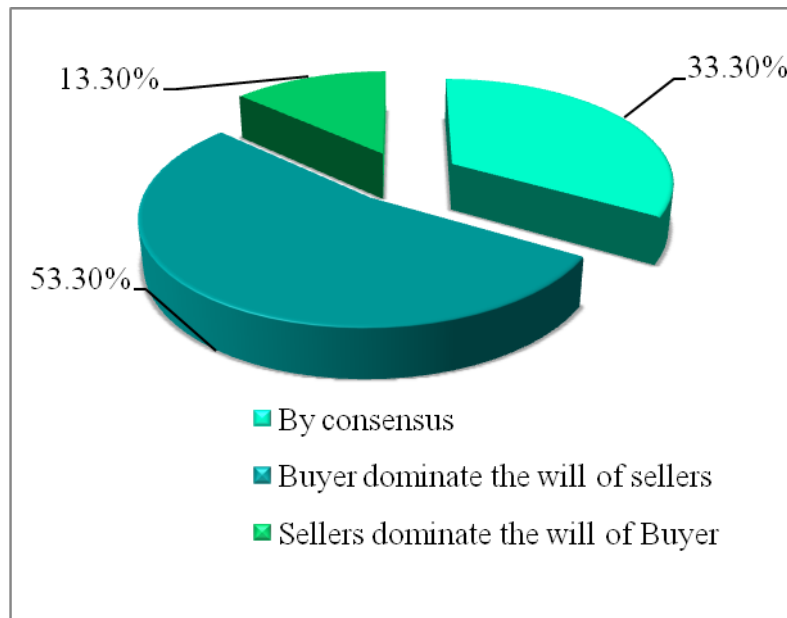
Source: *Interview data from study* (July, 2016)

Figure 14 indicates that there 60% of sweet potato farmers report that they do not have any support from the Government in their daily farming activities. On the other hand, 40% of them pointed the existence of Government interventions mainly through the allowance given to the projects related to sweet potato. The differences in responses could be that, those who said there was government intervention could have been part of those under the government priority crops support programme and might have been supported in a way. While the other farmers are complaining about Government interventions in their sweet potato activities.

This is because unless NGOs support in terms of financial, nothing NGOs can do on lack of land. This is the issue of government only who is on top to take last decision about land.

4.2.3.2. Interaction in value chain between farmers and processors

Figure 14: Sweet potato price fixing process at the market (N=15)



Source: *Interview data from study* (July, 2016)

The study considered interaction in value chain between farmers and processors in terms of sweet potato price fixing process at the market. The evaluation of this variable also has an idea of focusing on power relations between processors and farmers. The results presented in the figure 15, showed that 53.3% of farmers agreed that buyers (processors) dominate sellers (farmers) in terms of fixing price of selling their products (harvested sweet potato) because of the lack of government regulation to fix sweet potato price. The results also show that 33.3% of farmers think that sale is done through consensus and finally 13.3 % said that farmers or sellers have power in terms of selling sweet potato to the processors because they can sell to other buyers if the price offered by the processor is not favorable.

4.3. Technical issues of sweet potato value chain holding back production

In a context like the rural agricultural lands of Rwanda, it is hard to achieve on any objective or goals without facing some challenges or technical issues. During the study, farmers identified some of those constraints as illustrated in table 5.

Table 5: The main constraints encountered during production process of sweet potato (N =15)

The constraints	Frequency	Percent
Insufficient land	3	20.0
Affordability of new varieties to replace traditional varieties	1	6.7
Insufficient skills of how properly to cultivate sweet potatoes	3	20.0
Lack of governmental follow up in sweet potatoes production	6	40.0
Non- durable harvested sweet potato	2	13.3

Source: *Interview data from study* (July, 2016)

The findings presented in table 5 showed that 40% of farmers complained lack governmental follow up in sweet potatoes production as it currently done for other crops such as maize, Irish potatoes, cassava, etc. Insufficient skills of how properly to cultivate sweet potato and insufficient land were also rated at 20%. The study also found that some farmers (13%) were frustrated by thinking about the non- durability sweet potato and finally the sweet potato farmers at 6.7% said that affordability of new varieties to replace traditional varieties is still problem.

4.4. Farmers' suggestions to cope with the challenges in sweet potato value chain

One of the evidence of the performance is the ability to cope with the encountered challenges listed above. For the sake of development of sweet potato farming activities sweet potato farmers made a few suggestions summarized in table 6.

Table 6: Farmers' suggestions to cope with the challenges in sweet potato value chain (N=15)

Farmers 'suggestions	Frequency	Percent
Availability of land and subsidies	4	26.7
Capacity building on sweet potatoes production efficiency	2	13.3
Dissemination of new varieties of sweet potatoes	3	20.0
Considering sweet potato as hunger fighting crops	6	40.0

Source: *Interview data from study* (July, 2016)

Results in table 6 indicate that 40 % wished that stakeholders in sweet potato value chain consider sweet potato as hunger fighting crops. 20% of the farmers also wished to have new varieties of sweet potatoes that provides higher productivity. For some, the availability of government facilities such as down payment or collateral in order to have easy access to bank loans, insurance of cultivated sweet potato so as to be safe in case of impacts of climate or environmental shocks. Finally 13.3% of farmers complained about limited training for cultivators of sweet potato production to increase their efficiency.

Chapter 5

Discussion on sweet potato stakeholders and the findings Analysis

The main objective is to understand the actors involved in sweet potato value chain in the framework of food security and livelihood; and discuss the challenges around their interactions. Rwandan food security has a critical issue in the period of crop intensification and has been criticized by farmers for its failure dominated by political policy and their structure. This has employed issues of power and conflicts (McKeon 2015: 75). The power of the Government is admitted by all the actors and the data analysis confirmed the same. In that context, everyone also concurs on the need to support farmers in terms of inputs and material they need in the agricultural sector.

This is the role of RAB and IPC in sweet potato value chain where they provide *seed multipliers clean planting materials of promising sweet potato varieties for further multiplication and supply to the ordinary farmers for roots production* (interview August 2016). In the same vein, Scoones supported that there is need to have physical assets for sustaining livelihood (Scoones 2015: 6). Thus the provision of these materials by these actors to the farmers creates an enabling environment to sustain their livelihoods. Researchers, NGOs and processors support the ideas of the farmers to build on the absence of right to land to produce sweet potato. Farmers are supported even their idea do not have right but cultivate sweet potato, and that is similar to what Petal said as people can be food secure without right (Petal 2009: 665).

The results suggest that there is a problem of sweet potato sovereignty and access to marshland for producing more and thereafter improve farmers' access to basic needs. This supports Scoones who asserted that households' livelihood are secured when household have access to natural assets namely land (Scoones 2015: 40). Farmers have attempted to improve their livelihood and food security from sweet potato and its inclusion in priority crops. They intend to improve household food security, nutrition and income through production of sweet potato at accessible prices in the course of utilisation and food stability. But the Government attempt to improve food security from other crops selected without including sweet potato. Those two groups are totally different in their logics. Although, the Government is powerful and influential in sweet potato value chain of Rwanda, it plays a role of setting policies in different sectors with capacity to use governing and forced power (principles applied by government for sweet potato production) to fulfil the interest of some actors. But not all the actors are pleased with that approach. This analysis contrasts

Maxwell who claimed that food security is achievable when there is equity growth to ensure that the livelihood of poor and vulnerable people is sustained (Maxwell 1991: 22 and 1988 cited in Maxwell 1996: 5).

I do believe that the question between government and farmers could be the absence participation of some actors in time of policy formulation. Thus, I argue that a powerful from Government in the value chain exclude rather than include sweet potato in priority crops as a main crop which can contribute for food security and sustain household life in the country. This is what Emerson said on power between stakeholders, the ability to overcome the resistance of others that means the power of government over to farmers (Emerson 1962 cited in Mitchell and Moore 2012: 12). In this case Scoones argue that the institutions and organizations are critically to understand how some people access to resources and livelihoods while other are excluded (Scoones 2015: 51). This is the “diverse powers of exclusion” (Hall et al 2011 cited in Scoones 2015: 52) which is focused on struggle and conflict between farmers and government and influential of power relations in excluding farmers from land and sweet potato cropping. Although, livelihood is sustained when households access to all assets for living. Therefore the policy for food security in Rwanda has not favoured Rwandan households’ livelihoods.

The farmers have been affected by government power, which appears to be the reason why they are complaining regarding several things including the lack of tangible government support. Thus not only agricultural policy, there are other factors running behind government power such as affordability of new varieties to replace the traditional varieties, insufficient skills about how properly to cultivate sweet potato. There is also non-establishment of infrastructure in the area of sweet potato production and even there is a low level of investment in sweet potato cultivation done by non-government institution or private investors. Besides farmers, processors also claim to have many problems encountered such as expensive equipment (long term assets and short term assets) and not easily available in the residence region. Also lack of government subsidies is another challenge in the processing of sweet potato and are the same as what is seen by farmers as the most challenges encountered as availability of financial capacity. The sweet potato processors also suspect to lack raw materials in the upcoming period if there will not be anything done by government in the process of facilitating sweet potato farmers.

Notwithstanding this, technical issues are not still a serious challenges for farmers and processor because they have researchers institutions and NGOs who have supported them to handle those challenges. It is the issue of unbalanced power relationship that have weakened farmers in the

chain and also a dilemmas of food security and livelihood security meaning for the Government. Here the government consider food security of some crops as commodity⁷ to secure their population while people are not even able to access the basic needs for sustaining their livelihoods. Following that line, farmers claimed sweet potato as food sovereignty that they have recognized food as a gift of life not to be squandered as also reported in (Nyéléni, 2007). Sen emphasizes that farmers need their right to food which he called freedom to production and democratically in the food system (Sen 1989: 777).

Considering the different actors and their logics, it is necessary that they all engage in an inclusive discussion to work out and find a common ground with respect to the concerns. As far as the study results are concerned, the root of the issues is about policy formulations and their execution in the field. This can be handled through policy amendments and taking into account the farmers' voice and other actors in the chain. The common logic on the way of food security can provide significant support at the time of handling those issues of land, inclusion and exclusion of crops; and is a roots of sustaining their livelihood of the society of Rwanda without ignoring farmers' participation.

⁷ Crop intensification for selling directly to market

Chapter 6

Conclusion and recommendations

This chapter presents conclusions derived from the research and following recommendations. It also highlights each specific objective and its findings.

6.1. Conclusion

Sweet potato is an important crop in the food and livelihood security of Rwandan and serve different products to consumers. Although 88 kg is consumed per capita in one year (sweet potato knowledge portal 2015: 1, News times 2015) and they are using as auto consumption (NISR 2015: 15) even if lost their potential (USAID 2010: 15). The central problem that drove this research was the need to suggest ways of addressing the tension in the exclusion of sweet potato from the priority crop considering the importance of that crop in food security and livelihood framework among Rwandan farmers.

Sweet potato production of Rwanda is entrenched in a complex set of agricultural policy linked to food security and how the policy is designed and operated. The study employed primary data (based on semi-structure interviews of farmers and key informants) and secondary data from different scholars to address the central research question. The value chain analysis indicted the link between different actors and their logic on food and livelihood security. This research confirmed that there is room for actors to discuss the different issues and understand each other as they all have a common goal which is food security and livelihood improvement in Rwanda.

With respect to technical issues such as access to land, subsidies, technology skills and so forth, there is also need to strengthen farmers through Government interventions similar to what researchers and non – governmental organizations are doing. The Government could very much influence sweet potato production in order to achieve the objective planned for food security and market competition. This would happen through support for small scale without undermining small-scale farmers' interests. In the current context, the Government has jumped directly from food security to market (maximizing profit) without considering household subsistence.

The study revealed that there are an unbalanced power relations amongst sweet potato stakeholders where the Government influenced other stakeholders in the chain. Especially, this power is illustrated by the communication between the Government and farmers. In that respect,

there was very limited government interventions in sweet potato farmers' daily farming activities and they relied on themselves or through cooperation with other agents. The unbalanced power exists also between farmers and a processor who dominate the market, in terms of fixing the price of products (harvested sweet potato) in the absence of Government regulations.

Farmers know their livelihood better than anyone else, and on that basis they formulated suggestions to address the challenges among the actors in sweet potato value chain. They have raised their voice to government for considering sweet potato as hunger fighting crops. Considering that the Government is the one which is on top of the sweet potato value chain, it may consider to include sweet potato in the priority crop as the farmers suggest for sustaining their livelihoods and eventually invest into the sector to turn it to the regional market. At the moment, sweet potato exclusion refrained farmers' efficiency production, and moving into different products is still challenging for them. This is seen as a domination of the Government applied and exercised at the expense of other actors in the chain. For this reason farmers are still having complaints about their partners especially government's influence in their agricultural activities without consulting them.

Another key finding is that the only processor in the chain is in a position of monopoly market and influence farmers quite seriously namely in fixing prices and enjoy profit without taking into consideration farmers' interest in the whole process. This is exacerbated by the lack of regulation by the Government in the sector. Powerful actors such as the government needs to avoid weakness but the important actor such as farmers in designing policy that affect directly the latter with respect to their livelihood and in the overall food security agenda. The study suggests that increasing sweet potato production and processing has the potential to lead to achieving both livelihood and food security in Rwanda.

6.2. Recommendations

After an extensive and exclusive research, it needs to make points of deficiency on the topic under study and to point out possible steps as remedies to the flaws, denoted as “recommendations”. In view of challenges highlighted in the literature and supported by the study findings, and considering need to design effective sweet potato value chain promotion the following targeted recommendations are made to farmers, processors, government and other institutions in the value chain.

6.2.1. Recommendations to YWCA

It will be valuable if YWCA can create a linkage between the different actors and express their challenges with respect to sweet potato value chain. This will help supporting farmers’ cooperatives in producing and selling their product. It needs also to create linkage with market actors as well as government in charge of sweet potato price regulating in order to discuss price setting or contracting.

Expressing the importance of sweet potato and their productivity will help the farmers to gain the financial and subsidies from Non-Government institutions, different donors and Government as well. Collaboration between farmers and Rwanda Agriculture Board should be increased by young women Christian Association in order to use improved sweet potato and also address the existing gap between them. Contract price as guarantee to sweet potato farmers will help them to ensure the market that will allow them to produce more.

6.2.2. Recommendations to Rwanda Agriculture Board

Rwanda Agriculture Board needs to reinforce the research on sweet potato chain and ensure the government of its importance in Rwandan population that will make the crop to be strong; and provide technical support to sweet potato agriculture research services like improved seed with higher yield, tolerant to pests and diseases also drought as well.

Availing the new sweet potato variety to replace the subsistence varieties that generate the efficiency harvest and containing the adequate body needed vitamins. Providing sufficient skills to farmers about how scrupulously cultivate sweet potato so as to ensure the non-poor sweet potato harvest in terms of content, quality and quantity. Create farmer field school to disseminate more of the knowledge about sweet potato production.

6.2.3. Recommendation to the Government

The Government needs to create a space to debate the amendment of existing policy namely the one affecting sweet potato production, in order to handle the issues of food and livelihood security as perceived by farmers. That dialogue may help achieving the Government's objective without ignoring sweet potato farmers' interest.

The Government will also need to facilitate sweet potato farmers' access to marshland and farming different crops in order to secure their livelihood and food security as well. It will also develop mechanism that can facilitate sweet potato farmers' access to financial credit in order to help farmers getting the inputs required for their activity.

Finally the Government should facilitate sweet potato farming by taking it into consideration during the policy formulation regarding food security, priority crops and land consolidation in Rwanda.

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Appendices

Appendix 1: Research Questionnaire and Interview guideline

A. DEMOGRAPHIC PROFILE OF RESPONDENTS

1. Sex (tick \surd): a) Male b) Female
2. Age:
3. Status of respondents: a) single b) Married c) Divorced d) Widowed
4. Level of education: a) None b) Primary c) Secondary d) University e) Others (specify).....

B. GUIDE OF QUESTIONS ADDRESSED TO FARMERS

1. In your daily life, what are your main tasks?
2. As sweet potato farmer, what is the incentive to produce that crop?
 - 2.1. Except being as sweet potato farmer, is there any other crop do you cultivate?
3. How do you cultivate sweet potato and how many times does it take to get it?
 - 3.1. What is the source of labor in the sweet potato production process?
 - 3.2. Is the land under cultivation your own?
 - 3.3. How many plots of sweet potato have you cultivated?
4. What do you do to increase the value of sweet potato?
 - 4.1. Do you get easily the agricultural inputs for sweet potato?
5. What do you do in order to get customers?

- 5.1. Are you happy with the cost of selling the sweet potato harvest?
- 5.2. Who fix the price of sweet potato at the market?
6. What support do you get from the government during the production process of sweet potato?
7. What are the main constraints do you encounter during your production process of sweet potato?
8. What are your wishes to government to overcome those encountered constraints for sustaining your sweet potatoes production?

C. GUIDE OF QUESTIONS ASKED TO PROCESSOR

1. In your daily life, what are your main tasks?
2. As sweet potato processor, what is the incentive to do the processing activities?
3. How do you get sweet potatoes to process in your processing activities?
4. What do you do in order to get best quality and quantity of sweet potato production?
5. What do you do in order to attract customers?
6. Can you share with me a brief story of sweet potato processing activities in terms of costs and profits generally?
7. What are the facilities do you get from the government in your processing activities?
8. What are the factors, which affect positively or negatively sweet potatoes processing?
9. What are your wishes to government, to your customers and to your suppliers to overcome the encountered constraints in your enterprise for sustaining your sweet potato processing?

D. Guide of Questions addressed to:

A. Government

1. Share with us the current situation of food security in Rwanda?
 - 1.1. What is being put in the place in order to ensure food security in Rwanda?
 - 1.2. Why Sweet potato is not among the first priority crops in Rwanda?
 - 1.3. What is the government ambition to promote sweet potatoes in Rwanda?
2. What the role of other stakeholders in sweet potato value chain in Rwanda?
3. What are your suggestions to ensure food and livelihood security through sweet potato value chain in Rwanda?

B. Private and public institutions

1. What role does your institution play in sweet potato value chain in Rwanda?
2. What are the other stakeholders in sweet potato value chain?
3. How does your institution collaborate with farmers and processors in relation with providing value chain services?
4. Are there any factors you perceive that they affect the efficiency of sweet potato value chain?
5. What are your suggestions to ensure food and livelihood security through sweet potato value chain in Rwanda?

THANK YOU!!!!