

**Strengthening avocado Value chain for the export market
Case study of Gisagara District, Southern Province of Rwanda.**



By
Charles HATEGEKIMANA
September 2019
Larensteinseweg 26a, Velp
The Netherlands

**Strengthening avocado Value chain for the export market
Case study of Gisagara District in SAVE sector, Southern Province of
Rwanda.**

A research project submitted to Van Hall Larenstein University of Applied Sciences in the partial fulfillment of the requirements of the Degree of Master in Agriculture Production Chain Management, specialization in Forest Chains.

Supervisor: dr. Peter van der Meer

Examiners: Albertien Kijne and Sebastian Masselink

**Charles HATEGEKIMANA
September 2019**

ACKNOWLEDGMENT

My grateful thanks go to the Royal Netherlands government through the Netherlands Organisation for International Cooperation in Higher education (NUFFIC) for offering me this opportunity to pursue a Master's program in Agriculture Production Chain Management.

I would like to acknowledge all the staff and lecturers of Agriculture Production Chain Management for their guidance and efforts to make strong and acquiring competences and skills related to this program. Express gratitude to NIYONSHIMA Astérie Coordinator of Commission of Justice and Peace Caritas Diocese Kabgayi who granted me to pursue this one-year program.

Special thanks to my supervisor Dr. Peter van der Meer for his support, guidance towards this work completed. I also want to thank the coordinator of Agriculture Production Chain Management, Marco Verschuur for his contribution to this achievement. Many thanks go to all Van Hall Larenstein University of Applied Sciences International staff for their contribution that helped me to accomplish this program. Many thanks to all Gisagara District / SAVE sector staff, and Farmers who gave me their time during data collection and BAZIRANKENDE David, Itangirubuntu prayer group for their moral supports and in kind.

I am thankful to my family especially my wife NISHIMWE Antoinette who supported during and at the time of study period.

Finally, I would like to thank Almighty God for his protection and strength that allowed me to accomplish this project and last not least appreciation to all my fellow mates at VHL for providing conducive environment during our time that helped me to learn from their experiences.

Thank you!

DEDICATION

This work is dedicated to the Almighty God for strength enabling me to accomplish this program. It is also dedicated to my family members, for their frequent calls that supported my trajectory abroad and in-country field research.

TABLE OF CONTENT

| | |
|--|------|
| ACKNOWLEDGMENT | iii |
| DEDICATION | iv |
| TABLE OF CONTENT | v |
| List of tables | vii |
| Acronomy | viii |
| ABSTRACT | vii |
| CHAPTER ONE: INTRODUCTION | 1 |
| 1.1 Background..... | 1 |
| 1.2 Problem statement..... | 3 |
| 1.3 Problem owner..... | 4 |
| 1.4 Research objective | 4 |
| 1.5 Main and sub-research questions | 4 |
| 1.6 Definition of terms | 5 |
| CHAPTER TWO: RESEARCH DESIGN..... | 6 |
| 2.1 Justification of the study area..... | 6 |
| 2.2 Description of the study area..... | 6 |
| 2.3 Research strategy..... | 7 |
| 2.3.1 Research framework..... | 7 |
| 2.3.1.1 Desk research | 7 |
| 2.3.1.2 Field research | 8 |
| 2.4 Sample size and sampling strategy..... | 10 |
| 2.5 Data analysis | 12 |
| 2.6 Limitation of the study..... | 12 |
| CHAPTER THREE: LITERATURE REVIEW | 13 |
| 3.1 Conceptual framework | 13 |
| 3.2 Literature review..... | 14 |
| 3.2.1 Horticulture in Rwanda..... | 14 |
| 3.2.2 Avocado production in Rwanda..... | 14 |
| 3.3. Market structure of avocado value chain at Gisagara district | 15 |
| 3.3.1 Value chain concept..... | 15 |
| 3.3.2 Governance in the avocado value chain..... | 15 |
| 3.3.2.3 Chain Relation..... | 16 |
| 3.3.3 Opportunities and Constraints in the avocado value chain | 17 |
| 3.4. Strategies to scale up the supply of quality avocado for export | 18 |
| 3.4.1 Export market requirement for avocado..... | 18 |

| | |
|---|----|
| 3.4.2 Factors affecting the profitability from sales to the export market for chain actors..... | 19 |
| 3.4.3 Sustainable standard in the avocado value chain | 20 |
| CHAPTER IV: RESEARCH FINDINGS | 21 |
| 4.1. The market structure of avocado value chain in Gisagara district | 21 |
| 4.1.1 The current avocado value chain at Gisagara district | 21 |
| 4.1.2 Governance in the avocado value chain..... | 26 |
| 4.1.3 The opportunities and constraints in the avocado value chain | 27 |
| 4.2 Strategies to scale up the supply of quality avocado to export market | 33 |
| 4.2.1 Farmer’s perception of avocado production for the export market..... | 33 |
| 4.2.2 The requirements for the export market | 33 |
| 4.2.3 The factors affecting the profitability of sales to the export market..... | 35 |
| 4.2.4 The sustainable standards that enable access to the export market..... | 37 |
| CHAPTER V: DISCUSSION OF FINDINGS..... | 39 |
| 5.1 Market structure of avocado value chain in Gisagara district | 39 |
| 5.1.1 Current situation of the avocado value chain in Gisagara District | 39 |
| 5.1.2 Governance in Gisagara avocado value chain | 39 |
| 5.1.3 The opportunities and constraints in the avocado value chain | 41 |
| 5.2 Strategies to scale up the supply of quality avocado to export market | 41 |
| 5.2.1 Farmer’s perception of avocado production for export..... | 41 |
| 5.2.2 The requirements for the export market | 42 |
| 5.2.3 The factors affecting the profitability from sales to the export market | 42 |
| 5.2.4 The sustainable standards that enable access to the export market..... | 43 |
| 5.3. Reflection on my role as a researcher | 44 |
| CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS | 45 |
| 6.1. Conclusions | 45 |
| 6.2 Recommendations | 46 |
| 6.2.1 Proposed Avocado Value chain | 47 |
| REFERENCES | 48 |
| APPENDICES..... | 53 |

List of tables

| | |
|--|----|
| Table 1: summarised of research results from respondents in Gisagara district | 11 |
| Table 2: Numbers of people responded and analysis tools | 12 |
| Table 4: variety grown by the farmers in Gisagara district | 23 |
| Table 5: Selling place for avocado producers in Gisagara district..... | 23 |
| Table 6: Stakeholder matrix in the avocado value chain and their role | 25 |
| Table 7: Supporters' matrix and their function in avocado value chain in Gisagara District | 26 |
| Table 8: SWOT and PESTEC matrix in avocado value chain in Gisagara District | 32 |
| Table 9: Variety which has a good market price | 33 |
| Table 10: Actors' value share in avocado value chain SAVE sector of Gisagara district | 36 |
| Table 11: Number of farmers who belong to producers 'association or group in Gisagara | 37 |

List of figures

| | |
|--|----|
| Figure 1. World Top ten avocado producing countries..... | 2 |
| Figure 2: Avocado Production in Rwanda | 3 |
| Figure 3:Gisagara district avocado causal diagram | 4 |
| Figure 4: Rwanda Map with highlighted study area | 6 |
| Figure 5: Research design roadmap | 7 |
| Figure 6: Respondents selection for research in Gisagara District..... | 10 |
| Figure 7: Research Concept framework | 13 |
| Figure 8: Typology of Governance structure in the value chain | 16 |
| Figure 9: Current avocado value Chain Map in Gisagara District..... | 21 |
| Figure 10: Figures of avocado seedlings source and nursery..... | 22 |
| Figure 11: Farmers preference on the type of varieties to grow in Gisagara district | 33 |
| Figure 12: Fertiliser use in avocado farming Gisagara district | 34 |
| Figure 13: Comparison of the season with a production | 35 |
| Figure 14: Value share for the export market in avocado value chain in Gisagara district | 36 |
| Figure 15: Value share for the domestic market in avocado value chain in Gisagara district | 37 |
| Figure 16: Farming practices proportion in SAVE sector of Gisagara district | 38 |
| Figure 17: A proposed avocado Value chain map in Gisagara District..... | 47 |

List of Appendices

| | |
|---|----|
| Appendix 1. Survey Questionnaire..... | 53 |
| Appendix 2. Key Informants checklists..... | 54 |
| Appendix 3. FGD checklist & Stakeholder meeting..... | 55 |
| Appendix 4: Demographic features of the respondents | 56 |
| Appendix 5:Relation between production and agriculture season | 56 |
| Appendix 6: Table indicating smallholders in Gisagara district land size..... | 57 |
| Appendix 7:Photos during FGDs..... | 58 |
| Appendix 8: Survey photo in Gatoki cell | 58 |
| Appendix 9: Survey Photo in Munazi cell | 58 |
| Appendix 10: Photo taken in survey from Zivu cell..... | 59 |
| Appendix 11: Photos of local and improved avocado tree | 59 |
| Appendix 12: Photos of middlemen transporting and grading avocado | 60 |
| Appendix 13: Manager of New vision seventy ltd in his avocado nursery | 60 |

Acronomy

| | |
|------------|---|
| CBI | Centre for the Promotion of Imports from developing countries |
| CO2 | Carbon dioxide |
| DFID | The Department for International Development |
| ES | Executive Secretary |
| EU | European Union |
| FAOSTATA | Food and Agriculture Organization Statistics |
| FGD | Focus Group Discussion |
| FSC | Forest Stewardship Council |
| GDP | Gross Domestic Product |
| Global GAP | Global Good Agriculture Practices |
| GVCs | Global Value Chains |
| IPCC | Intergovernmental Panel on Climate Change |
| MINAGRI | Ministry of Agriculture |
| NAEB | National Agriculture Export Board |
| NISR | National Institute of Statistics of Rwanda |
| NR | National Road |
| OECD | The Organisation for Economic Co-operation and Development |
| PESTEC | Political ,Economic, Social, Technical, Environment and Culture |
| RAB | Rwanda Agriculture Board |
| RBS | Rwanda Standards Bureau |
| SACCO | Savings and Credit Cooperative |
| SEDO | Social Economic Development Officer |
| SHF | Smallholders Farmers |
| SPS | Sanitary and Phytosanitary |
| SPSS | Statistical Package for Social Sciences |
| SWOT | Strength, Weakness, Opportunity, and Threats |
| TBT | Technical Barriers to Trade |
| UNECE | The United Nations Economic Commission for Europe |
| WTO | World Trade Organisation |
| RWFA | Rwanda Water and Forestry Authority |

ABSTRACT

This study intended to improve the avocado export value chain in order to stimulate local development for Gisagara district/ Southern Province and National Agriculture Export Board(NAEB). Stakeholder meeting, Survey, FGDs, interviews, and desk study were used as research method to find out the current avocado value chain, governance structures, and opportunities in place of strengthening sustainable avocado value chain in Gisagara district for export. Numerous tools were used for data analysis including SPSS, Grounded theory, Chain map, SWOT, PESTE, and stakeholder matrix.

The findings indicate that avocado value chain in SAVE sector/Gisagara district is characterised by small lands holding of less than 0.5ha, with production less than 500kg per agriculture season. It is also characterised by lack of Avocado producer groups, lack of chain coordination and weak relationship among chain actors, absence of policies and marketing institution to drive value chain as well poor information sharing among stakeholders. Poor agronomic practices and lack of know-how in production are the main factors hindering production of quality avocado. Stakeholders (NAEB, RAB, One Acre Fund, District) have recognised to support but their contribution is limited only to production of seedling and distribution, therefore lack of strategic plan for the value chain creates insufficient outcome and low change to the avocado subsector.

The absence of a local processing plant, Postharvest facilities, and inappropriate harvesting and handling equipment has found to be source of poor quality and low quantity and high postharvest loss. The producer has indicated the willingness to form avocado producer organisation, extending their plantation using improved varieties however its require strong supporting institutional framework to take into account at the beginning financial related issues. Results indicated that as there is domestic and globally increasing demand for avocado increasing production and upgrading quality in Gisagara can be possible considering history of the district on avocado, climatic condition, accessibility to feeder road if distance between producer and exporter reduced and willing to cooperate informal way.

The recommendation indicated that, for strengthening sustainable avocado value chain for export market in Gisagara district, there is a need for smart policy and capacity building for stakeholder and promoting a competitive regulation related to avocado value chain; close coordination and organisation among avocado value chain ; introduce district farming innovative practices to enhance the production and trade capacity of avocado value chain actors (Initiate model avocado producer group, demonstration farms on state land); Creation of avocado value chain platform and enhancement of mutual benefit and trust in order to facilitate the inclusiveness of small avocado producers ;There is a need to improve logistical support and continual support for standards both public and private through certification (farms and products); There is a need for facilitating access to finance, conduct regular research and innovation through vocation training centers and value-added assistance for entrepreneurs.

Keyword: Sustainable standards, Value chain, and Export market

CHAPTER ONE: INTRODUCTION

1.1 Background

In many developing countries, agriculture often is characterized by dual value chains working in parallel for the same product: one traditional and the other modern. Smallholders are frequently involved in traditional chains that deliver product to local middlemen. Modern value chains can supply the same product, usually in more uniform quality, from larger farms or more organized groups of small farmers to more commercial wholesalers and from there to supermarket or exporters (Karuiru, 2018).

Rwanda agriculture sector as in many other developing countries is constrained with low agricultural production due to low-quality seeds, outdated farming methods and standards, insufficient storage, processing, trade facilities, and limited government assistance especially lacking specific strategic development for each crop (Danafacility, 2018)

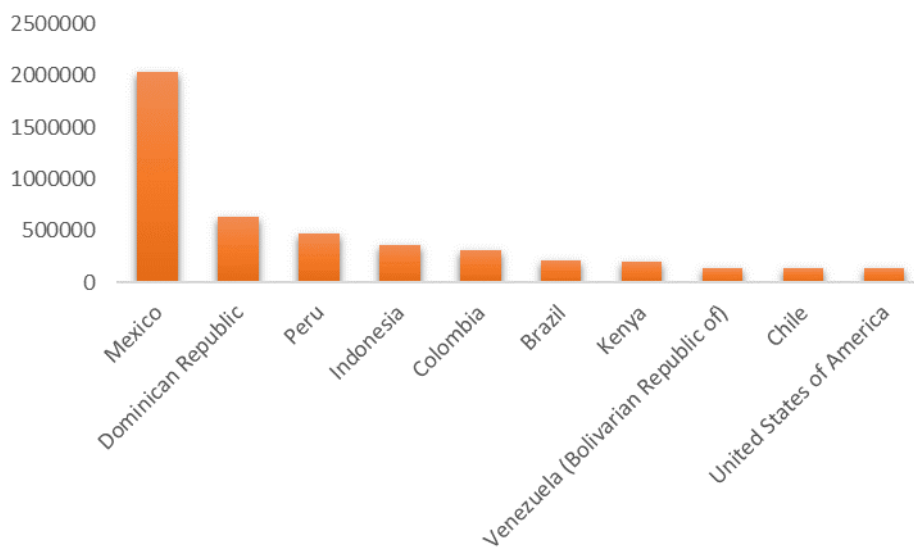
The agriculture is dominated by small-scale subsistence production on landholdings that are less than 0.5ha and for over a quarter of all households, are less than 0.2ha (NAEB, 2014). However, it contributes approximately 33% on Rwanda's GDP, employing 72 % of the labor force and 25% of all export (RAB, 2018). The most priority fruits in the country considering the estimated production volume are avocado, Banana, Mango and Passion fruits and there are also other fruits like, Tamarillo, lemon, orange, and papaya scattered in main food crop that are produced by smallholder farm (NAEB, 2014). The available avocado varieties are Fuerte, Hass, and others like Ettinger, Puebla, Reed, Nabal, Pinkerton, Bacon, and Simmonds are grown for domestic consumption (Anon., 2019).

Avocado is native evergreen fruits from Mesoamerica and grown in the tropical and subtropical region around the world. It is known as *Persea Americana*, which belongs to the family Lauraceae. It can continue ripening after being harvested and produce ethylene during respiration (Nair & Chandran, 2018). Consumer demand continues to grow at a considerable rate due to its large and nutritious value including a group of antioxidants and cholesterol reduction (Calderón-Vázquez, et al., 2013).

Global demand for Fuerte and Hass avocado varieties is increasing in the developed market (EU, USA, and the Middle East), due to its taste and nutritional value. Moreover, Rwanda production volume is low because of poor quality fruit, High number of local varieties, poor harvesting method, limited producers' capacity to add value, weakness of marketing institution that consider farmers' interest and rights over their marketable produce and sometimes domestic consumption mindset of local smallholder farmers influences (Muhaise, 2016).

The world top ten avocado producing countries, according to Food and Agriculture Organisation statistics (2019), Mexico is the first producer with 2.03 metric tons, and the last among ten is the United States of America with 1.33metric tons as shown in figure 1.

Figure 1. World Top ten avocado producing countries



Source: Adapted from (FAOSTAT, 2019)

Avocado fruits value chain can make a considerable direct contribution to poverty reduction by providing employment, nutritious food and complement with other householders businesses that generate revenues to local small-scale farmers if actors in the chain work together for value chain development from fruit production, Processing, and Marketing (Faris, 2016).

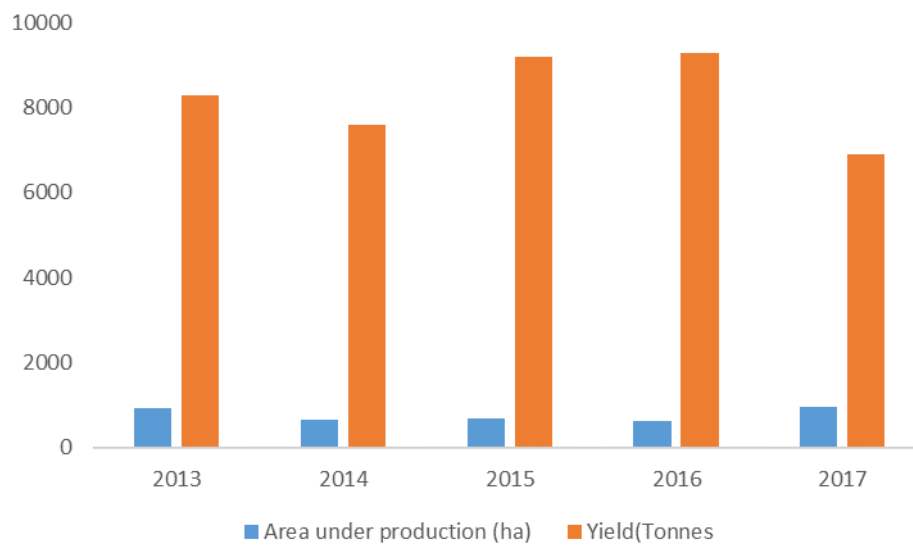
In Rwanda, avocado fruit is grown by over 500,000 smallholder farmers (Ggombe & Newfarmer, 2017). The government priority is to shift from subsistence to commercial agriculture and to increase and diversify quantity and value of exports. Rwanda 's trade policy and export strategy identify the horticulture industry as a way to boost and diversify exports. By 2018, the horticulture industry was expected to fetch more than US\$ 129 million per year. It is in this optical that forecasts of export 20, 000 metric tons in the upcoming years, prompted the distribution of different export grade of avocado seedling and educating smallholder's farmer on its economic and nutritional value (Monitor group, 2012).

Rwanda's national horticultural policy is consistent with the relationship between the public and private sector institutions, thus the last is encouraged to invest in agriculture (processing, packaging, and export of exotic fruits including avocado, passion fruits (FAO, 2016). However, public investment in basic infrastructure facilities, research, extension, and market development will continue to be important (NAEB, 2014).

Despite the distinct favorable growing condition of Rwanda including year-round rainfall exceeding 1000mm per annum, average humidity of 75% and temperature of 22 degrees' Celsius makes the country compete for avocado cultivation and potential for export. Rwanda may not be the biggest exporter of the fruit in the Great Lakes Region, due unavailability of quality seedlings to the farmers, lack of concerted government support, poor coordination, and limited access to market, lack of reliable data on individual fruits.

The avocados production for five years is indicated in figure2, where the production decreased by by34.5% in 2017 compared to the production in 2016

Figure 2: Avocado Production in Rwanda



Source: Adapted from (FAOSTAT, 2019)

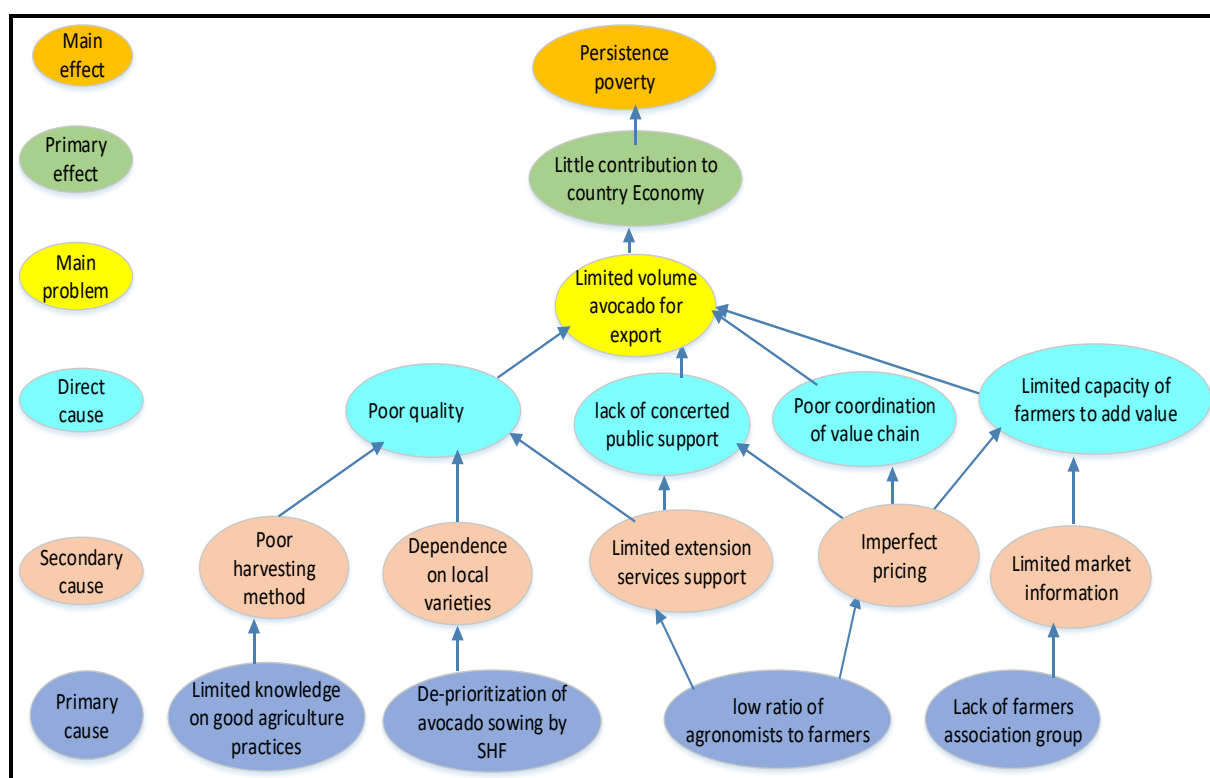
However, Gisagara district as one of the six districts in the country which has a suitable growing condition for avocado production. The avocado is scattered in other crops and the production is characterized by small scale farmers with less bargaining power in price determination, imperfect pricing system of local traders and poor quality grade for an export market is the most hindering issue in the district (NISR, 2011).

1.2 Problem statement

The main identified problem is a limited quantity of avocado for the export market affected by poor quality grade, undeveloped avocado value chain and the lack of coordination among avocado stakeholders, small plantation size, limited knowledge on agronomic practices. Therefore, low contribution to poverty reduction, and affect district and country economic in general (Monitor group, 2012) as indicated below in figure3.

The following causal diagram illustrates the main problems in avocado value chain in SAVE sector, Gisagara district. Red color indicates Effect, dark red primary effect, Yellow main problem, light blue direct causes, grey secondary causes, and dark blue Primary causes

Figure 3:Gisagara district avocado causal diagram



Source: author,2019

1.3 Problem owner

Gisagara producing district of Southern Province of Rwanda and National Agriculture Export Board(NAEB).

1.4 Research objective

The objective of this research is to improve the avocado value chain export market in order to stimulate local development in Gisagara district, SAVE sector/ Southern Province and NAEB.

1.5 Main and sub-research questions

1. What is the market structure of avocado value chain in Rwanda?

- What is the current avocado value chain in Gisagara district?
- What is the governance in the avocado value chain?
- What are the opportunities and constraints in the avocado value chain?

2. What strategies are there to scale up the supply of quality avocado to the export market?

- What is the farmer's perception of avocado production for export?
- What are the requirements for the niche export market?
- What are the factors affecting the profitability of sales to the export market?
- What are the sustainable standards that enable access to the export market?

1.6 Definition of terms

Avocado

Avocado is a tropical evergreen climacteric fruit scientifically known as *Persea Americana*, which belongs to the family Lauraceae (Nair & Chandran, 2018). According to (Biazin, et al., 2018) avocado is native to Mexico. In respect of its nutritional quality and economic importance, avocado has been disseminated to the rest of the world since the last 400 years.

Value chain

A value chain is a sequence of target-oriented groupings of production factors that create a marketable product or service from its beginning to the final consumption. This includes activities such as design, production, marketing, distribution, and support services up to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms, as well as within a single geographical location or spread over wider areas (Herr, 2007). The model of value chain involves organization and coordination, the strategies and the power relationship of the different actors in the chain (Berg, et al., 2008).

CHAPTER TWO: RESEARCH DESIGN

2.1 Justification of the study area

Gisagara district was selected as the research study area because of being the first district among six (Huye, Nyagatare, Nyanza, Muhanga, Musanze, and Gicumbi) which have potential for avocado production, accessible road facilities, closer to the agriculture research station and this was the first research done on avocado value chain in this area. My research is useful to NAEB and Gisagara district because through recommendation and suggestion from the research there will be improvement in the production of quality and quantity avocado which will lead to reduce poverty among smallholder farmers and stimulate local development by creating job opportunities, attracting investors for processing plant. Not only production of quality avocado but also will enhance relation and coordination among chain actors then create mutual benefit.

In addition, the study will trace out all opportunities and challenges faced by smallholder's farmers and allow policymaker commissioner to plan accordingly.

2.2 Description of the study area

Gisagara District is one of the 8 Districts of the southern province. It comprises of 13 sectors which are Gikonko, Gishubi, Kansi, Kibilizi, Kigembe, Mamba, Muganza, Mugombwa, Mukindo, Musha, Ndora, Nyanza and Save. These sectors are divided into 59 Cells and 524 villages. The District covers a surface area of 679 km². The total population in 2012 was 322,803. The population density is 475 people/ km² which is 14% higher than the national average of 416 people/ km². The data indicates that the majority of the population is young with 53% aged less than 19 years and 81% under 40 years; people aged 65 and above is 2%. Females are 52% in the district (MINAGRI, 2015).

The study area is indicated under the map of Rwanda below in figure 5.

Figure 4: Rwanda Map with highlighted study area



Source: (Yusuf, 2008)

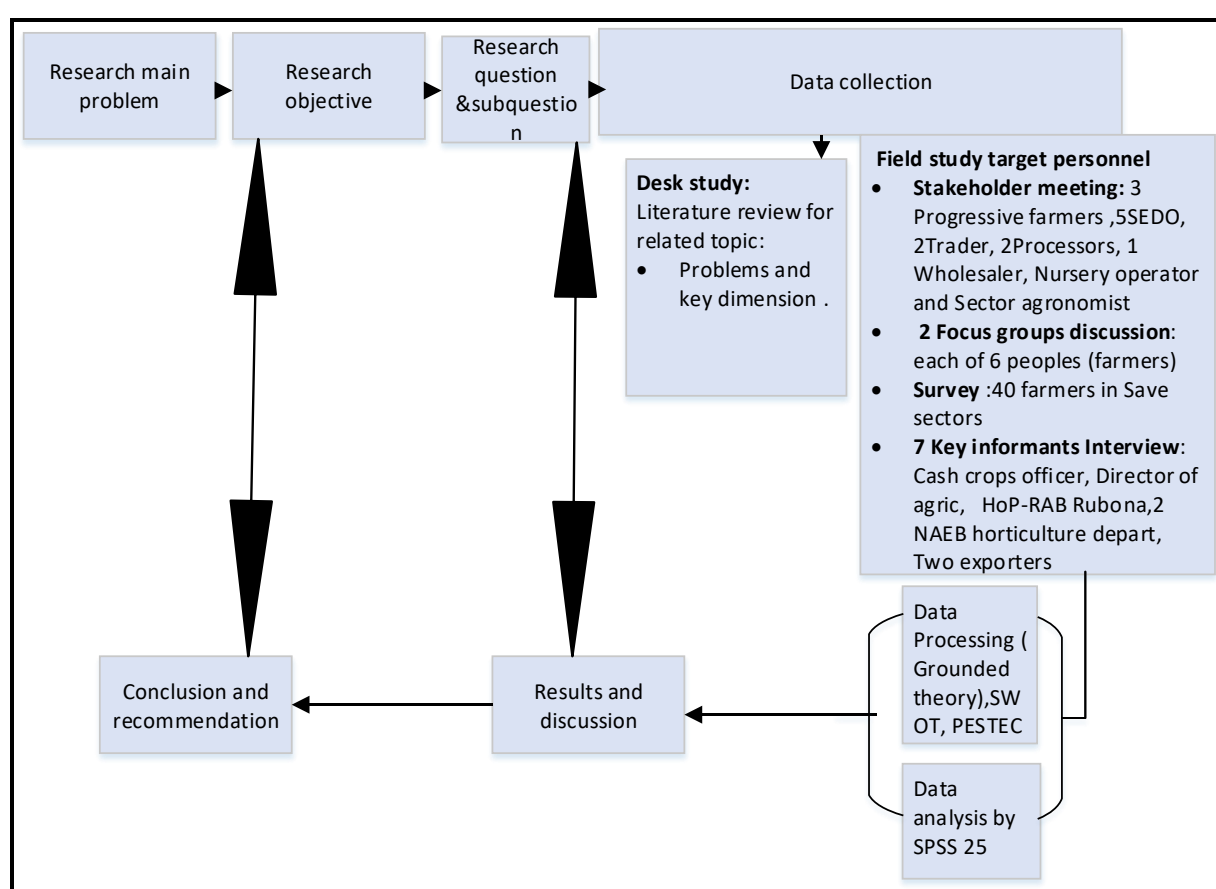
2.3 Research strategy

This research collected both qualitative and quantitative data through desk and field research. Small smallholder farmers were the major target group for the survey study. Key informants from Public and private institutions (HoP RAB, District cash Crop, Director of agriculture, 2 NAEB officer, and Exporters), were consulted and interviewed at the time of research.

2.3.1 Research framework

This figure illustrates the roadmap of the research from problem definition to final conclusion and recommendation. Desk research was used for literature review on the already known on the avocado value chain and Field research, primary data was collected from different stakeholder respondents.

Figure 5: Research design roadmap



Source: adapted from Verschuur, 2019

2.3.1.1 Desk research

This type of strategy was used to find out literature on secondary data and relevant information through a review of different scientific research, Journals, books, a report from government institutions and the online search engine(Greeni), was consulted for information gathering.

2.3.1.2 Field research

Primary data was collected from different people using participatory rapid appraisal tools like Stakeholder meeting, Focus group discussions, Surveys and Interview with Key informants as are detailed below.

2.3.1.2.1 Stakeholder meeting

This meeting was considered as starting point for my research, where fifteen (15) people who live and have close relations with avocado farmers were purposively selected (5 Socio-economic development Officers at cell level, 3 farmers, 2 Traders, 2 processors, and one wholesaler, Save Sector Executive Secretary, and 1 representative of nursery operators to get a clear picture of the current avocado value chain, stakeholders involved and their power relation.

Photo 1: Stakeholder meeting photo



Source: stakeholder meeting. Photos were taken by the author, July 2019

2.3.1.2.2 Focus Group discussion

Two (2) focus groups discussion were organized for two categories, one of the farmers who grew avocado started selling it to distance from homestead, second FGD was of Collectors who had experience in dealing with local farmers and act as a lead firm, the selection was statistically random sampling from 105 total populations. Each was of 6 peoples to discuss opportunities and constraints in the avocado value chain and value share among chain actors. The information which was missed in the interviews, the compliments were gotten from FGD, both women and men were invited. The checklist was used to guide the discussions. Bellow picture depicted the discussion in two focus groups discussion.

Photo 2: FGD with avocado producers Gisagara district



Source: Taken by the author, July 2019

2.3.1.2.3 Survey

Random sampling, of forty (40) smallholder avocado producers but for those who have more than ten trees grow local varieties in SAVE sector Gisagara district from hundred twenty (120) avocado farmers and were surveyed using semi-structured question.

Photo 3: Survey picture with avocado producers



Source: Survey. Photos were taken by the author, August 2019

2.3.1.2.4 Key Informants Interview

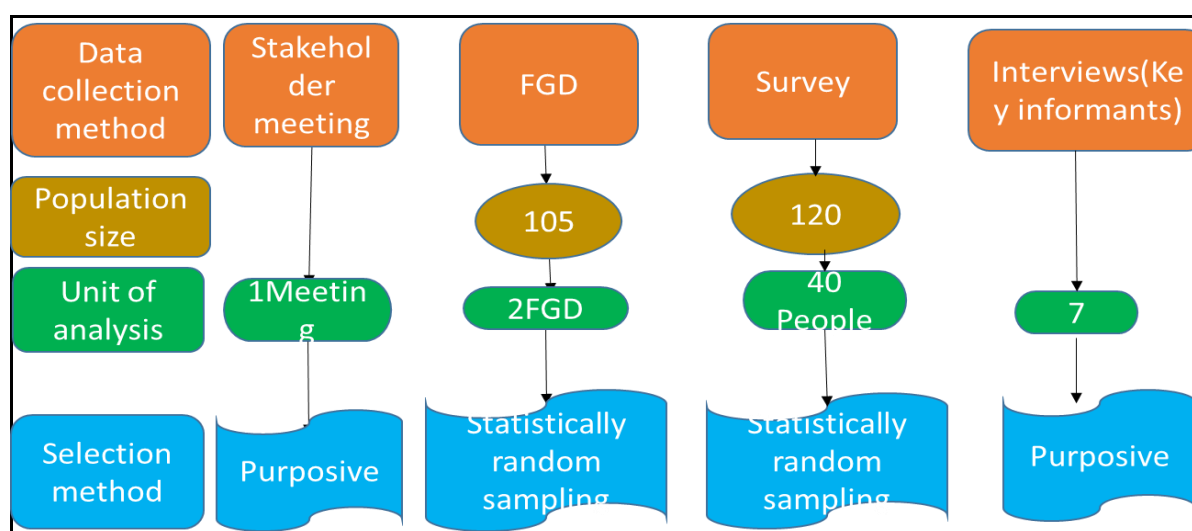
- **Seven (7)** Key Informants selected purposively to answer the sub-question on what are the quality and quantity required for the export market? What are the opportunities and constraints in the avocado value chain? What are the sustainable standards that enable access to niche export market? The following people were interviewed:
- One person from Rubona research institution who is in charge of fruit multiplication,
- One person from the National Agriculture Export board who is in charge of export commodity,
- Director of agriculture at Gisagara district who is dealing with farmer's day per day, and Cash crop at the district level
- Two Exporters of avocado (Nature cloud Fresh Produce Ltd, and Excella produce Ltd) to the external market who dealt with producers were interviewed using the Interview guide.
- One people from the Middlemen who is collecting from Producers,

Systematic field observation using a checklist with indicators during the survey was undertaken for cross-checking type of variety in place, estimated area.

2.4 Sample size and sampling strategy

Figure 6 indicated how respondents were selected some have been selected purposively and others using statistical random sampling.

Figure 6: Respondents selection for research in Gisagara District



Source: Author, 2019

This table1 indicate, dimensions related to concept framework respondents, data collection methods, results, and data analysis methods.

Table 1: summarised of research results from respondents in Gisagara district

| Dimensions | Targeted respondents | Methods or tools of data collection | Expected results from respondents | Data analysis |
|--------------------------------------|---|---|--|--|
| Value chain | Nursery operator Farmers, Collectors, wholesaler, retailers, NAEB, RAB | Stakeholder meeting use of meeting guide | <ul style="list-style-type: none"> • Characteristic of respondents • Value chain map • List of stakeholders and their role • Opportunities and constraints | A grounded theory for qualitative data |
| Governance | Farmers, RAB, NAEB, and Director of Agriculture | Interview with checklist | <ul style="list-style-type: none"> • Chain coordination • Governance structures • Chain relation | A grounded theory for qualitative data |
| Opportunities and Constraints | Farmers, ES Save, RAB Rubona officer | FGDs, and interview | <ul style="list-style-type: none"> • improved variety, • infrastructure, • Access to market and loan • Supporting services in place (extension services) | A grounded theory for qualitative data, SWOT and PESTE |
| Farmers' perception | Farmers, | Survey with semi-structured | <ul style="list-style-type: none"> • Knowledge of Markets • Awareness of export varieties • Support toward the transition from local to export varieties | Descriptive statistics Grounded theory after transcription |
| Export market requirements | Key Informants (RAB, NAEB, Exporters) | checklist | <ul style="list-style-type: none"> • size, color, shapes • Sanitary & Phytosanitary related issues | A grounded theory for qualitative data |
| Profitability factors | Farmers & stakeholders | Checklist | <ul style="list-style-type: none"> • Volume • Shares among actors • Consistency supply • Producer groups | Excel and grounded theory for qualitative data |
| Sustainable standards | Key Informants | Checklist | <ul style="list-style-type: none"> • Voluntary and compulsory standards(GAP, FSC, Organic) | Descriptive statistics and A grounded theory for qualitative data |

Source: Author, 2019

2.5 Data analysis

After qualitative and quantitative data being collected from the field and from different sources, qualitative data were analyzed using grounded theory through which collected data was processed under organizing data into fragments, checking for relevant data and finally coding. Then, Value chain Map, SWOT, and PESTEC were used to present and summarise the outcome from grounded theory. Quantitative data collected from survey questionnaires were summarized and analyzed using Statistical Package for Social Sciences (SPSS 25). Descriptive statistics, for data presentation in cross-tabulation, frequency table, graphic, and charts were generated for results discussion and helped to draw conclusion and recommendations.

Table 2: Numbers of people responded and analysis tools

| Approaches | # of respondents | Outcome | Tools for analysis |
|-------------------------------|------------------|---|------------------------------|
| Stakeholders meeting | 15 | <ul style="list-style-type: none">• Value chain Map,• List of stakeholders and roles• Opportunities and Constraints | SWOT, PESTEC, and literature |
| Survey | 40 | <ul style="list-style-type: none">• Quantitative for closed questions• Qualitative data for open questions | SPSS and Grounded theory |
| FGD | 2 | Qualitative data | Grounded theory |
| Interview with Key Informants | 7 | Qualitative data | Grounded theory |

Source: Authors, 2019

2.6 Limitation of the study

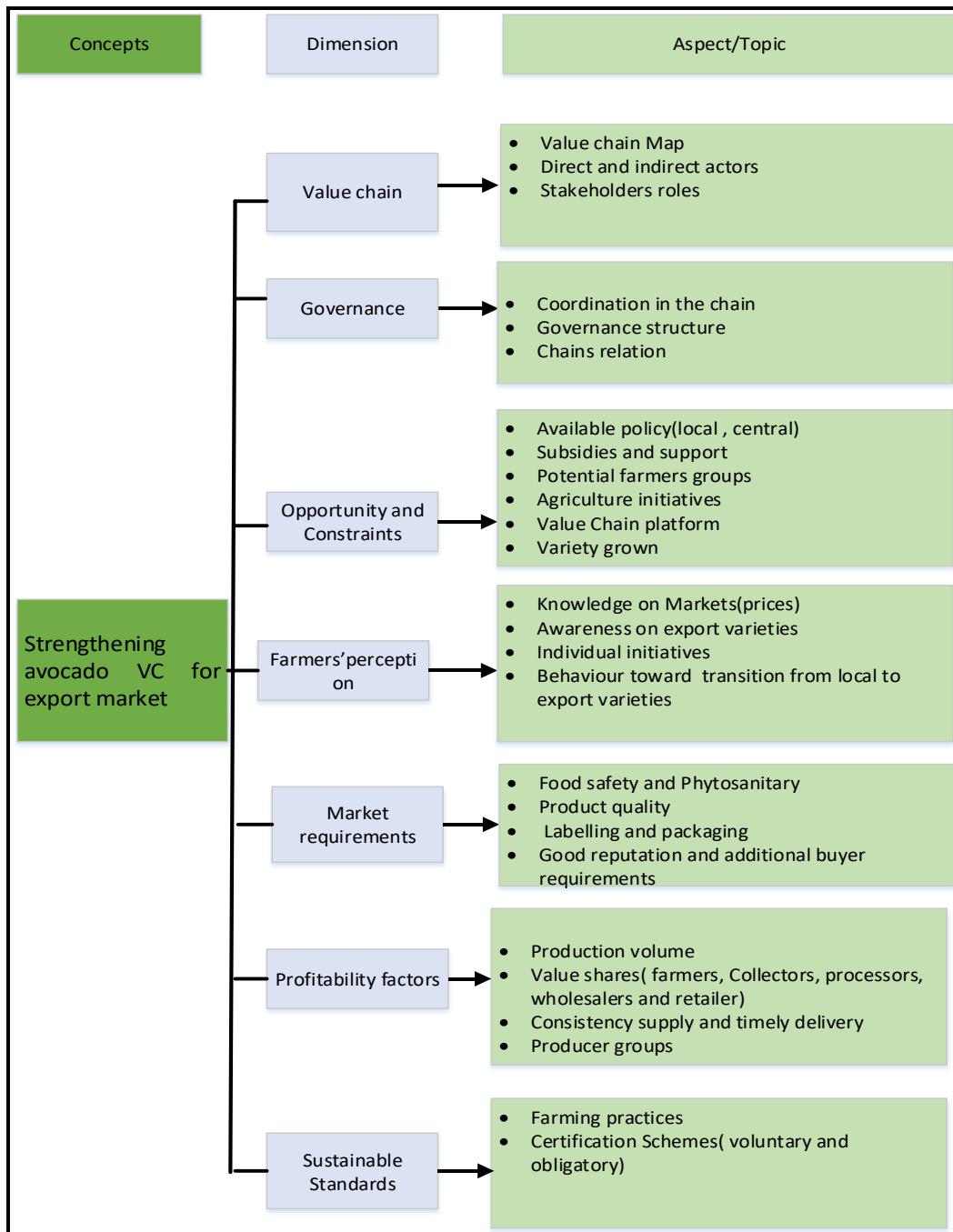
This limitation of the study was unavailability of reliable data on Production volumes. As the research on avocado in the study area is new, many expectations from respondents can sometimes lead to biases of answers. Local administration hesitated to give accurate data. People who wanted money before any discussion that can delay the interviews especially with key Informants, it requires to call their chief for confirmation. Limited money to Cover all respondents allowance based on their allowances policies for government employees.

CHAPTER THREE: LITERATURE REVIEW

3.1 Conceptual framework

This conceptual framework describes how the research problem was explored (Adom, et al., 2018). Figure 7 indicates, core concepts and dimensions which are related to research questions and sub-questions as below described.

Figure 7: Research Concept framework



Source: adapted from Verschuur, 2019

3.2 Literature review

This part of the literature review explains the core concepts and their related dimensions which was used to guide the study. A brief description of avocado and horticulture in Rwanda, value chain concept, opportunities and constraints in the avocado value chain, market requirements, farmer's perception, profitability factors and sustainable standard to afford niche market.

3.2.1 Horticulture in Rwanda

Rwanda's climate and soils are highly suitable for horticultural crops and flowers production because of: Abundant rainfall and natural water sources, diversified agro-climatic zones combining high, middle and low altitudes offer ideal conditions for growing a wide range of fruits, vegetable, and flowers throughout the year. However, yields obtained per hectare are well below those which could be achieved and a high proportion of production is thought to be lost after harvest or is not harvested because there is no organized market (NAEB, 2014).

Southern Province's 4 districts account roughly half of national avocado production in which Gisagara district is ranked the first in the country of being highly productive (NAEB, 2014). Rwanda agricultural transformation strategy through private investment is built on inclusive business models where horticulture is seen as critical for export growth and diversification and in which avocado takes place among the priorities (Bajiji, et al., 2016).

3.2.2 Avocado production in Rwanda

The horticulture sector in Rwanda is still emergent. Nucleus farms were seen to be a solution to achieve an export capacity of 2,400 metric tons per annum from 2018 (Monitor group, 2012). The local context, suitable climate, soil, and diversified agro-climatic zones that offer ideal condition of growing fruits the avocado yield was projected to 17.5 metric tons per hectare from nucleus centered out-growers.

For successful optimum growth, avocado requires a temperature ranging between 25 and 33°C (77–91.4°F) with moderate humidity levels. Avocado trees grown from seed can take 4–6 years to produce fruit whereas grafted plants may produce fruit within 1–2 years. The tree has a ligneous trunk that can reach up to 80 cm to 1 m in diameter in trees that are 25 to 30 years old (raceme), that can be axillaries or terminal. The flesh fruit is yellow-green in color and has the consistency of butter. Each fruit contains one large seed (Salathé & Hughes, 2013)

Fruits are frequently picked by hand using qualified labor, good working tools, hauling access to picking area, and telescopic poles fitted with a cutting blade and catch bag when reaching the physiological maturation points can contribute to good quality and increase shelf life of the avocado (Yahia, 2012). Harvesting should not be in the rainy period or when the fruit is wet, and to minimize skin damage and rotting, careful postharvest handling protocols and procedures are crucial for their control (Yahia, 2018). Harvesting of the fruit before reaching an optimal point can lead to deficient ripening and quality (Lidia, et al., 2004).

3.3. Market structure of avocado value chain at Gisagara district

3.3.1 Value chain concept

The value chain is defined as the full range of activities that are necessary to bring a product or service from conception, through the intermediary phases of production, delivery to final consumers, and final disposal after use (Saarelainen & Sievers, 2011). This includes activities such as design, production, marketing, distribution, and support services up to the final consumer (and often beyond, when recycling processes are taken into account) (Saarelainen & Sievers, 2011). A value chain can be the fact that value is added to the initial product through the combination with other resources (like tools, manpower, knowledge, and skills) (Herr, 2007).

value chain analysis is a useful approach to explore the role that value chains can play in achieving specific policy objectives, such as poverty alleviation, sustained growth and inequality reduction (Bellù, 2013). Therefore, long-term competitiveness is possible when all stakeholders in the chain are coordinated and to achieve such competitiveness by operating as an individual business within a fragmented value chain seems to be difficult, or even impossible (Canadian Agri-Food Policy Institute, 2012).

Involvement in global value chain (GVCs) requires a high level of coordination and co-operation across industry stakeholders in the public, private, and even non-profit organization in order to ensure that interests are aligned, skill and knowledge gaps are closed, and essential constraints are addressed (OECD; WTO ; World Bank Group, 2014).

3.3.2 Governance in the avocado value chain

According to Martin Dietz (2017), governance is defined as a capability to exert control along the chain for a particular purpose. Where firms or organisation can set parameters to what to producer, how is to be produced and how much? Governance is a crucial mechanism for performance and achieving a competitive advantage in a high demand market.

3.3.2.1 Coordination in the chain

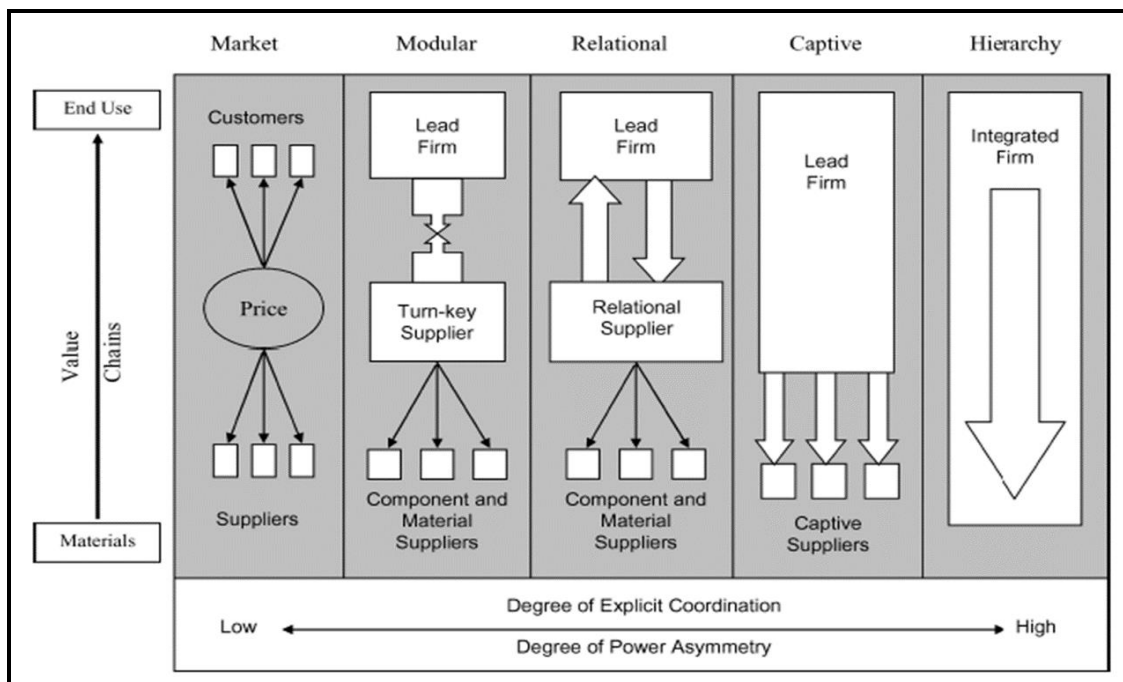
The coordination in the chain is the mechanism of enforcing effective governance and can be either Vertical or Horizontal linkage among chain actors. Vertical coordinations are those between actors' different function and horizontal coordination are those with actors who have the same market function (Dietz, 2017). As producers and traders become focused on their businesses, they also need effective coordination of their interactions. This can help to minimize losses, damage which may happen to any stage in the chain. Hence chain coordination is attained through regular communications between chain actors. (KIT & IIRR, 2008).

3.3.2.2 Governance structure

Governance structure can relate to a type of relationship that is between chain actors (Dietz, 2017) Type of relationship that value chain actors have each other and with a lead firm, defines governance system in place. The governance in avocado value chain reflects how the business activities are vertically coordinated (GTZ, 2007). The instruments in value chain governance include a contract that link chain actors, Standards for products and processes, Self-regulatory in value chains, Government regulatory frameworks, unwritten norms that determine who can participate in the chain as well as expectations from the public and management of producer organization. According to Dietz (2017), governance structure or systems are of five types such as:

- **Market Governance:** characterized by minimal information exchange, limited product specification and producer produce with little input from the buyer. The governance mechanism is price;
- **Modular Governance:** Suppliers making products or service according to buyers' specifications. The governance mechanism is command and control by LEAD firm;
- **Relational Governance:** dependencies are regulated through reputation, social and proximity. governance mechanism is informal rules or shared norms;
- **Captive governance:** constitutes small suppliers who are dependent on large buyers. Governance mechanism is a contract;
- **Hierarchy governance:** Is characterized by vertical integration-transaction taking place inside a single firm. Governance mechanism is command and control. Figure8 detailed system of governance.

Figure 8: Typology of Governance structure in the value chain



Source: Dietz (2017)

3.3.2.3 Chain Relation

Chain relation is about the organization, trust, open communication and collaboration for mutual development between two or more actors in the chain (KIT & IIRR, 2008). Reduction of transaction cost and other dangers that hinder chain development is a result of strong chain relation. It is characterized by a formal contract where actors make agreement on quality and quantity to produce, delivery frequency and payments methods that enhance business cooperation (KIT & IIRR, 2008).

The business relationships among the various actors in the chain are defined as chain relation. KIT and IIR (2008), indicate that all stakeholders in the value chain may benefit more if supplier and traders accept to improve their relationship. Same authors showed how it can be achieved like: creating mutual understanding through respect for roles and needs of other chain actors; specializing in every actor's roles to deliver better products and services in order to strengthen the value chain; development of chain partnerships through a shared vision to improve the performance of their businesses. To ensure avocado value chain is developed in Gisagara district/Save sector and integration of small scale producers, the prioritization of chain actors mainly producers and traders platform, to share common interest and joint activities planning should be a starting point.

3.3.3 Opportunities and Constraints in the avocado value chain

- **Opportunities**

- Production systems today are very complex, with multifaceted international sourcing networks and fast-evolving, technology-enabled business models that increasingly allow cross-border economic activity to grow (Cusolito, et al., 2016).
- Traditional tropical export crops like (coffee, cocoa, and Tea), started to lose importance. This increase of high-value agricultural markets has been complemented by large and rapid structural changes in west Africa due to the increase of non-traditional agriculture products in (fruits, vegetables, milk). These changes have important consequences for farmers around the world, who may or may not benefit from being integrated into these high-value supply chains (Swinnen, et al., 2013).
- Trusted exporting companies which stimulate mutual benefit linkage and taking advantage to build a strong relationship for value chain growth (Webber & Labaste, 2010),
- Access to knowledge and technology by learning from and networking with other value chain actors in an integrated production process can influence the success and growth of value chain (Cusolito, et al., 2016).
- The important factor that can influence the integration of countries into value chains is high-quality transportation (WTO, 2013).

- **Constraints**

As long as the information transfer is needed between domestic production and sustainable consumption gap still exists (Shao, et al., 2017). Therefore public-private organizations take responsibility to make adequate information related to a product available to producers and end consumers (Shao, et al., 2017). To sustain a chain there is a need to set out a mechanism for value addition, governance, and networking both vertically and horizontally among chain actors (Trienekens, 2011).

The major constraints that producers in developing countries that limit value chain development are; market access restrictions, weak infrastructures, lack of resources, lack of an enabling environment offering institutional, unavailability of resources and inefficient and ineffective coordination and current cooperatives they are no providing support in terms of production technics, marketing, sorting and grading for in value chains (Trienekens, 2011).

Delay in product delivery has created extensive competition in the market place and forced companies or producing farmer's organization to re-join more quickly to customer needs through quick product development and shortening delivery time (Simatupang & Sridharan, 2002). Smallholder farmer's investment depends on savings from their low incomes, which limits opportunities for expansion of their agriculture activities (Salami, et al., 2010).

3.4. Strategies to scale up the supply of quality avocado for export

3.4.1 Export market requirement for avocado

- **Food safety and phytosanitary**

Requirement related to food safety and phytosanitary standards when exporting to highly demanding markets in North America and Europe should pass to Minimum residue level related to pesticide use (MRL) and checked and certified for phytosanitary by a competent authority or supplying countries have agreement with the destination country (Coronado, et al., 2015). Avocados should at least be: intact clean and free from pests, free from damage, free of abnormal external moisture, have a stalk no longer than 10 mm in length, be in a condition to withstand transport and handling Size and packaging

- **Product quality**

Numerous commercial quality distinction systems for perishable products are based on extrinsic attributes of the product, for instance: shape, color, size, weight, and blemishes. For avocado fruit, external color is not a maturity index, and its smell is too weak and appears later in its maturity stage.

Harvesting mature fruit is crucial to ensure that fruit has an acceptable eating quality and will ripen effectively. The postharvest quality and shelf life of avocado are influenced by many factors for example temperature which increases during the respiration process that occurs in ripening and avocado produce ethylene (Wright, et al., 2013)

Avocado oil content and dry matter determine eating quality, and increases as the fruit develop to maturity (Cañete, et al., 2018)

According to UNECE (2017) standards, dry matter content for Hass varieties should not go below 21% and Fuerte 20%. But avocado product standards may differ per country and per variety. For the Hass variety, Europe often prefers a dry matter content of 23%.

According to CBI (2017), quality is classified into three classes: Extra Class, Class I, Class II, hence avocado in extra class is of superior quality. This class must be free from defects, with minor superficial defects, that do not affect the appearance, quality, and the keeping quality. The avocado in the class I must be of good quality. The tolerable defects are those which do not affect the general appearance of the fruits like a slight defect in shape, in coloring. Avocado in class II, are those do not qualify for inclusion in higher class but satisfy the minimum requirements that do not affect its essential features related to quality (UNECE, 2017).

Size Codes for fresh avocados are classified according to 1 to 30, with a minimum weight of 123 grams (or for Hass 80 grams). In Europe, the preferred sizes for Hass avocados range between size code 16 and 20 (for the Fuerte variety 14 to 16) (CBI, 2017).

- **Labelling and Packaging**

Environmental factors have an influence on fruit shape where fruit grown in cooler environments tend to be more rounded as compared to fruit grown in warmer conditions which tend to be more elongate

(Arpaia, 2013). Avocado shelf life can also be affected by packaging materials at the end of the ripening period in case actors use carton with a poly sheet (Nardos & Wakgari, 2016).

Packaging requirements differ between customers and market segments. They must at least be packed in new, clean and quality packaging to prevent damage and protect the product properly (CBI, 2017)

- **Good reputation/long-term interest and additional buyer requirements**

Eliminating irregularities and supplying what the consumer anticipates is a key factor for retaining and intensifying both domestic and international markets (CBI, 2017)

3.4.2 Factors affecting the profitability from sales to the export market for chain actors

- **Production volume**

Production of enough volume required to market, fulfilling consumer's quality requirements has been identified to be a strategic alternative that can create sustainable profit for stakeholders and can lead to competitive advantage if variety diversification, increase plantation of exotic breeding varieties, access to resources including loans are ensured by all chain actors (Martínez, et al., 2014)

- **Value share distribution among chain actors**

The analysis of cost and margin in the avocado value chain can indicate that the business is a good source of income for smallholders or affordable to each actor in the chain. Financial trends in the chain ensure the potential growth in the future both economic and pro-poor growth. The economic growth effects positively all actors' incomes in the chain while pro-poor growth generates greater improvement in income and wealth for the smallholder (DFID, 2008).

Farmers' profit margin influence business profitability, which is calculated by dividing profit with operating revenue. The net profit margin indicates how much net income a business farmer makes with total sales achieved. A higher net profit margin means that a business is efficient at converting sales into actual profit (Wilkinson, 2013)

- **Consistency supply and timely delivery**

A study conducted among avocado large scale farmers in Mexico, on transaction cost and supply chain management practices confirmed that they are three solutions in the supply chain for obtaining reliable quality which is source of profit, you need to take into account: Product standardisation, supply partnership, and Information exchanges if you want to enhance Quality, (Coronado, et al., 2015)

- **Producer Groups**

Producer organisation can play a key role in facilitating value chain linkage and success in upgrading production, adding value to the product, negotiating export contact and fair price for its members (Shepherd, 2016). To reduce transaction cost and increase profitability in the supply chain, producer group can be a solution for sharing cost and aggregate sale for input purchase and getting technical assistance and access to loan and increase their bargaining power than an individual (Wiggins & Keats, 2013).

Producer group cooperation can provide many benefits, like overcoming the limitation of scale, reduce production and marketing cost, and achieve the necessary minimum quantity of production. To ensure cooperation is profitable, the cost of investment and cooperation have to be less than benefit (Springer-Heinze, 2017).

3.4.3 Sustainable standard in the avocado value chain

To ensure good management and conservation of the natural resources and the orientation of technological and institutional change in the attaining and continuing satisfaction of human needs for present and future generations sustainable standards are required (FAO, 2014). There are two main as detailed below:

- **Public regulation**

To increase market attractiveness, Public regulations as well as private corporate food standards, while targeting highly export market these standard are compulsory and have been risen sharply in the last decade. Fresh food exports to the EU, have to meet numbers of harsh public rules, including marketing standards, labelling requirements, regulations concerning contamination in food, general hygiene rules, and traceability requirements. Rwanda Standards Bureau (RBS) has been created and tasked to audit for compliance of horticulture commodities and other products that reach maximum global certification standard, (Monitor group, 2012).

- **Voluntary standards**

Not only public requirements but also big food companies have established their own standards that meet their client's requirements which are not legally obligatory. Due to their role and having a large share in the international agro-food trade, meeting these standards that most of it concerns with perishable products that are consumed fresh and more disposed to food safety risks and quality concerns by end consumers is becoming de facto mandatory for example (FSC, Global GAP) (Swinnen, et al., 2013).

Sustainable improvement of the avocado value chain by voluntary standards like labelling and certification are becoming more compulsory in global Agri-food chains, in this case third party- assess and compare, norms, against standards relating to environmental, social, ethical and food safety issues, adopted by farmers groups to demonstrate the performance of their products (Wagemakers, 1996)

Despite government initiative of having RBS for quality standard and good condition for avocado farming, a number of concerns of the cost of accessing to these private certification schemes hinder farmers to develop technical skills that allow them to become certified (Carey & Guttenstein, 2008). The local food supply chains of individual countries should be integrated into a smoothly operating global food supply system by investing in agriculture especially in a developing country. This multinational collaboration north to south by considering price signals and rules can contribute to stable global agriculture market for future food needs and enable access to sustainable scheme (Sjauw-Koen-Fa, 2010).

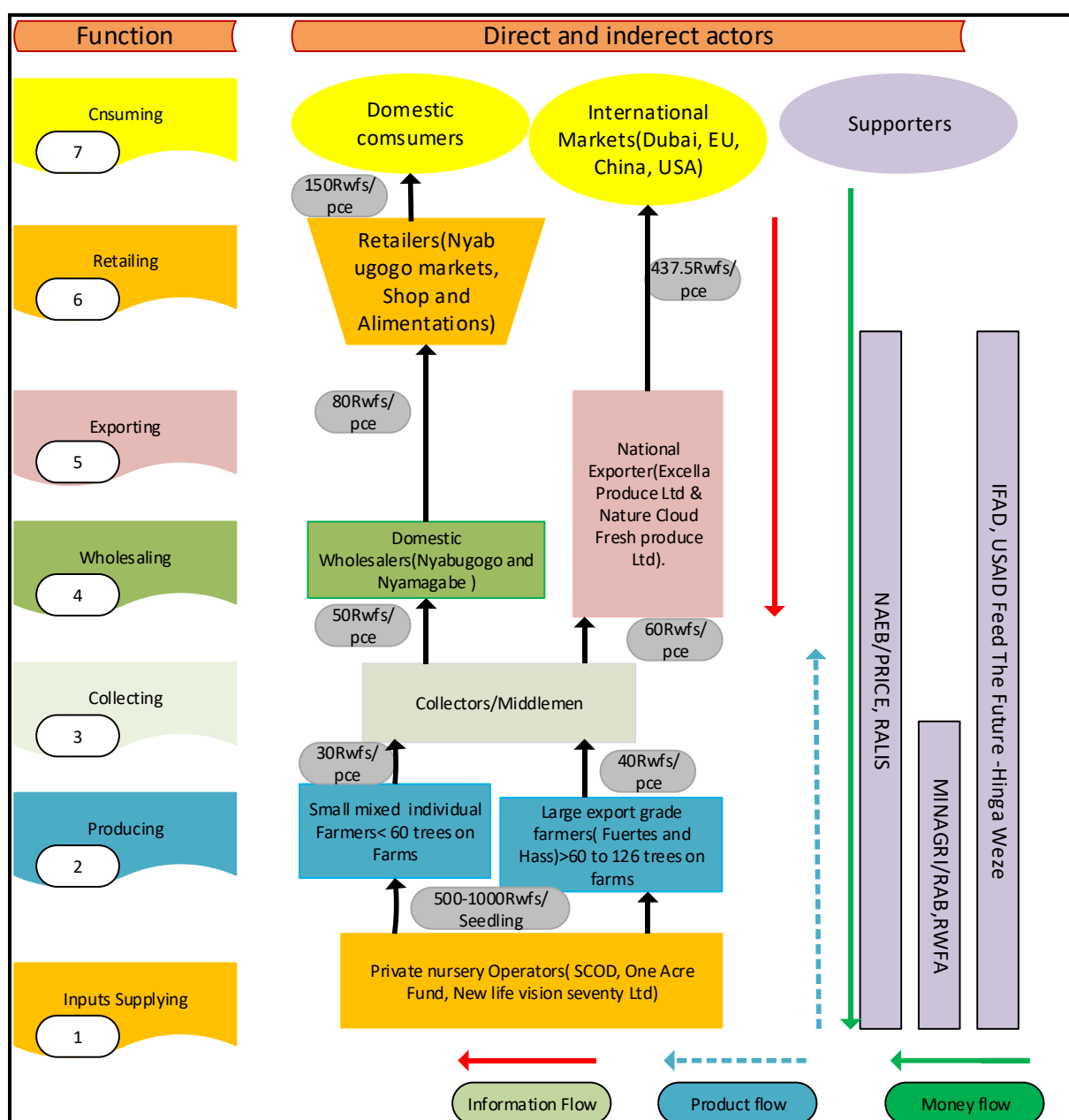
CHAPTER IV: RESEARCH FINDINGS

4.1. The market structure of avocado value chain in Gisagara district

4.1.1 The current avocado value chain at Gisagara district

The research found that current avocado value chain in Gisagara district is not well developed and stakeholders are poorly coordinated. Stakeholders the communication and coordination still need to be improved. Figure 9 indicates the identified stakeholders in avocado value chain. The challenges were identified at production level and exporting level.

Figure 9: Current avocado value Chain Map in Gisagara District



Source: FGD, Stakeholder meeting and Interviews

A) Direct actors

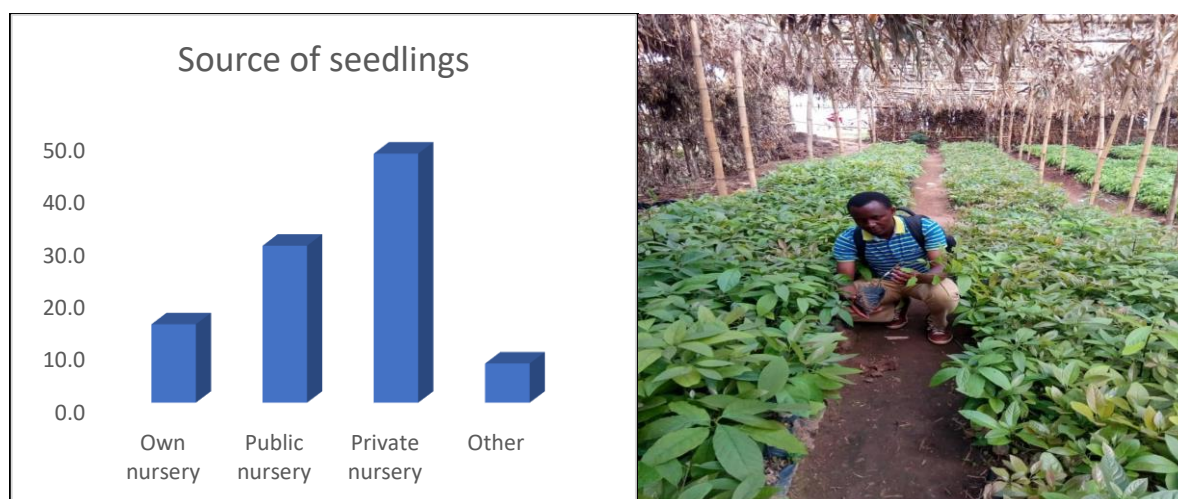
The identified 7 direct actors in the current avocado value chain are going to be described in details below

1. Input supplier.

According to research findings, the identified inputs suppliers are Private nursery operators (New life vision seventy Ltd, SCOD), NAEB/PRICE, RAB, and One AcreFund. Government agencies and Non-governmental organisation results show that perform more than one activities in the chain including inputs supplying, supporting and enablers services functions.

Figure 10 indicates that 47.5% of seedlings are from private nurseries and 30% of the seedlings are from public nurseries which are sponsored by project PRICE /NAEB. Finally, 7.5% of the seedlings are sourced from local markets which sometimes are diseased as highlighted by focus group discussion 1. The results show that Inputs suppliers are still constrained with limited knowledge of nursery management and lack of proper breeding materials.

Figure 10: Figures of avocado seedlings source and nursery



Source: SPSS generated by the author.

The photo was taken by the author, 2019

2. Farmers producer

The survey results indicated that 77.5% the avocado producer are small landholders of less than 0.5 ha and hold trees less than 60, while only 22.5% own land between 0.5-2ha and hold avocado trees between 60-125 (see Appendix 13).

According to the interviews we had with Head of Program from Rwanda agriculture board Rubona station, smallholders grew avocado in SAVE sectors Gisagara district not for income generation but for home consumption and windbreak and shelter for their animals. Furthermore, concerning variety the results indicated in Table 4, show that Fuerte is grown at 57.5% followed by Hass which is grown at 40% and finally other Varieties Ettinger, Puebla, Reed, Nabal) with 2.5%.

Table 3: variety grown by the farmers in Gisagara district

| | Type of Variety grown | | Valid Percent | Cumulative Percent |
|--------------|-----------------------|---------|---------------|--------------------|
| | Frequency | Percent | | |
| Valid | Hass | 16 | 40.0 | 40.0 |
| | Fuertes | 23 | 57.5 | 97.5 |
| | Other | 1 | 2.5 | 100.0 |
| | Total | 40 | 100.0 | |

Source: SPSS data generated by the author, August 2019

3. Collectors/ Middlemen in avocado business.

Collectors are considered by the producers, retailers, processors, and Exporters as a key person in the avocado value chain. Farmers depend on them to get market information and buy the entire standing tree for its own harvesting. The results indicated that 50.8% of the respondents sell their avocado to their neighbors, followed by those who sell to Middlemen consist of 45.9% while 1.6% sell their products to the exporting company.

Table 4: Selling place for avocado producers in Gisagara district

| Selling place | Percentage |
|------------------------------|------------|
| sell to neighbors | 50.8% |
| Sell to collectors/Middlemen | 45.9% |
| Sell to Company | 1.6% |
| sell to others | 1.6% |
| Total | 100.0% |

Source: SPSS data generated by the author, August 2019

Photo depicted middlemen assembling the avocado, ready to be sent to his customers

Photo 4: Middlemen assembling the avocado collected from producer in SAVE sector of Gisagara district



Source: The picture was taken by the author, 2019

The results indicated that local varieties (e.g. Ettinger) farmers are being paid based on how abundance the fruits on the tree. However, collector/middlemen received per bag of 50 kg containing 110 avocados on average of 7000Rwfs. The results also show, for export grade is being paid 1500Rwfs on daily basis, after collecting avocado from producers. The middlemen are still being constrained by lack of appropriate transport means. Lack of stable market for available fruits and lack of processing plant for local varieties, long-distance to market, postharvest loss as indicated by results.

4. Wholesaler and Retailer.

The result indicated that domestic wholesaler purchases avocado through middlemen and sometimes buy from the farm gate. During and after the peak season the collectors bought standing trees and harvested for the customer in Kigali, Huye, Nyanza, Nyamagabe, and Kigali/Nyabugogo. The transport is done on bicycles from the farm and transported in the pick-up car to the wholesalers and retailers. According to the interviews, wholesaler prefers to deal with middlemen because is the one who has direct connection with good farmers who has good varieties whether local or export grade.

5. Retailers

The Retailers buys from a domestic wholesaler who purchased bags of 50kg containing avocado between 110-150pieces/bag. The selling price to the retailer is 80 Rwfs/piece. Because Retailer they waited avocado three to four days to ripen, they sell to their client at 150 Rwfs/piece.

6. Exporters (Nature cloud fresh produce Ltd, Excella Produce Ltd).

The findings indicated that avocado export for Rwanda is new, and 1.6% of fruits directly sourced from out-grower farmers in 5 districts including Gisagara, Kayanza, Gicumbi, Nyagatare, and Musanze and 56% from middlemen. The results indicated that weekly volume required per exporting company is at least 16 tonnes. Moreover, results show Fuerte variety has marketed the Middle East and the USA market while Hass variety has market in EU. Inconsistency supply is the main identified constraints among exporters.

7. Consumers

As indicated in the chain map (figure 9), they are segmented as domestic consumers (those are the one who purchase directly from in-country whether in urban shops, Restaurants, Hotels, and rural markets) these types of consumers buy both local variety and subgrade of export grade (Hass and Fuerte). According to Exporters, International consumers are Company and high supermarkets who have specific requirement of the product they want and they are located in the Middle East, EU, USA, UK).

B) Avocado stakeholder's role

The results from the stakeholder meeting proved that the stakeholders in avocado value chain are (Inputs supplier, Producers, Collectors, retailer, supporters from local administration). Their involvement in a meeting was especially important: it meant that their contribution made the subsector understandable to everyone. The outcome of this meeting was the commitment of all the participants to work together to achieve the required quantity and quality. It has been indicated that collectors buy on the spot and sell the export-grade to exporter without written agreement. This lead to switching to another buyer who offers a good price, then inconsistency supply to the niche market. The results indicated that only 1.6% of the export has direct link with the producer while 46% are not having a direct link (**see table5**), this lead to high rejection of the avocado at the park house. Figure 6, Illustrate present stakeholders in the avocado value chain from Gisagara SAVE sector.

Table 5: Stakeholder matrix in the avocado value chain and their role

| Function | Stakeholders | Their role in the avocado value chain |
|-------------------------|--|---|
| Inputs supplying | <ul style="list-style-type: none"> • NAEB, RAB • SCOD, • One Acre Fund, • New life vision seventy Ltd | <ul style="list-style-type: none"> • Provide technical support on seedling production • Provide certified planting materials(Scion) • Produce and sell seedlings both from government and non-governmental organization (World vision, Volcano gorillas and New forest company) |
| Producing | <ul style="list-style-type: none"> • Farmers | <ul style="list-style-type: none"> • Production and caring for maturity • Organic fertilizer application • Pest and disease control |
| Collecting | <ul style="list-style-type: none"> • Collector/Middlemen | <ul style="list-style-type: none"> • Provide marking information and other necessary to avocado farmers • Serve as a link between farmer and buyer • Buy a standing tree and do the harvesting • Collection and transport to the customer agreed on the meeting point |
| Wholesaling | <ul style="list-style-type: none"> • Wholesaler for domestic and export market (in Kigali, Huye and Nyamagabe and NAEB park house) | <ul style="list-style-type: none"> • Sorting and grading • Collection and transportation of avocado from middlemen • Selling the retailer and hotel |
| Exporting | <ul style="list-style-type: none"> • Nature cloud fresh produce ltd • Excella produce ltd • Nature Fresh food Ltd | <ul style="list-style-type: none"> • Collect from middlemen and transport to the park house • Sorting, grading, and washing • Precooling and Cooling to a suitable temperature • Waxing and packaging • Exporting to external clients(UK, EU, DUBAI, USA) |
| Retailing | <ul style="list-style-type: none"> • Nyabugogo market • Nyamagabe –Gasarenda Market • Huye and Nyanza market | <ul style="list-style-type: none"> • Source avocado from middlemen and wholesaler • Sell to the consumers and traveler traders |
| Consuming | <ul style="list-style-type: none"> • Large and small income consumer(Domestic, regional and international market) | <ul style="list-style-type: none"> • Influencing and driving the market trend • Set out their quality preference |

Source: stakeholders meeting, FGDs, and Interviews with actors, July 2019

C) Supporters of avocado value chain in Gisagara district SAVE sector

The results in table 7, indicated avocado farming in SAVE/ Gisagara district is supported by both public and non-governmental organizations in seedling production, distribution and providing infrastructure support facilities to exporters like cool room and park house. Table 7, indicates supporter's roles.

Table 6: Supporters' matrix and their function in avocado value chain in Gisagara District

| Stakeholders | Role in the value chain |
|--|--|
| NAEB/PRINCE | <ul style="list-style-type: none"> Regulating, promoting, coordinating, developing and facilitating operations of the horticulture subsector in Rwanda. Promote commercial farming of avocado on large scale |
| RAB | <ul style="list-style-type: none"> Provide research findings and extension services for agriculture improvement. Capacity building of local agriculture officers on orchard management including pest and disease control Monitor and follow up all avocado seedlings distributed NAEB and its stakeholders. |
| MINAGRI | <ul style="list-style-type: none"> Set policy and regulation related to agriculture crops (Post-harvest and handling practices of fruits) |
| RWFA | <ul style="list-style-type: none"> Support nursery operator for avocado production and other fruits Ensure each householder has planted at least 3-10 trees each year |
| One Acre Fund(TUBURA) | <ul style="list-style-type: none"> Production and distribution of seedlings to farmers Provide training and fertilizers to be paid back after harvest. |
| World Vision | <ul style="list-style-type: none"> Provide supporting in buying seedlings to vulnerable families and train them on good management practices |
| RALIS | <ul style="list-style-type: none"> Enhance safe trade by limiting the introduction of new pests, The coordinate function of National plant protection services and enforce regulation for phytosanitary measures necessary for trade. Issue all phytosanitary certificates for export of avocado from Rwanda. Ensure registration of fruits nurseries and test soil before avocado plantation to reduce the incidence of pest and disease spreading Train avocado producers and exporters Communicate to exporters and producer's problems encountered in the third market(interceptions). |
| USAID Feed the Future | <ul style="list-style-type: none"> Provide financial support to out-growers Train farmers and other stakeholders on business managements Provide micro-grants to young entrepreneurs |
| Local Government administration | <ul style="list-style-type: none"> Provide extension services to farmers Monitor and ensure smooth transaction between Collectors and farmers Ensure the implementation of policy and regulation with producer |

Source: Interviews with Key informants (NAEB, District staff, and Exporters) and farmers, nursery operators, August 2019.

4.1.2 Governance in the avocado value chain

4.1.2.1 Coordination in the avocado value chain

It has been revealed that in Gisagara avocado value chain there is poor coordination among the actors both direct and indirect. The results indicated that communication channel and information sharing between producer, middleman, Exporters, and NAEB is not clear. The interview with key informants from horticulture division in Rwanda National export board indicated that inconsistency supply and low-quality export has resulted from poor coordination and lack of operational avocado

platform for all stakeholders. The weak coordination has been observed at supporting levels where the results indicated duplication of effort during the time of inputs supplying (seedlings) and capacity building where results from Focus group discussion indicated that producers get support from more than one organisation.

4.1.2.2 Governance structure

The avocado was brought in Rwanda in 1934's. It is well known in the southern province especially in SAVE sectors of Gisagara district. Despite its long history in SAVE sector, results show that 65% of farmers do farming based on their understanding without any technical guidance (Training from stakeholder, subsidies) and cost of a transaction is low and there is no formal cooperation between actors. This type of governance is market structure and coordination mechanism is price.

4.1.2.3 Relation in the avocado value chain.

The results from the qualitative analysis revealed that relation in the chain is marked by distrust, weak relation among Producers, Middlemen, and exporters. Therefore, there is a strong relationship between NAEB and Exporter, where Exporters are facilitated for Park house, Cold room, and cold truck at minimum charges. Furthermore, results indicated, there is no avocado producer's organisation in place, no formal binding contract between Producers, Middlemen, and exporters where the right price of avocado is unknown which is bad for all actors and affect the entire chain.

4.1.3 The opportunities and constraints in the avocado value chain

According to PESTEC, SWOT the findings for opportunities include; Government and private stakeholder's engagement in promoting avocado production, strategic disposition of the district between secondary cities, access to national and feeder roads, Good edaphic condition and weather. The constraints are related to poor coordination even though governments and stakeholders have engaged in developing avocado subsector, the results indicated some poor agronomic practices, Lack of processing plant for value addition, limited infrastructure supports (Collection centers, cold-room, and trucks), least producers bargaining power on price and poor harvesting and handling equipment. Table 8 below present SWOT and PESTEC for Gisagara avocado value chain in details

Table 7: SWOT and PESTEC matrix in avocado value chain in Gisagara District

| | Strength | Weakness | Opportunities | Threats |
|----------------------|---|--|--|---|
| Political | Decentralized agriculture extension services The political will to support commercial growers | -Inaccessibility to improved seeds -Low awareness -Lack of platform -Limited research -Lack of processing plants -Duplication of resources and efforts by Governments agencies and NGOs | -Cooling room, trucks belong to the state -The good standing market of Rwandan avocado due to high oil contents -Plan to organize PPP in avocado | Competition with Region market |
| Economical | -Logistically, for uplifting Fresh Produce, the flight cost has been set down to \$1 per kilogram for a national airline. | -Lack of market for local varieties -Inconsistency supply -the unwillingness of the private the sector to invest in the whole value chain -Limited incentives | -Free seedlings -The growing demand for Rwandan avocado in The EU, Dubai, America, - Financial support for those with > 0.2 ha get ten million Rwandan francs, | -Thieves who steal seedlings and fruits -The price is not as clear as the one for coffee and tea -Limited capacity to add value to the subgrade |
| Social | -Labor intensive which is not expensive -The environmental condition | -Lack of a strong relationship between farmers and market players -Lack of Avocado Producer groups | -Contribute to balanced diets -Job creation among community -Historically known for avocado | |
| Technical | -Offer park house and cold truck facilities to exporters during and to the airport | -Offseason supply -Lack of organized large plantation -Lack of facilities at farm levels (collection Center, cold room) -Weak monitoring plan of distributed seedlings | -Access to the feeder road | -Most of the exported th not ready to support farne -Long-distance to market |
| Environmental | -Good climate -Favorable soil for avocado | -The land shortage that hinders the cultivation on large scale | -Year-round production | -Perishability risks |

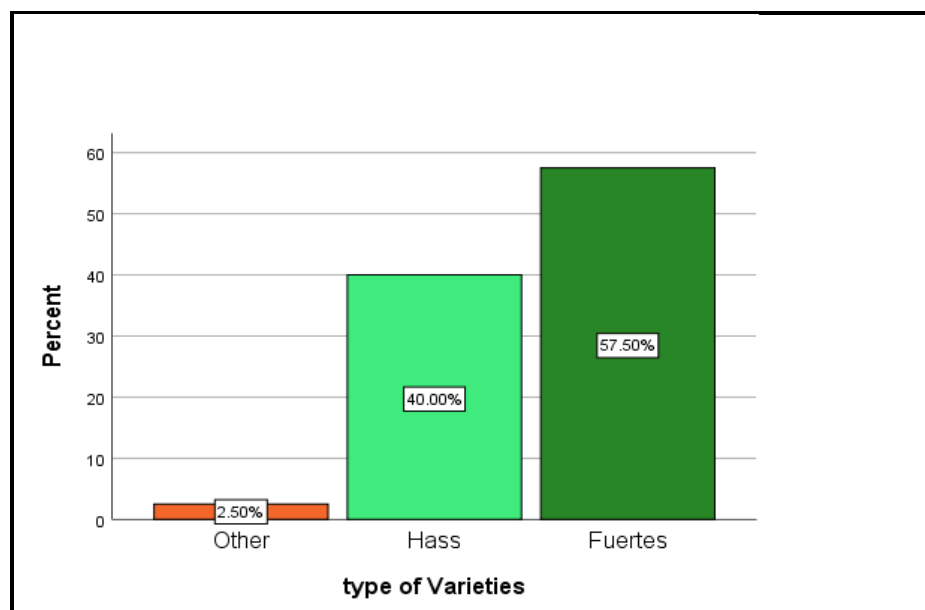
4.2 Strategies to scale up the supply of quality avocado to export market

4.2.1 Farmer's perception of avocado production for the export market

Results from interviews and focus group discussion indicated farmer perceive that:

- Demand for the improved breed (Hass and Fuertes) is increasing and market price is good compared to local varieties. 97.5% producers are willing to adopt on large plantation while 2.5% are not interested because of land shortage''.

Figure 11: Farmers preference on the type of varieties to grow in Gisagara district



Source: SPSS Survey data, 2019

- Production for improved varieties for export gives more yield (year-round production)
- Perceive that export market producer has low-value share and exporter gives the same price to improved grade (Hass and Fuerte) while local market buyers give price according to variety. Table 9 shows that 80% of export grade (Hass 32.5% and Fuerte 47.5%) has better market price. They perceived that export market requires many activities than producing for local varieties even though it's market price 20%.

Table 8: Variety which has a good market price

| Variety with better market price | | | | | |
|----------------------------------|--------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Hass | 13 | 32.5 | 32.5 | 32.5 |
| | Fuerte | 19 | 47.5 | 47.5 | 80 |
| | other | 8 | 20 | 20 | 100 |
| | Total | 40 | 100 | 100 | |

Source: generated from SPSS by author, 2019

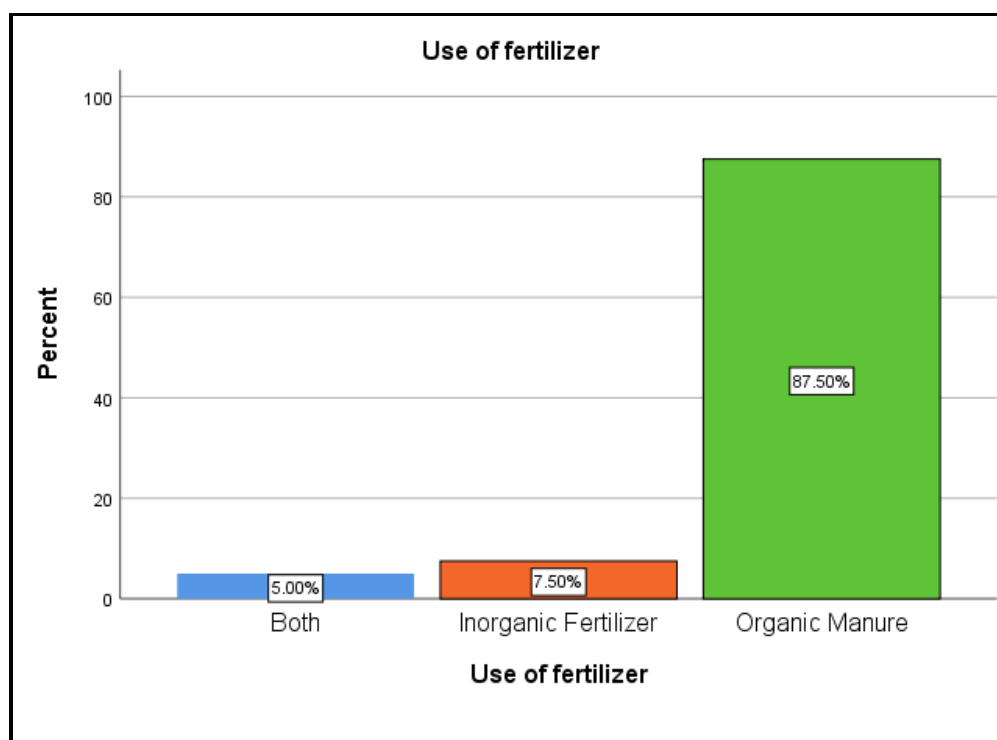
4.2.2 The requirements for the export market

The results indicated that for export market most of the obligatory requirements are almost similar to both EU, Middle East and USA for fruits and Vegetables including avocado. The identified requirements are related to Food Safety, Product quality and Social, environmental and business compliance.

4.2.2.1 Food Safety

The results in Figure 12 indicated that 87.5% of farmers are using organic manure for fertilizing their avocado tree while 7.5% use inorganic fertilizers and few of them 5% combine organic manure with fertilizer at the beginning. The results from interview also show that 100% of fresh fruits that are exported are checked by RALIS for phytosanitary parameters and being issued a certificate of a check.

Figure 12: Fertiliser use in avocado farming Gisagara district



Source: Survey, 2019

4.2.2.2 Product quality

The results from interviews indicated that marketing standards related to dry matter and maturity index are met acceptable level, where avocado from Gisagara district are sorted and graded to meet these quality specifications. However, Fuerte is packed in 4kg /boxes and of size 14-24, class I, II and Extra ready for Middle East export market. The results indicated that the European Market require Hass variety of size 12,18, 22, 28,30. Where Size 14-24 are packed in 4kg boxes and Sizes 26- 30 packed in 10kg/boxes all class I and Extra class only.

4.2.2.3 Labelling and packaging requirement

The results from exporter indicated that 100% of activities related to Labelling and packaging for commercial identification: class size(code), number of units, net weight, name and address of exporter, packer and/or dispatcher, country of origin, traceability code, are tagged on the packaging materials and to minimize loss in park house, pre-cooling and cooling washing, waxing , monitoring of temperature, and packaging, was found to be done with care while inbound rejection is 30% of the avocado collected from middlemen due to bruising at the time handling and transportation.

4.2.2.4 Long term interest and additional buyer requirements

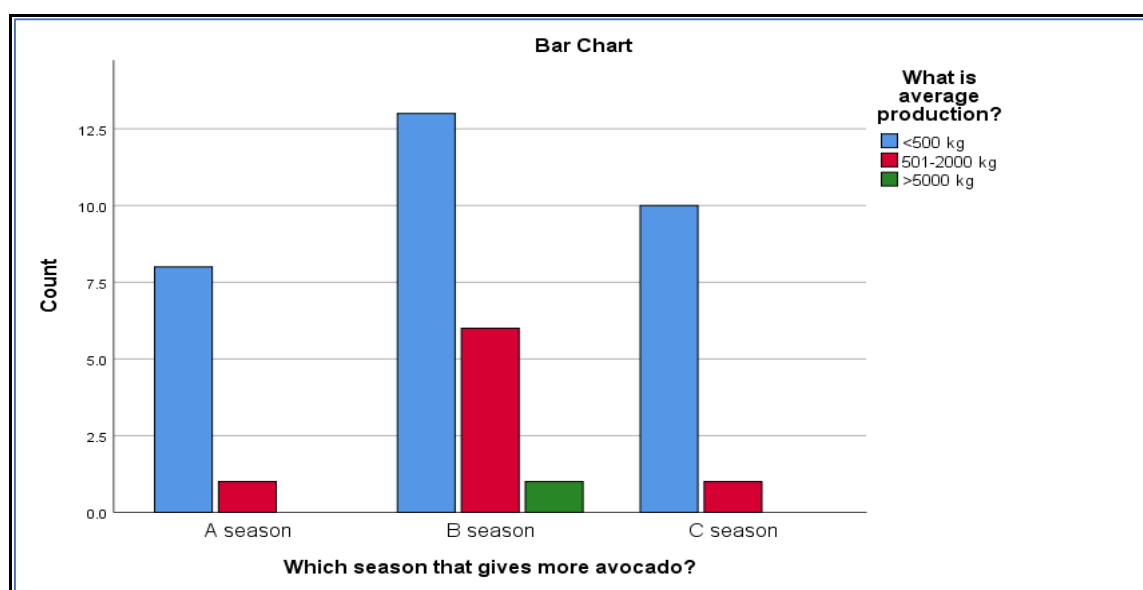
The results indicated that 100% of exporting company is registered from Rwanda Development Board(RDB), as committed business organisation. Therefore, the results show that none among the farms in Gisagara district is certified for additional buyer requirements including Global G.A.P and Fairtrade. The inconsistency supply to export market has been identified during research which at 12% per agriculture season. The results from the focus group discussion and survey indicated that 75% of inconsistency supply are the result of irregularities in controlling physiological features that are stimulated by irrigation, fertilization, pest and disease control, maturity consideration, post-harvesting or picking methods.

4.2.3 The factors affecting the profitability of sales to the export market

4.2.3.1 Agriculture season and Production

The results in figure 14 indicated that all the three agriculture season production is less than 500kg because most of the farmers hold land less than 0.2ha. The results revealed that only profitability can be achieved if number of farmers who produce less than 500kg increases.

Figure 13: Comparison of the season with a production



Source: author,2019

4.2.3.2 Value share among key actors in the avocado value chain

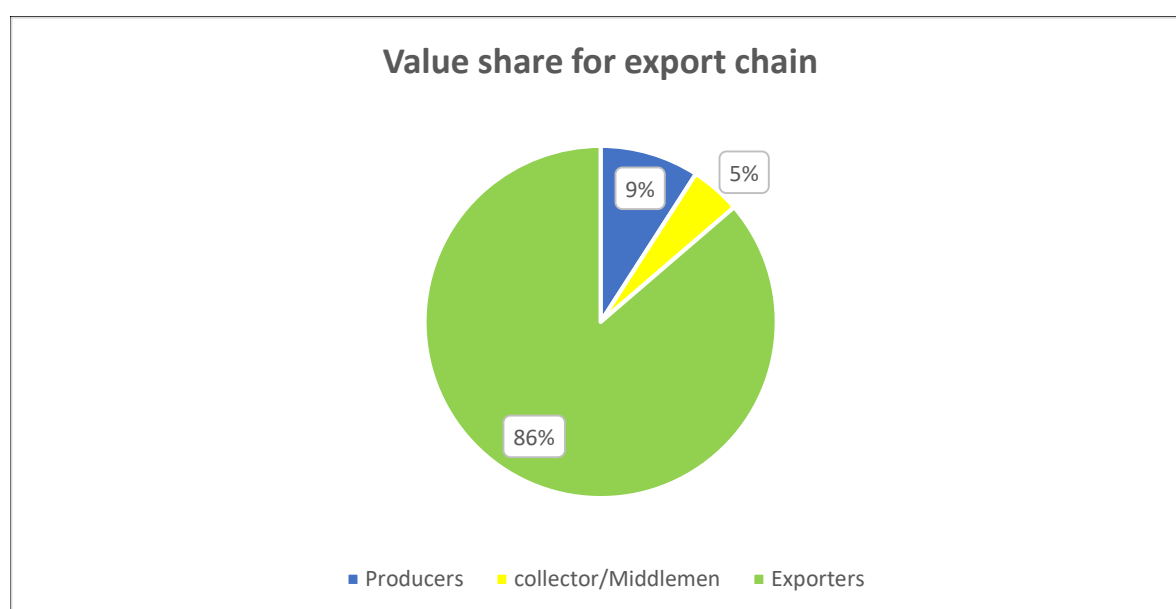
The table number 9 and figure 15 indicated that, export chain the exporter has higher value share of 86%, followed by the producers with 9% and Finally Middlemen with 5% of value share.

Table 9: Actors' value share in avocado value chain SAVE sector of Gisagara district

| Export chain | | | | Domestic market | | | |
|----------------------------|----------------------|--------------------------|--------------------------|-----------------------|----------------------|--------------------------|--------------------------|
| Actors | Selling (Rwfs/piece) | Added value (Rwfs/piece) | Value share (Rwfs/piece) | Actors | Selling (Rwfs/piece) | Added value (Rwfs/piece) | Value share (Rwfs/piece) |
| Producers | 40 | 40 | 9.1% | Producers | 30 | 30 | 20% |
| collector/Middlemen | 60 | 20 | 4.6% | Collectors /Middlemen | 50 | 20 | 13.3% |
| Exporters | 437.5 | 377.5 | 86.3% | Wholesaler | 80 | 30 | 20% |
| | | | | Retailer | 150 | 70 | 46.7% |

Source: FGD, Collectors/middlemen and Exporter, Augustin,2019

Figure 14: Value share for the export market in avocado value chain in Gisagara district

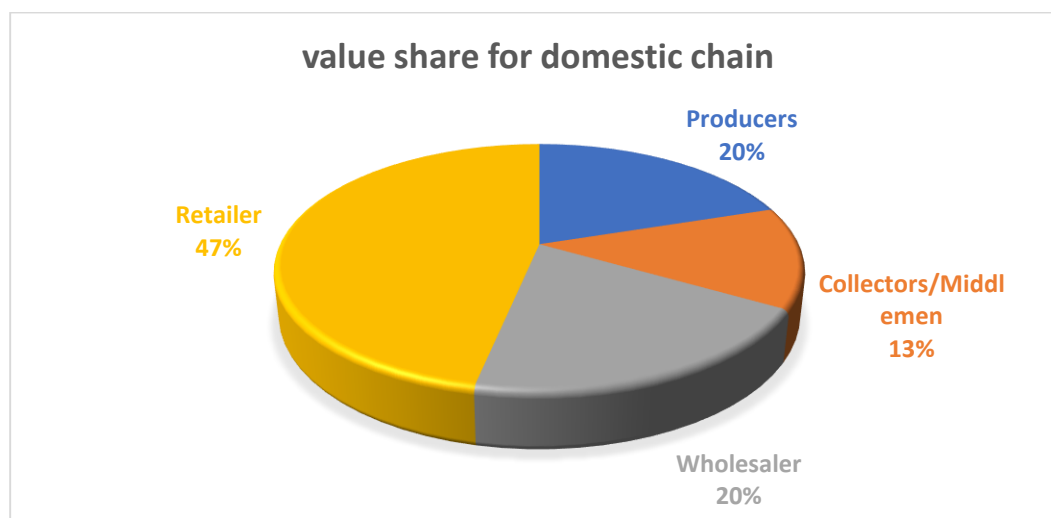


Source: surveyed by Author,2019

Domestic market value share

In figure 15, indicated that in the domestic chain retailer is getting 47% of the share, followed by producers and wholesalers which both have 20% of value share and middlemen having 13% of the value share.

Figure 15: Value share for the domestic market in avocado value chain in Gisagara district



Source: author,2019

The calculation was based on the following formula:

- **Value Added**= Selling price of the following actor minus Previous actor's price
- **Value share**= (Added valueX100)/Final actor's selling price
- **Note:** selling price was conveyed from FGD and Interviews with Exporter and Middlemen.
- By August 29, 2019 exchange rate **was 1 euro equal 978 Rwanda francs.**

4.2.3.3 Producer groups in avocado value chain SAVE sector Gisagara District.

The results from the survey indicated that 100% of avocado producer none of them belong to the producer group or association thus they are working independently.

Table 10: Number of farmers who belong to producers 'association or group in Gisagara

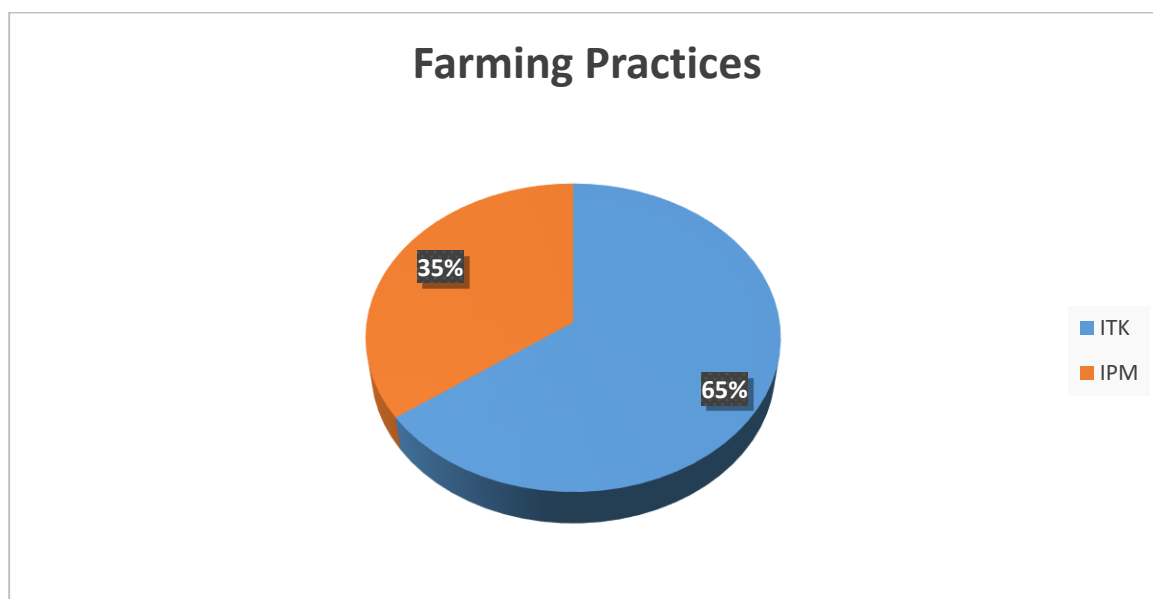
| Do you belong to any avocado Producer' association? | | | | | |
|---|----|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | No | 40 | 100.0 | 100.0 | 100.0 |

Source: Author,2019

4.2.4 The sustainable standards that enable access to the export market

Survey results indicated that none of Gisagara avocado producer is certified for sustainable standard. only individual farmers are using their traditional knowledge at 65% and few of them 35% practiced Integrated Pest Management(IPM) and in-process for certification. This has been confirmed even by Key Informants No 3, who demonstrated that avocado is dominated by tradition farming.

Figure 16: Farming practices proportion in SAVE sector of Gisagara district



Source: SPSS generated by the author, August 2019

The interview results indicated that NAEB is trying to help individual farmers with commercial plantation to increase their production and acquire voluntary certification scheme (Global GAP, Fairtrade, UTZ, FSC, Organic) that are most required to the export market.

CHAPTER V: DISCUSSION OF FINDINGS

This chapter mainly focuses on comparing of obtained information from the field survey, interviews and Focus group discussion with the retrieved data from the literature review.

5.1 Market structure of avocado value chain in Gisagara district

5.1.1 Current situation of the avocado value chain in Gisagara District

Avocado value chain in, Gisagara district involves inputs suppliers to end-user consumers. The avocado value chain is supported by the government of Rwanda through National Agriculture Export Board and its stakeholders including Non-Governmental Organisations and civil society organization that are fund in the Gisagara district. The intermediary role is played by middlemen who link both producer and Exporters or Domestic retailers.

Based on the results from Focus group discussion, interviews now and value chain analysis of Gisagara district organization in the avocado value chain is poor and farmers are working independently, thus poor coordination of chain actors. Therefore, producers are willing to create network into avocado producer group to upgrade their position in the value chain. These network groups are strongly supported by work-study of (Trienekens, 2011) who said that network relation may enhance the social capital of a group, by making it feasible to get access to information, technical know-how and financial support, thereby reducing transaction costs and improving access to markets.

The research also revealed that middlemen are playing a key role in avocado business who serve as a link between producer and exporter for external market or retailer in domestic market. Trienekens (2011), argued that intermediaries between producer and downstream parties in the chain are needless and modern market-oriented chain have tendency to become shorter because of emergence of the direct trading relationships between producer's groups and Buyers or consumers.

Generally, the interview with supporter emphasized that avocado value chain supporters are government agencies (NAEB, RAB, RALIS) and Gisagara district /SAVE sector. They providing technical support, extension services, regulating policies, facilitating market access and this has been supported by the results from Focus group discussion, where respondents confirmed that they are benefiting from governments and its stakeholder's free seedlings, training for nursery operators and model out-growers. Other studies by Trienekens (2011) confirm that the presence of a third, external, party is a major enabler of change and upgrading. Non-governmental organizations are also supporting avocado producers in providing seedlings, access to credits, support knowledge infrastructure to support the upgrading of avocado value chain.

5. 1.2 Governance in Gisagara avocado value chain

5.1.2.1 Coordination

It has been revealed that in Gisagara avocado value chain there is poor coordination among the actors both direct and indirect. The interview with key informants from horticulture division in Rwanda National export board indicated that low export volume is a result of poor coordination and not having an operational platform of all stakeholders, especially for avocado. It was reported by Middlemen that, binding contract between actors can be bonded. The weak coordination is also observed at supporting levels where the results indicated duplication of effort during the time of inputs supplying(seedlings) due to incomplete information related to avocado value chain and producer in particular. As supported

by (Himanshu.S.Moharana, et al., 2012) supply chain can't be profitable and sustainable as a whole if all stages are not coordinated. Good coordination also has been significantly observed to be top success factor by many companies or subsectors.

The results indicated also that the information flow is not well communicated, sometimes being distorted. Himanshu. Moharana et al (2012), in his study, demonstrated that information sharing is of the central importance for coordination of forecasts and forecasts done based on perfect data. In researcher's opinion, effective coordination can empower chain actors, and increase profitability among stakeholders through working under a conducive environment which enforces formal binding contract that specifies terms and conditions that serves as guide to what to produce? how to be produced and when?

5.1.2.3 Governance Structure in the avocado value chain

The results from Exporters and FGD indicated that Gisagara avocado value chain is characterized by market governance structure and coordination mechanism is price exchange at spot market. This is in the same line with Dietz (2017), who found out that when farmers are working with minimal information exchange, produce under limited product specification from other actors and coordination mechanism is price, this type of governance is market governance system. This goes in the same line with the results of Dijkxhoorn et al (2016) who shows that domestic and regional market of fruits and vegetable in Rwanda is classified as market governance structure due to simple transaction happening at spot market.

The results from the interview with exporters also compliment with governance structure in avocado value chain, where indicated that they don't have any control in the production, no information is shared between buyer and suppliers, the parameters are exclusively defined by each firm at its point in the chain. Coronado et al (2015) findings indicated that information exchange is typical solution to the uncertainty problem. Sharing information to what market/consumer need can reduce the cost of stocks and cost of misalignment between quality and quantity required. In researcher point of view, as exporter and producers won't join their hands to increase production of quality avocado from production site, farmers will continue to work using their outdated practices.

5.1.2.4 Relationship in the avocado value chain

The results from the qualitative analysis revealed that the chain actors they don't recognize each other, supports and information sharing among chain actors are limited which indicate weak relation among Producers, Middlemen, and exporters. Therefore, there is an indication of a strong relationship between NAEB and Exporter where the last are given infrastructure facilities (Park house, Cold room, and cold truck) at minimum charges. The relation in the entire chain is marked by distrust. The farmers and middlemen don't know the exact price of avocado to external markets this situation is bad for all actors and affect the entire chain.

KIT and IIRR (2008), in its book "Trading Up " distinguishes strong and weak chain relation where strong is characterized by organisation, effective and small scale inclusion in value chain. Weak chain relations: farmers and traders are not organized, there is lack of trust. They conclude that farmers and traders can benefit from value chain if they manage to make chain more stable, transparent and organized relationships. Such relation can reduce the costs and risks that they are facing in their businesses.

5.1.2. 5 Power relation in the avocado value chain

Results show that middlemen have power over producers in the avocado value chain on price, in purchasing the standing tree before fruits maturity. The results from interview show also, that even though exporters depend on middlemen, they have control on quantity, variety needed, middlemen can change customer or Buyer change price any time because there is no formal binding contract. In researcher's view this indicated imbalance in power relation where middlemen have power on producers and Exporter has power on middlemen, this hinders the upgrade of avocado activities. (Kahkonen & Lintukangas, 2011) argued that, for a good basis adoption of strategies based on collaboration, there is a need for power balance relation between buyer and suppliers. According to (UNIDO, 2009) show that the way economic gains and risks are distributed among chain actors and how chain actors face barriers of entry and eventually left out from participating in the value chain determine degree of power relation.

5.1.3 The opportunities and constraints in the avocado value chain

5.1.3.1 Opportunities

Like the survey, focus group discussion, and interviews show that 77.5% of avocado is grown on smallholder's farms(**Appendex4**). As the avocado market is growing, farmers in Gisagara district SAVE sectors can use free seedlings distributed by NAEB/PRICE for commercial opportunities to support to extend plantation. This has been supported by (Bender, et al., 2015) who said, commercial producing avocados, are not grown to maturity from seedlings, but rather like commercial fruits crops, are grafted with good known varieties on top of rootstocks. The constant demand of Rwandan avocado to domestic and export in EU, Middle East, USA, DUBAI market combined with national financial support, infrastructure facilities, labour-intensive, good environmental conditions that favor potential growth, political will that facilitate investors and availability of agriculture research Center and non-governmental organisation that involved in avocado subsector development are also opportunities.

5.1.3.2 Constraints

Avocado farmers in Gisagara district have low access to improved grafted varieties due to high cost and limited experienced nursery operators. Limited post-harvest technology, lack of processing plant, limited private investment in the avocado value chain, lack of avocado producer platform. Perishability risks, land shortage, limited capacity of growers. Avocado subsector promises high potential in Gisagara district, SAVE sector, but yet it's characterized by low yields and low income to producers.

The results from survey and focus group discussion indicated that even though avocado can contribute to their livelihoods they are still confronted by a number of problems including, falling down before getting mature, pest and diseases. This has been supported by Faris (2016) who shows that avocado has significant economic and social role in livelihood wellbeing, but its production is confronted by number of constraints including degeneration of fruits, disease problem and absence of good agronomic practices.

5.2 Strategies to scale up the supply of quality avocado to export market

5.2.1 Farmer's perception of avocado production for export

The results indicated that the perception on export grade is high and the farmers are willing to adopt plantation on large scale of export-grade than local varieties but the feel that avocado is constrained by perishability, unstable price, and they can increase their income and social wellbeing in their area.

This perception was in the same line with the findings of Faris (2016), even though the subsector is confronted with many challenges drought, high perishability and limited know-how of farmers it can still contribute to poverty reduction and increase household's economy.

As far as quality and quantity are concerned in consistency way, farmers 'capacity to increase their position is low, and there is a need of capacity building and incentives provision at early age stage of their plantation. These findings are in line with the results of (Coronado, 2010) who indicated that consistent product quality and compliance with complex safety are required while targeting the higher demanding markets.

5.2.2 The requirements for the export market

Findings from the focus group discussion and survey indicated that 65% of orchards are managed under routine knowledge (intercropping with other crops) by smallholder farmers. The same study conducted by Faris (2016), in Ethiopia, indicated that smallholder's farmers intercrop avocado with maize, cabbage, gingers at an early stage.

The findings from an interview with exporters show that the activities that influence physiological features are not controlled in a sustainable way including irrigation, fertilization pest, and disease control, maturity consideration, harvesting or picking gives tradition low-quality fruits for the domestic market. This affect quality and quantity to be exported by national exporters at a high rejection rate (32%) of total inbound volume. The same study done by Coronado, et al (2015) shows that, when supplying to high demanding market in developed countries, deliveries both quality and quantity have to be reliable, but creating consistency supply of high quality product is challenging for export-oriented company.

The findings from interview indicated that exporter met quality-related Product description, Size, and Packaging, dry matter content (21% for Hass and 20% for Fuerte, different class (I, II, Extra)) for the export market and met fulfilled the country regulation on food safety and phytosanitary standards. The inconsistency supply to the international market resulted from poor organization of farmers, limited agronomic practices and behavior change for adoption is the threats for industry. The results sorting and grading are done according to quality specifications as said by Respondent No3: where Fuerte packed in 4kg /boxes ready for export, Hass size 12,18, 22, 28,30. Size 14-24 packed in 4kg boxes and Sizes 26- 30 packed in 10kg/boxes. Fuerte size 14-24 all packed in the 4kg boxes. The requirement related to quality has been also reported by Coronado (2010), stating that actors who are targeting the international market must comply with number of phytosanitary quality, which is free from pests and diseases, and must come from a certified orchard and finally, packing house should have a registration.

5.2.3 The factors affecting the profitability from sales to the export market

- **Production volume**

As agriculture season and production are the factors which affect profitability in results we found out that there is no influence on quantity and quality of avocado produced in Gisagara district. 78% of the respondent produce less than 500 kg per in season A, B, and C classified as smallholder farmers. 20% of the respondent produces quantity between 501-2000kg and finally, 2% belong to category of those who produce more than 5000kg.

As indicated by survey results factors that influence low production capacity were: lack of know-how, limited cultural practices and specific extension services and land shortage and working on an individual basis and has created a high competition among many exporters. The same study done by (Porto, et al., 2011) indicated that in Africa commercialization of export agriculture is produced along

a supply chain, often firm competing for the commodities produced by vulnerable smallholders. Finally, report by (Mwangi, 2016) stated that avocado production in Rwanda is done by smallholder farmers, with land less than 0.5ha and low production due poor agronomic practices, poor crop nutrition, use of indigenous rootstock that has not been researched upon affect survival rate, and flower abortion.

- **Share value distribution**

As value share being considered as major concerns in assessing the profitability of chain actors, the results from interviews and survey with actors revealed that exporters have the highest value share of 86%, producers in Gisagara district Save sector follow with 9% and Middlemen ow 5%. Furthermore, Retail also in the domestic market has high share value compared to other actors where they have 47%, followed by Production and wholesalers with 20% each and finally middlemen with 13%. KIT and IIRR (2008) argued that traders/exporters the share he/she is taking is not too high as most people though when compared to share value in Africa and developed countries. But is almost impossible because in Africa they are dealing with small quantities and operate in chain that is far from efficient and associated with lack of supply, large price fluctuations, theft, wastage of produce.

- **Producer groups**

The results also indicated that 100% of avocado producer in Gisagara district, SAVE sector none of the producer belong to producer group, they are working independently and their bargaining power is limited and profit as well. This was stated in the studies of Technical Centre for Agriculture and Rural Cooperation (2016), Shepherd (2016), Wiggins and Keats (2013) and Springer-Heinze (2017) all of them highlighting that smallholders should be grouped in form of cooperation or association that can help them to increase their bargaining power and profitability through access to financial services and increased production capacity which cannot be achieved by individual.

In the research point of view, if Gisagara district SAVE sector avocado producer get organized the production volume can be achieved for export because the study has been indicated that 77.5% are those holding hand less than 0.5ha and produce avocado less than 500kg per agriculture season.

5.2.4 The sustainable standards that enable access to the export market

Survey and interviews have shown that avocado producers in Gisagara district/SAVE sectors 65% still using their traditional indigenous knowledge and 35%of them are practicing Integrated pest management and they are under certification process for phytosanitary aspects. This is associated with lack of coordination mechanism among stakeholders, low consideration of public regulation related to sustainable farming for the international market is not considered as necessary by domestic market. A large volume of avocado that is rejected because of poor export standard is sold to the domestic market. This means international markets demand fulfillment of food safety condition, phytosanitary conditions. The same work by Coronado et al (2015) illustrated that in Mexico 70% of total avocado production is consumed domestically, and 30% is exported because inability to meet safety and phytosanitary requirement.

The interview results indicated that the certification process is too expensive, smallholders cannot afford the service by considering their investment capital. This has also supported by Carey and Guttentstein (2008) who said that because of high cost to meet certification criteria that enable access to higher market sustainable way, government involvement is needed. In research point of view, certification both public and voluntary are becoming mandatory to the export market and Gisagara

district smallholders 'incomes are low, therefore there is a call for subsidies from government for those engaged to produce for export markets. Public awareness of public regulation and private certification are needed.

5.3. Reflection on my role as a researcher

As I was not familiar with the research area, incentives provided to the respondent have also a positive impact on my research findings. I have told respondents from survey, FGD and Interviews that the research objective is to improve avocado value chain and I need their contribution by voicing out the ground reality that can help to develop strengthened chain.

In my research the conceptual framework was found very useful as it guided me to align my objectives, framing research questions and prepare for interviews, FGD, survey. Without the conceptual framework, I could not have come up with this report. Initially, I did not have exact idea on role of conceptual framework, but I understood at the end of the study that was key driver, for successful research and can lead to your destiny.

The study limits to one sector of the district although there is 13 sectors in Gisagara district. The purposive sampling size might also have left out some of the potential respondents who could have shared their views and might have impact on the finding of the study. The data collection time falls during the evaluation of district and sector performance contract by central government and the respondent were not prioritizing my study. In this process some of the respondents were not able to dedicate their time to share the information. Realizing this I adapted my schedule accordingly and conducting focus group in morning and evening survey. This proved to be helpful to obtain in-depth information and meet deadline.

Interview with key Informants especially in National Agriculture and Export Board, to get someone to interview was very challenging because those who were in charge of Horticulture were reluctant to give information related to the avocado value chain. As researcher, I was obliged to call NAEB chief executive officer, therefore they accepted to have interview with me. At this time, they restricted me from recording and taking photo during the interview by saying they don't want to appear in the public. I have learned that, there is still low awareness of research and why to contribute to the research.

Feedback from my supervisor was very critical and it confused me at times when he shared his neutral opinion, but it was realized that I was not thinking out of box. Realizing it, I decided to adapt based on the feedback as it helped me to learn more independently. In fact, it helped to broaden my knowledge. His time support has enabled to complete my report on time.

The important limitation of this study could be explored in future research as my study focus only on inclusive business model in avocado value chain. For a country like Rwanda with a suitable growing condition for avocado, further research is needed to assess the contribution of improved technology related to farming can benefit the smallholder.

The findings of this result will help the relevant institution to put stronger intervention on the gap identified to ensure inclusive value chain.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

This chapter 6 summarises the conclusion derived from desk research, semi-structured interviews, stakeholders meeting, and Focus group discussion with avocado value chain actor. It illustrates also the recommendations addressed to SAVE sector/ Gisagara district, NAEB and other stakeholders in order to develop a sustainable avocado value chain for export market.

6.1. Conclusions

This study was conducted to give recommendations to Gisagara district and Rwanda National Agriculture Export Board(NAEB), on how to improve the avocado export value chain in order to stimulate local development through strengthened sustainable production. After analysis below conclusion are made based on two main research question and sub-question.

- The current avocado value chain in Gisagara district has different stakeholders. However, their contribution is minor to bring change in the avocado subsector this was indicated by Limited support in inputs supplying, limited know-how by producers and market information sharing, weak relation among chain actors through avocado producer groups and poor organization among chain actors.
- The governance system in avocado value chain Gisagara district was characterized market structure where negotiation is done on spot market and low support from the buyers, has affected consistency supply
- Concerning opportunities and constraints, although it was shown that there are many initiatives to promote avocado value chain under government support and its stakeholders including but not limited to edaphic suitability for production, cheap labor and intensive are the opportunity. However, there is still lack of policy related to the avocado value chain, poor market integration, inadequacy of breeding varieties and updated post-harvest technologies, lack of farmers' organization, limited infrastructure support at farms level, poor agronomic practices, long distance between buyers and suppliers
- Demographic characteristics of the farmers in Gisagara district/ SAVE sector are having small land less than 0.2ha and most farmer's avocado production is less to 500kg per season. It was also found out that the avocado production is done in a scattered manner, not on consolidated land which results in low production and poor organisation among producers.
- Farmer's perception on avocado production for export market was characterised by being aware that demand is growing for improved varieties, Avocado farming can increase their income, and are willing to extend their plantation but they are not aware how much is needed of which quality and where to sell because usually they depend on stop market. Hence farmers are not organised in a good way to get full information related to market.
- As quality is major concerns for international market producer don't care about phytosanitary and sustainable standard both public and private. This is also a serious problem for smallholder farmer in Gisagara district as production is still using outdated practices. Concerning export market requirements, it was shown that only exporters are aware of those specifications related to food quality and safety and phytosanitary exigence for high demanding market. The miss collaboration has made exporters in better position to dominate pricing.

- It was shown that Exporters have the highest value share in the avocado value chain, where they hold 86% and to domestic market Retailers is the one who has high share value of 47% in the entire chain. Even though in all market segment Middlemen is getting small share. Moreover, there is no binding contract between actors, middlemen exporter this has led to underdevelopment of avocado value chain that smallholder benefits.

To ensure sustainable development of the avocado value chain in Gisagara district, both private and public supporters need to help direct actors to join their hands and strengthen trust under regular communication through stakeholders meeting and considering each actors value in the chain.

6.2 Recommendations

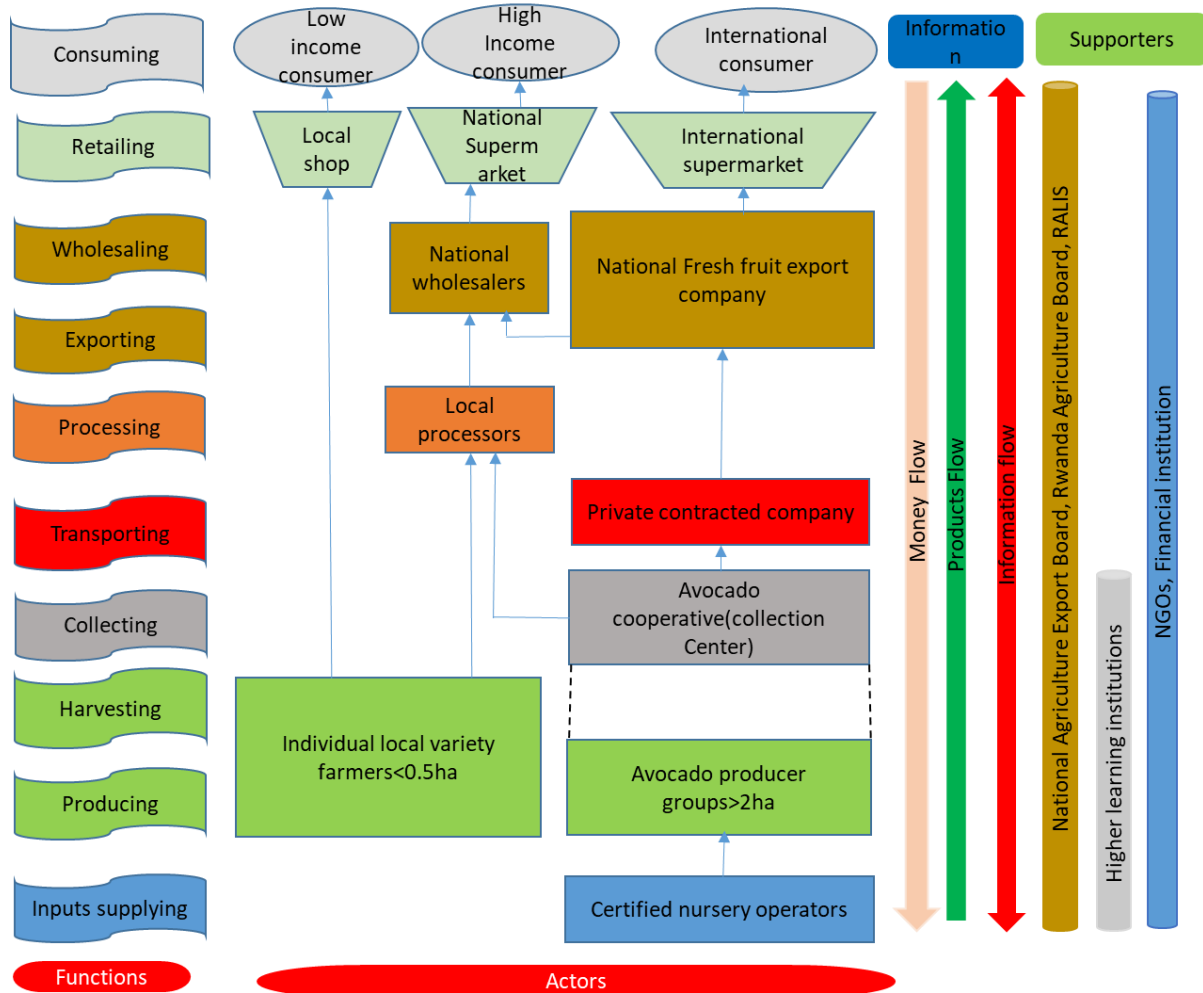
As the Rwandan avocado industry is growing and need for sustainable avocado for the export market is required, nine (9) recommendations to value chain stakeholders (Gisagara district/SAVE sectors, NAEB) for stimulating local development are as following:

1. There is a need for smart policy and capacity building for avocado value chain stakeholder by 2020
2. NAEB will lead the dissemination of avocado policy through its stakeholders from central to local communities;
3. There is a need for close coordination and organisation among avocado value chain stakeholders Including Ministry of agriculture, Ministry of Trade and Industry, Ministry of Local government and their concerned agencies (RAB, NAEB, RALIS, RWFA) and improving communication and timely information sharing by 2020,
4. Creation of Avocado value chain platform and enhancement of mutual benefit and trust in order to facilitate the inclusiveness of small avocado producers by 2020;
5. Building equipped avocado collection Center at the community level which will be managed by producer organisation and exporters as well by 2021
6. There is a need to improve logistical support and continual support for standards both public and private through certification (farms and products)
7. There is a need for facilitating access to finance, conduct regular research and innovation through Vocation training centers and assistance for entrepreneurs by 2020;
8. There is a need for building a strong avocado market institution that can lead the avocado value chain and ensure producers are producing according to customers' needs, NAEB can facilitate this activity, by 2021
9. District and NAEB facilitate awareness campaign on the role of food safety and phytosanitary requirement when targeting high demanding market by June 2020

6.2.1 Proposed Avocado Value chain

The proposed value chain with the above recommendation can lead to increased production, improve communication, consistency supply, and strong coordination among avocado stakeholders

Figure 17: A proposed avocado Value chain map in Gisagara District



REFERENCES

- Canadian Agri-Food Policy Institute, 2012. *Characterizing the Determinants of Successful Value Chains*, Ottawa: George Morris Centre.
- Adom, D., Hussein, E. K. & Agyem, J. A., 2018. Theoretical and Conceptual Framework: Mandatory Ingredients of a Quality Research. *International Journal of Scientific Research*, 7(1), pp. 438-441.
- Anon., 2019. *Rwanda Avocados*. [Online] Available at: www.selinawamucii.com/ [Accessed 28 March 2019].
- Arpaia, M. L., 2013. *Avocado Postharvest Quality-an Overview*, California: ResearchGate.
- Bajiji, I., Nirere, S. & Nsanzabaganwa, E., 2016. *Opportunities for Investors in Rwanda's Horticulture Sector*, Kigali: Rwanda Development Board(RDB).
- Barbi, V., 2014. *Adaptation: Key Concepts, Strategies and Practices*, s.l.: International center for climate governance.
- Bellù, L. G., 2013. *Value Chain Analysis for Policy Making :Methodological Guidelines andcountry cases for a Quantitative Approach*, Rome, Italy: FAO.
- Bender, G. S., Meng, J. A. & Arpaia, M. L., 2015. *Avocado Rootstocks*. 1 ed. s.l.:University of California: Agriculture and Natural Resources.
- Berg, M. v. d. et al., 2008. *Making Value Chains Work Better for the Poor*. Vietnam: Making Markets Work Better for the Poor (M4P).
- Biazin, B. et al., 2018. Smallholders' avocado production systems and tree productivity in the southern highlands of Ethiopia. *Agroforestry system*, 92(1), p. 127–137.
- Calderón-Vázquez, C. et al., 2013. Quantitative Genetic Analysis of Three Important Nutritive Traits in the Fruit of Avocado. *American Society for Horticultural Science*, 138(4), p. 283–289.
- Cañete, M., Cobos, R. d. I. & J.J.Hueso, 2018. *Influence of harvest date on sensory quality attributes of avocado 'Hass'*, Almeria: ResearchGate.
- Carey, C. & Guttentstein, E., 2008. *E052 Governmental Use of Voluntary Standards ,Case Study 7: Rwanda and the East Africa Organic ,Products Standard*, London: ISEAL Alliance.
- CBI, 2017. *Exporting fresh avocados to Europe*. [Online] Available at: <https://hortintl.cals.ncsu.edu> [Accessed 23 May 2019].
- Coronado, J. A., Bijman, J., Omta, O. & Lansink, A. O., 2015. A case study of the Mexican avocado industry based on transaction costs and supply chain management practices. *ECONOMÍA: TEORÍA Y PRÁCTICA • Nueva Época, número 42, enero-junio 2015*, Volume 42, pp. 137-165.

- Coronado, J. A., Bijman, J., Omta, O. & Lansink, A. O., 2015. A case study of the Mexican avocado industry based on transaction costs and supply chain management practices*. *Economía: teoría y práctica, Nueva Época*, Volume 42, pp. 138-164.
- Coronado, J. J. A., 2010. *Supply chain practices, performance and organizational configuration in the Mexican avocado industry*, Wageningen: Wageningen University.
- Cusolito, A. P., Safadi, R. & Taglioni, D., 2016. *Inclusive Global Value Chains: Policy Options for Small and Medium*. Washington , DC: Worldbank.
- Danafacility, 2018. *Improving Avocado Production in Chin State and Southern Shan State*, myanmar/Chin State: DaNa Facility.
- DFID, 2008. *Making Value chains Working for the poor: A toolbox for Practitioners of Value Chain Analysis*. 3rd ed. Phnom Penh: Agriculture Development International(Cambodia Representative Office).
- Dietz, M., 2017. *Value Chain Governance that Benefits the Poor: working paper*, s.l.: HELVETAS(Swiss Intercooperation).
- Dijkxhoorn, Y., Gonzalez, Y. S. & Judge, L., 2016 . *Horticulture and floriculture in Rwanda* , Wageningen: LEI Wageningen UR .
- FAO, 2013. *Country Programming Framework for Rwanda*, Kigali: s.n.
- FAO, 2014. *Sustainability Assessment of Food and Agriculture Systems Guideline*, Rome: SAFA.
- FAO, 2016. *Country facts sheets on food and Agriculture policy trends*, Rwanda: FAPDA.
- FAOSTAT, 2019. *Food and agriculture organisation of the United Nation/Production/Yield quantities of Avocados in Rwanda*. [Online] Available at: <http://www.fao.org/faostat/en/#data/QC/visualize> [Accessed 27 April 2019].
- Faris, A., 2016. Review on Avocado Value Chain in Ethiopia. *Industrial Engineering Letters*, Vol.6(3), pp. 33-40.
- Ggombe, K. & Newfarmer, R., 2017. *WIDER working Paper 2017/84 ,Rwanda :From devastation to services-first transformation*, s.l.: UNU-WIDER .
- GTZ, 2007. *ValueLinks Manual: The Methodology of Value Chain Promotion*. 1st ed. s.l.:s.n.
- Herr, M. L., 2007. *Local Value Chain Development: Combining Local Economic Development (LED) with Value Chain Development (VCD) to strengthen competitiveness and integration of SMEs into markets*, Sri Lanka: Enterprise for Pro-poor Growth (Enter-Growth).
- Herr, M. L., 2007. *Operational guide to Local Value Chain Development* , Colombo,Sri Lanka: ILO.
- Hidalgo Investments Ltd, 2019. *Soko directory: Kenya Leads as the Biggest Avocado Producer in Africa*. [Online] Available at: <https://sokodirectory.com>[Accessed 28 May 2019].

Himanshu.S.Moharana, J.S.Murty, S.K.Senapati & K.Khuntia, 2012. Coordination, Collaboration and Integration for Supply Chain Management. *International Journal of Interscience Management Review*, 2(2), pp. 2231-1513.

Kahkonen, A.-K. & Lintukangas, K., 2011. *The role of power in supplier relationship management*, Finland: Lappeenranta University of Technology, School of Business.

Karuiru, M., 2018. Value chain Management and the performance of avocado fruit small scale farmers in Kandara subcounty, MURUNG'A County, Kenya. *International Journal of Physical and Social Sciences*, 8(10).

Kayonga, G. W., 2018. *Opportunities for Investors in Rwanda's Horticulture Sector*, Kigali: National Agricultural Export Development Board (NAEB).

KIT & IIRR, 2008. *Trading up: Building cooperation between farmers and traders in Africa*. Nairobi: Royal Tropical Institute, Amsterdam; and International Institute of Rural Reconstruction.

Lidia, D., Lidia, P. & Alicia, O., 2004. *Post-harvest Compendium : Avocado*, Rome: Food and Agriculture Organization of the United Nations (FAO).

Martínez, J. A., J.Bonales, A.G.Zamudio & J.Gaytan, 2014. Competitiveness's determinants in the Avocado export sector's value chain. *American Journal of Experimental Agriculture*, 4(3), pp. 275-289.

Mattern, M. & Ramirez, R., 2017. *Digitizing Value Chain Finance for Smallholder Farmers*, Washington DC: CGAP.

MINAGRI, 2015. *Resettlement Action Plan for Selected Feeder Road in Rwanda*, Kigali: Rwanda Transport Development Agency (RTDA).

Monitor group, 2012. *The Business Case for Investing in the export of avocado in Rwanda*, Kigali: National Agriculture Export Board (NAEB).

Muhaise, J., 2016. *Fortune of Africa_ Rwanda_ avocado crop*. [Online] Available at: <https://fortuneofafrica.com> [Accessed 28 March 2019].

Mwangi, B., 2016. *Rwanda Avocado value chain_ strategy implementation plan for 2016-2021*, Nairobi: Ideal Business Link Ltd.

NAEB, 2014. *National Horticulture Policy and Strategic Implementation Plan*, Kigali: National Agriculture export Board.

Nair, S. S. & Chandran, D. A., 2018. Nutrient composition of avocado fruits of selected cultivars grown in Kerala. *International Journal of Food Science and Nutrition*, 3(3), pp. 65-67.

Nardos, T. & Wakgari, T., 2016. Packaging Material Affects Quality Attributes and Ripening Period of Avocado (*Persea americana*) Fruit. *World Journal of Agricultural Sciences*, 12(3), pp. 229-235.

Nicolas, H., 2013. *Annual Report 2012-2013*, Kigali: RAB.

NISR, 2011. *EICV3 District profile - South - Gisagara*, Kigali: National Institute of Statistics of Rwanda.

- NISR, 2016. *Statistical yearbook*, Kigali: National Institute of Statistics of Rwanda.
- OECD; WTO ; World Bank Group, 2014. *Global Value Chains: Challenges, Opportunities, and implication for policy*, Australia, Sydney: G20 Trade Ministers.
- Porto, G., Chauvin, N. D. & Olarreaga, M., 2011. *Supply Chains in Export Agriculture Competition, and Poverty in Sub-Saharan Africa*, USA: The World Bank.
- RAB, 2018. *Sustainable Agricultural Intensification and Food Security: Integrated Pest Management Plan*, Kigali: MINAGRI.
- Saarelainen, E. & Sievers, M., 2011. *Value Chain Development*. [Online] Available at: www.ilo.org [Accessed 1 May 2019].
- Salami, A., Kamara, A. B. & Brixiova, Z., 2010. *Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities*, Tunis: African Development Bank Group.
- Salathé, M. & Hughes, D., 2013. *PlantVillage*. [Online] Available at: <https://plantvillage.psu.edu> [Accessed 3 May 2019].
- Shao, J., Taisch, M. & Mier, M. O., 2017. Influencing factors to facilitate sustainable consumption: from the experts' viewpoints. *Journal of Cleaner Production*, Volume 142, pp. 203-216.
- Shepherd, A., 2016. *Including Small-Scale Farmers in Profitable value chain*, Wageningen: CTA.
- Simatupang, T. M. & Sridharan, R., 2002. The Collaborative Supply Chain. *The International Journal of Logistics Management*, 1,, 13(1), pp. 15-30.
- Sjauw-Koen-Fa, A., 2010. *Sustainability and security of the global food supply chain*, Washington, CD: Rabobank group.
- Springer-Heinze, A., 2017. *ValueLinks2.0: Manual on Sustainable Value Chain Development*. 2 ed. Eschborn: giz.
- Swinnen, J. F., Colen, L. & Maertens, M., 2013. *Constraints to smallholder participation in high-value agriculture in West Africa*, Leuven: FAO.
- Thilmany, D., 2008. *What are Niche Markets*. Colorado: Colorado State University.
- Trienekens, J. H., 2011. Agricultural Value Chains in Developing Countries: A Framework for Analysis. *International Food and Agribusiness Management Review*, 14(2), pp. 51-82.
- UNECE, 2017. *Standards concerning the marketing and commercial quality control of avocados*. New York: United Nations.
- UNIDO, 2009. *Value Chain Diagnostics for Industrial Development*, Vienna: United Nations Industrial Development Organization: Working paper.
- Wagemakers, J., 1996. *Global Green Standards: ISO 14000 and Sustainable Development*. Canada: International Institute for Sustainable Development.

Webber, C. M. & Labaste, P., 2010. *Building Competitiveness in Africa's Agriculture: A guide to Value Chain Concepts and Application*, Washington , DC: World Bank.

Wiggins, S. & Keats, S., 2013. *Leaping and Learning: Linking smallholders to markets in Africa*, Landon: Agriculture for Impact, Imperial college and Overseas Development Institute.

wilkinson, J., 2013. *WikiCFO*. [Online] Available at: <https://strategiccfo.com/net-profit-margin-analysis>[Accessed 26 May 2019].

Wright, C., Grauf, S. & Gadek, P., 2013. *Non-invasive assessment of avocado quality attributes*, Queensland ,Australia: ResearchGate.

WTO, 2013. *Chapter 3:Value chains and development path*, s.l.: AID FOR TRADE.

Yahia, E. M., 2012. *Crop Post-Harvest: Science and Technology: Avocado*. 2nd ed. ResearchGate: Blackwell Publishing Ltd.

Yahia, E. M., 2018. *Crop Post-Harvest: Science and Technology*. 1st ed. Santiago de Querétaro, Mexico: Blackwell Publishing Ltd.

Yusuf, M., 2008. *Rapport d'analyse gisagara final*, Kigali: National Institutional of statistics of Rwanda.

APPENDICES

Appendix 1. Survey Questionnaire

Survey Questionnaire Number..... date.....

- Sector: Cell: Village:
- Sex: Male ☐ Female ☐
- Age: <18 ☐ (19-35) ☐ (36-55) ☐ (56-80) ☐ >80 ☐
- Marital status Single: ☐ Married: ☐ Widowed: ☐ Divorced: ☐ Separated: ☐
- Educational level None ☐ Primary ☐ 9YBE ☐ 12YBE ☐ VTC ☐
 University ☐ Postgraduate ☐
- What is the size of avocado plantation? (select one)
 < 0.5ha ☐ 0.5-2ha ☐ 2-5ha ☐ >5ha ☐
- What type of varieties grown is your farm? (More answers apply)
 Hass ☐ Fuerte ☐ Other ☐
- Which one do you consider the most important and why?
- Where do you source from avocado seedling?
 Own ☐ Public nursery ☐ Private operator ☐ Other ☐
- Do you appreciate the type of variety you have?
 Yes ☐ No ☐
 If No, why?
- What are the most 3 important reasons for growing avocado?
 1
 2
 3
- What is your average avocado production?
 <500 kg ☐ 501-2000Kg ☐ 2001-5000Kg ☐ >5000Kg ☐
- In which season do you produce more Volume?
 A ☐ B ☐ C ☐
- Where do you sell your avocado? (multiple answers apply)
 Neighbours ☐ Collector ☐ Company ☐ Processing Plant ☐ Retailer ☐ Supermarkets ☐ other ☐
- Which variety has a better market price?
 Hass ☐ Fuerte ☐ Other ☐
 Why?
- Which variety do you prefer to grow and why?
- What type of fertilisers you are using in your farm? (select one)
 Organic manure ☐
 Inorganic fertiliser ☐
 Both ☐

18. What type of farming practices do you follow? (More answer apply)

ITK ☐

GAP ☐

Organic ☐

Others ☐

19. Have you had training on avocado farming?

Yes ☐

No ☐

20. Do you participate in any avocado farmers' association or group?

Yes ☐

No ☐

If no, why?

21. What constraints faced by avocado farmer's producers?

-
-
-

22. What do you suggest can be done to improve avocado farming?

-
-
-

Appendix 2. Key Informants checklists

Checklist for Key Informants

A person from Province:

1. Role in avocado value chain development
2. Staff focal point for avocado production
3. Provincial initiatives to support avocado producers
4. Avocado stakeholder's platform
5. Opportunity and constraints in avocado development

Checklist for Head of Program in RAB/Rubona station

1. Role in horticulture and value chain development
2. Type of promoted varieties
3. Institution roles in availing improved seedlings
4. Level of adoptability and adaptability of the new varieties
5. Collaboration agreements between research institution with specific groups
6. Sustainability issue in the avocado value chain

Checklist for district officer (Director of agriculture and cash crop officer)

1. Role in avocado value chain development
2. District initiatives to promote avocado value chain and support farmer's initiatives
3. Policy related to avocado value chain in Gisagara
4. Opportunities and constraints in the avocado value chain
5. Stakeholders platform for avocado value chain
6. The vision of the sector in the next five years

Checklist for National Agriculture Export Board (NAEB) Horticulture Division Manager and Fruits chain officer

1. Role of NAEB in avocado value chain development
2. The focal point for avocado developments
3. Stakeholder and their role in the avocado value chain
4. Market requirement for exporting avocado (Quality & Quantity), S mark, International standard both phytosanitary and Technical Barrier to Trade (TBT) or what sanitary and phytosanitary measure in avocado from production to export
5. Policy related to avocado exportation and importation
6. The budget allocated for the avocado value development

7. Dissemination and communication channel of policies
8. Opportunities and constraints in the avocado value chain
9. Future plan for avocado value chain improvements

Two exporters Checklist

1. Role in the avocado value chain
2. Relationship with producers and support toward them
3. Source of their product and variety
4. Profitability
5. Niche market requirements
6. Platform with small scale inclusive
7. Opportunities and constraints

Appendix 3. FGD checklist & Stakeholder meeting

Checklist for Focus Group Discussion (Progressive and Conventional farmers)

1. Opportunities and constraints in their area that influence avocado production
2. Perception on avocado value chain business in Gisagara district
3. Farmers initiatives to improve avocado production
4. Their contribution to increasing avocado production for export
5. Suggestion on what can be done to improve avocado value chain
6. Number of Avocado farmer's group in the area
7. Relation with their customers
8. Public initiatives to support farmers' initiatives

Stakeholder Meeting Checklist

1. Source the input
2. Type of varieties
3. Direct actors
4. Indirect actors
5. External influences
6. Governance
7. Power relation among avocado VC
8. Determinants variety and quantity
9. Influence of supporting service on your production
10. Problem do SHF face in avocado production?
11. Opportunities in place toward avocado SHF
12. Value addition
13. Value addition
14. Value share
15. Selling price
16. Customer segments

Appendix 4: Demographic features of the respondents

| Variables | | Frequency | Percent |
|-------------------|-------------|-----------|---------|
| Respondent sex | Male | 27 | 67.5 |
| | Female | 13 | 32.5 |
| | Total | 40 | 100.0 |
| Marital status | Single | 5 | 12.5 |
| | Married | 33 | 82.5 |
| | Widow | 1 | 2.5 |
| | Separated | 1 | 2.5 |
| | Total | 40 | 100.0 |
| Educational level | None | 4 | 10.0 |
| | Primary | 31 | 77.5 |
| | 9 YBE | 2 | 5.0 |
| | 12 YBE | 2 | 5.0 |
| | TVET | 1 | 2.5 |
| | Total | 40 | 100.0 |
| Age category | 1-35 years | 4 | 10.0 |
| | 36-55 years | 26 | 65.0 |
| | 56-80 years | 10 | 25.0 |
| | Total | 40 | 100.0 |
| land size | <0.5 ha | 31 | 77.5 |
| | 0.5-2 ha | 9 | 22.5 |
| | Total | 40 | 100.0 |

Appendix 5: Relation between production and agriculture season

What is average production? * Which season that gives more avocado? Crosstabulation

Count

| | | Which season that gives more avocado? | | | Total |
|-----------------------------|-------------|---------------------------------------|----------|----------|-------|
| | | A season | B season | C season | |
| What is average production? | <500 kg | 8 | 13 | 10 | 31 |
| | 501-2000 kg | 1 | 6 | 1 | 8 |
| | >5000 kg | 0 | 1 | 0 | 1 |
| Total | | 9 | 20 | 11 | 40 |

Appendix 6: Table indicating smallholders in Gisagara district land size

| | | Land size? | | | Cumulative Percent |
|-------|----------|------------|---------|---------------|-----------------------|
| | | Frequency | Percent | Valid Percent | |
| Valid | <0.5 ha | 31 | 77.5 | 77.5 | 77.5 |
| | 0.5-2 ha | 9 | 22.5 | 22.5 | 100.0 |
| | Total | 40 | 100.0 | 100.0 | |

Land size? * What is average production? Cross tabulation

Count

| | | What is average production? | | | Total |
|------------|----------|-----------------------------|-------------|----------|-------|
| | | <500 kg | 501-2000 kg | >5000 kg | |
| Land size? | <0.5 ha | 28 | 3 | 0 | 31 |
| | 0.5-2 ha | 3 | 5 | 1 | 9 |
| Total | | 31 | 8 | 1 | 40 |

Symmetric Measures

| | | Value | Asymptotic Standard Error ^a | Approximate T ^b | Approximate Significance |
|----------------------|----------------------|-------|---|----------------------------|-----------------------------|
| Interval by Interval | Pearson's R | .560 | .117 | 4.162 | .000 ^c |
| Ordinal by Ordinal | Spearman Correlation | .579 | .154 | 4.375 | .000 ^c |
| N of Valid Cases | | 40 | | | |

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Appendix 7: Photos during FGDs



Appendix 8: Survey photo in Gatoki cell



Appendix 9: Survey Photo in Munazi cell



Appendix 10: Photo taken in survey from Zivu cell



Appendix 11: Photos of local and improved avocado tree





Appendix 12: Photos of middlemen transporting and grading avocado



Appendix 13: Manager of New vision seventy ltd in his avocado nursery

