VALUE CHAIN AND THE PRODUCTION OF RICE IN KABUYE MARSHLAND, KIGALI, RWANDA

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In Partial Fulfilment of the Requirements for the Degree of
Master of Business Administration (Management)

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DECLARATION A

"This thesis is my original work and has not been presented for a Degree or any other academic award in any University or Institution of Learning".

HAKIZIMANA THEOPHILE

Name and Signature of Candidate

01 / NOV. / 2011

Date

DECLARATION B

"I confirm that the work reported in this thesis was carried out by the candidate under my supervision".

Name and Signature of Supervisor

Date

APPROVAL SHEET

This thesis entitled" Value Chain and the Production of Rice in Kabuye Marshland, Kigali, Rwanda" prepared and submitted by HAKIZIMANA THEOPHILE in partial fulfilment of the requirements for the degree of MBA Management has been examined and approved by the panel on oral examination with a grade of **PASSED**.

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DEDICATION

This thesis is dedicated to my wife, Mrs. Odette Hakizimana and our two sons: Newman GH Migisha and Ike Ikuzo Mihigo.

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ACRONYMS AND ABBREVIATIONS

ACSCP	African Crop Science Conference Proceedings
Apr	April
Aug	August
BEE	Business Enabling Environment
BMO	Business Membership Organizations
Cm	Centimetre
ODL	Open and Distance Learning
CORIKA	Cooperative of Rice Farmers of Kabuye
EAC	East African Community
EDPRS	Economic Development and Poverty Reduction Strategy (Rwanda, 2008-2012)
Feb	February
GTZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Company for International Cooperation)
Ha	Hectare
Ibidem	Same Author
Jan	January
Jul	July
Jun	June
KIU	Kampala International University
KM	Kabuye Marshland
LDCs	Less Developed Countries
M	Meter
Mar	March
Mar	March
Mm	Millimeter
MSEs	Micro- and Small Enterprises

MSL	Mean Sea Level
MSL	Mean Sea Level
N	Total Population
N	Sample Size
Nov	November
Oct	October
Sept	September
SSA	Sub-Saharan Africa
Std. Deviation	Standard Deviation
t/Ha	Ton per Hectare
USAID	United States Agency for International Development

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ABSTRACT

This study was conducted to establish the relationship between the level of value chain and the extent of rice production. Specifically, the study sought to establish the effect of (i) the level of value chain (ii) the extent of rice production and (iii) the relationship between the level of value chain and the extent of rice production in Kabuye Marshland, Rwanda.

The study employed the qualitative descriptive correlation design and data were collected from 107 respondents using a self administered questionnaire as the key data collection instrument. The data gathered were collated, encoded into the computer and statistically analysed using the Statistical Package for Social Sciences (SPSS) and Excel.

The research revealed that the level of value chain is good while the extent of rice production is fair. There was no significant relationship between the level of value chain and the extent of rice production in Kabuye marshland, Rwanda.

From the above findings, appropriate conclusions and recommendations including those for further researches were made. The government should ensure adequate hill water management and provide subsidies for the refurbishment and building of stores and drying areas.

The cooperative of farmer should hull, package, label and sell the rice as a stand-alone Kabuye rice brand, and they should ensure the regular maintenance of the existing public infrastructures, have a business plan and ensure good financial management of their business to increase the level of trust of members.

The following two studies are suggested for future researches: (1) End-market analysis of the Kabuye Marshland Rice, and (2) Analysis of the business enabling environment in the production of rice in Kabuye Marshland.

CHAPTER ONE

THE PROBLEM AND ITS SCOPE

Background of the Study

Rice is the most important staple food for a large part of the world's human population, especially in East and South Asia, the Middle East, Latin America, and the West Indies. It is the grain with the second-highest worldwide production, after maize (corn). Since a large portion of maize crops are grown for purposes other than human consumption, rice is the most important grain with regard to human nutrition and caloric intake, providing more than one fifth of the calories consumed worldwide by the human species (http://en.wikipedia.org/wiki/Rice).

Rwanda is counted among the sub-Saharan Less Developed Countries (LDCs) located in the heart of Africa. The country was ruined by constant wars including the most devastating Genocide of Tutsi of 1994. Thanks to security that was restored after the Genocide, strategies for economic recovery were established and they include largely agriculture, on which the country's economy is heavily based.

Among all the objectives set out in the Economic Development and Poverty Reduction Strategy 2008-2012 (EDPRs) in Rwanda in order to reduce poverty and hunger, the government policies aim at promoting the agricultural land intensification through the production of high value crops, modern livestock management and through the promotion of commodity chains and agribusiness.

And so, owing to the advantages of rice grains such as long shelf-life, ease of cooking and transportation, and less requirement of cooking fuel (compared to traditional food such as potato) that has rendered rice a popular choice of food in schools, homes, restaurants, and public programs in Rwanda, the production of rice has been given a high priority and so the government is seeking to increase productivity from the flood prone valley bottoms that are conducive for rice growing, which has drawn the Ministry of Agriculture and Animal Resources to invest tremendous amount of resources into the development of rice sub-sector in the country (Jagwe et al, 2003).

The same author states that it has also been observed that rice is capable of giving very high yields of over 7 tons per Ha per growth cycle, which is far above the yield from any other crops that can be planted in marshlands. Therefore, rice production is considered the most profitable enterprise as regards the utilization of the hydro-agricultural investments laid out. Rice as a food commodity is steadily growing in demand and consumption is mainly institutional or urban. Other desirable features of rice include its ease of storage, handling and shelf life. When processed, rice gives off several useful by-products, which can be utilized in the animal feed industry, breweries and other industries.

Since the introduction of rice for cultivation in 1960s, rice has become one of the major food crops grown in Rwanda. The fertile soil, favourable weather, natural water resources, and efficient manpower make Rwanda highly suitable for rice cultivation. The rising incomes, growing urban population, and changing lifestyles have further aggravated the demand for rice. The local markets responded to the increase in demand mainly by importing milled rice grains from countries such as Tanzania, Pakistan, Vietnam, and Uganda. Rwanda, in accordance with its East African Community (EAC) membership, currently administers a tariff-free rice imports from EAC countries and imposes a common external tariff for rice imported from outside it. The leading rice stores in urban areas largely sell the imported rice grains, whereas the stores in rural areas and in other unorganized markets sell predominantly the locally produced rice grains (Arumugam, 2010).

Chinese rice researchers in Rwanda have said that some parts of the country are suitable for the production of upland rice, but there is need to closely monitor climate changes. Some areas identified to be viable for upland rice production include Kabuye in Kigali, Rwamagana in the Eastern Province, and Huye in the Southern province. According to the research findings, rice planting is favourable in November and January. With better irrigation, July is also a favourable month.

Under marshlands, rice is grown in puddled soil in two seasons a year. Due to the mountainous nature of Rwandan geography, rice is grown mostly in swampy inland valleys that are referred to as marshlands. In old marshlands where rice has

been grown over the past few years, the quality of seeds limits the productivity. Since the adoption of new varieties in 2002, farmers were able to increase their yield. Farmers' yield has increased at a moderate slope of 0.15t/Ha over the past 10 years and the yield gaps between progressive farmers and national average remains very high. This suggests that there is room for substantial improvement of the current productivity levels. The importance of post harvest technologies on efficient processing and its effect on prices is generally not recognized and/or ignored by the rice farmers in Rwanda. Until recently, the milling in Rwanda remained an informal business activity in rural areas (Arumugam, 2010).

Statement of the Problem

Raising the productivity and increasing the efficiency of agricultural value chains are basic to the success of sub-Saharan Africa (SSA) rural economies and to the growth of incomes of their rural populations (Martin, W. & Labaste, 2010).

Rice is a staple typically grown in marshlands in Rwanda where it has become a major food crop, and has been one among the prioritized crops which offer better trade and value added prospects than the traditional food staples, thus helping to create a more self-reliant food balance (Jagwe et al, 2003).

Among all the objectives set out in the Economic Development and Poverty Reduction Strategy 2008-2012 (EDPRs) in Rwanda in order to reduce poverty and hunger, the government policies aim at promoting the agricultural land intensification through the production of high value crops, modern livestock management and through the promotion of commodity chains and agribusiness.

With focus on Kabuye Marshland as is the general case for all marshlands, the extent of rice production depends on the suitability of soil and rice seed varieties, adequate exploitation of the available area for cultivation, hill rain water management, availability of sufficient rain water and water for irrigation; adequate capacities to predict changes in rainfall patterns, sufficient soil fertility, land fallowing and crop rotations, adequate farming technology and sources of inputs (seeds, pesticides, fertilizers) as well as availability of irrigation equipments whereas

the level of value chain depends on access to finance, availability public infrastructures, availability supporting services, cost of inputs (seeds, pesticides, fertilizers), interest and profits sharing, joint activities, organization, collaboration, communication and relationships, laws and procedures, overall quality of Kabuye marshland rice, post-harvest handling and processing technology, quality of transportation equipment, quantity of production generated from cultivated area, trust of farmers towards leaders, use and follow-up of loans, use of by-products (bran and straws).

In view of the above, this research seeks to establish a relationship between the extent of rice production and the level of value chain in Kabuye Marshland to understand the opportunities and constraints that obstruct the performance of the value chain.

Purpose of the Study

This study intends to understand the systemic factors and conditions under which the production of rice in the Kabuye Marshland cannot achieve high output and all the major constraints to improve its performance or competitiveness.

Research Objectives

General: To establish the relationship of value chain and rice production in Kabuye Marshland, Kigali, Rwanda.

Specific: The objectives of this research are as follows:

1. To determine the profile of the respondents in terms of age, gender, number of qualified rice producers, education background, and length (number of years) of working experience in rice production.
2. To determine the level of value chain in Kabuye Marshland, Rwanda.
3. To establish the extent of rice production in Kabuye Marshland, Rwanda.
4. To establish if there is a significant relationship between the level of value chain and the extent of rice production in Kabuye Marshland.

Research questions

1. What is the profile of the respondents in terms of age, gender, educational background and length of working experience in rice production?
2. What is the level of value chain in Kabuye Marshland?
3. What is the extent of rice production in Kabuye Marshland, Rwanda?
4. Is there a significant relationship between the level of value chain and the extent of rice production in Kabuye Marshland?

Null Hypothesis

There is no significant relationship between the level of Value Chain and the Extent of Rice Production in Kabuye Marshland, Kigali, Rwanda.

Scope

This research is limited in terms of geographical scope, time scope, theoretical scope and content scope.

Geographical scope: This research was conducted in Kabuye Marshland located in a suburban place of Gasabo district in Kigali city, Rwanda. It is a mid-altitude (1,200 – 1,700 meters) wetland that covers an area of approximately 320 square kilometres, with well maintained organic material content in soils. This lowland constitutes a prolongation of Nyabugogo River from Muhazi Lake, around 5 miles away from Nyabugogo marketplace, by the Uganda Road.

Time Scope: This research was conducted from June until September 2011.

Theoretical Scope: This study covers Value Chain Theory especially the model developed by USAID (2005).

Content Scope: This study seeks to determine the profile of the respondents in terms of age, gender, number of qualified rice producers, education background, and length (number of years) of working experience in rice production. It determines the level of value chain and the extent of rice production and establishes if there is a significant relationship between the level of value chain and the extent of rice production in Kabuye Marshland.

Significance of the Study

1. The beneficiaries of this research include the Kabuye Marshland rice value chain actors including largely farmers, support market and business enabling environment agents, and end-market players, investors, scholars and researchers.
2. The research will generate information that will help raise the level of effectiveness of value chain in the production of rice in Kabuye Marshland.
3. The research will provide the value chain actors with information on what constitutes constraints and opportunities in the production of rice in the Kabuye Marshland.
4. The future researchers will utilize the findings of this study to embark on related rice value chain studies.

Operational Definitions

Value chain - a sequential flow of junctions all along the production process of rice in Kabuye marshland from inputs supply to its delivery to end-consumers, involving internal and external implications.

Rice production - the whole process of production of rice involving selection and supply of seeds, plantation, harvest, post-harvest handling and processing, and delivery in the market.

Constraints - all hindrances or obstacles incurred in the production of rice by farmers in Kabuye Marshland, Kigali, Rwanda.

Opportunities - prospects of improvement or upgrading of the production of rice in Kabuye Marshland, Kigali, Rwanda.

Value chain actors - all physical and moral people involved directly or indirectly in the production of rice in Kabuye Marshland, Kigali, Rwanda.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Concepts, Opinions and Ideas from Authors/Experts

This section deals with the review of the literature related to value chain analysis concepts.

Effectiveness

According to Fry et al (1998), effectiveness is a measure of the degree to which a business achieves its goals. These may be financial goals, employee performance goals, quality goals, innovation goals, or any other outcome that the business deems critical. The key is that a business is effective if it reaches its goals.

Production

Production is concerned with the creation of a good or service. For physical products, when we talk about production, we generally mean manufacturing. The production function of a company creates value by performing its activities efficiently so that lower costs result. Production can also create value by performing its activities in a way that is consistent with high product quality, which leads to differentiation and lower costs – both of which increase the value created (Charles, W. L. H. & Gareth, R. J., 2001).

The production goal is related to minimising variations in the range of production operations over a given period of time, and to the overall level of production (Laurie, J. M. (1994).

From the afore definitions, the researcher extracted value creation, minimisation of variations in the range of production operations over a given period of time, and high product quality to be the main points to emphasise in his research. As such, the researcher defines production as a full range of operations that are undertaken to create a valuable product to end-users.

Rice

Rice is the seed of the monocot plants Oryza sativa or Oryza glaberrima. As a cereal grain, it is the most important staple food for a large part of the world's human population, especially in East and South Asia, the Middle East, Latin America, and the West Indies. It is the grain with the second-highest worldwide production, after maize (http://en.wikipedia.org/wiki/Rice).

Since a large portion of maize crops are grown for purposes other than human consumption, rice is the most important grain with regard to human nutrition and caloric intake, providing more than one fifth of the calories consumed worldwide by the human species (ibidem).

A traditional food plant in Africa, its cultivation declined in colonial times, but its production has the potential to improve nutrition, boost food security, foster rural development and support sustainable land care. It helped Africa conquer its famine of 1203 (ibidem).

Rice is normally grown as an annual plant, although in tropical areas it can survive as a perennial and can produce for up to 30 years. The rice plant can grow to 1–1.8 m tall, occasionally more depending on the variety and soil fertility. It has long, slender leaves 50–100 cm long and 2–2.5 cm broad. The small wind-pollinated flowers are produced in a branched arching to pendulous inflorescence 30–50 cm long. The edible seed is a grain (caryopsis) 5–12 mm long and 2–3 mm thick. Rice cultivation is well-suited to countries and regions with low labour costs and high rainfall, as it is labor-intensive to cultivate and requires ample water. Rice can be grown practically anywhere, even on a steep hill or mountain.

Although its parent species are native to South Asia and certain parts of Africa, centuries of trade and exportation have made it commonplace in many cultures worldwide (ibidem).

The traditional method for cultivating rice is flooding the fields while, or after, setting the young seedlings. This simple method requires sound planning and servicing of the water damming and channelling, but reduces the growth of less robust weed and pest plants that have no submerged growth state, and deters

vermin. While flooding is not mandatory for the cultivation of rice, all other methods of irrigation require higher effort in weed and pest control during growth periods and a different approach for fertilizing the soil (ibidem).

Value Chain

The value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use (Kaplinsky, R., & Morris, M., 2002).

Value chains are a key framework for understanding how inputs and services are brought together and then used to grow, transform, or manufacture a product; how the product then moves physically from the producer to the customer; and how value increases along the way. Value chains encapsulate the sequence of steps, flows, investments, actors, and interrelationships that characterize and drive the process from production to delivery of a product to the market. Typically, value chain describes the full range of value adding activities (Webber & Labaste, 2010).

The term value chain refers to the idea that a company is a chain of activities for transforming inputs into outputs that consumers value. The process of transforming inputs comprises a number of primary and support activities (Charles & Gareth, 2001).

The primary analytical tool of strategic cost analysis is a value chain identifying the separate activities, functions, and business processes that are performed in designing, producing, marketing, delivering and supporting a product or service (Thompson & Strickland, 2003).

A value chain is a sequence of related business activities (functions) from the provision of specific inputs for a particular product to primary production, transformation, marketing, and up to the final sale of the particular product to consumers (the functional view on a value chain). It also refers to the set of enterprises (operators) performing these functions i.e. producers, processors,

traders and distributors of a particular product. Enterprises are linked by a series of business transactions in which the product is passed on from primary producers to end consumers (GTZ, 2007).

In consideration of the definitions above, the researcher defines value chain as a sequential flow of junctions all along the production process of a product or service, from inputs supply to its delivery to end-consumers, with internal and external implications it involves that result from linkages, support, governance and business environment where it resides and functions.

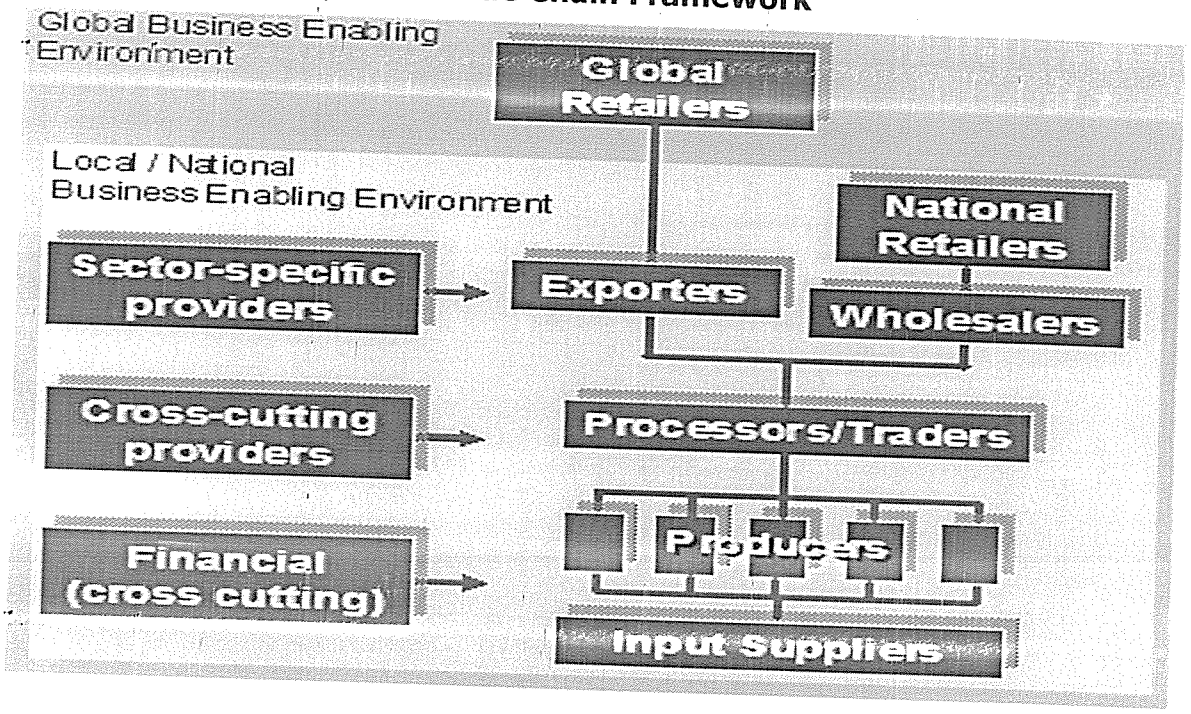
Theoretical Perspectives

This section describes different theories that were reviewed by the researcher related to value chain analysis and to which he based his research. The most useful ones include GTZ and USAID, and World Bank theories.

Value Chain Framework

According to the USAID (2005), Value Chain Framework comprises the structure and dynamics of the value chain. These are End Markets, Business Enabling Environment, Vertical Linkages, Horizontal Linkages, Supporting Markets that constitute of Value Chain Finance and Information and Communications Technology, Value Chain Governance, Inter-firm Relationships and Upgrading.

Figure 2.1:
Value Chain Framework



Source:
http://apps.develebridge.net/amap/index.php/Chain_Analysis#Value_Chain Framework

Structural Factors

The structure of a value chain includes all the firms in the chain and can be characterized in terms of five elements described below:

End-markets

The term end market is used to indicate where the final transaction takes place in a value chain. Typically, it is where the end-user is located, meaning the individual or organization for whom the product or service has been created, and who is not expected to resell that product or service. Local end markets are limited to areas surrounding the source of a product or service. These are typically defined by towns and districts within a country (although in some cases a nearby cross-border market may also be considered a local end market). In a value chain analysis, it is important to explore each existing and potential end market to determine which offers the greatest benefits (profit margins, embedded services,

competitive advantages, etc.) and risks (competition, sizeable investment, fleeting business relationships, etc.) for each actor in the value chain (USAID, 2005).

The researcher defines end-market as a non-for-resale client who purchases a finished commodity for satisfaction of his/her basic needs and the all the way and means used to deliver it to him/her.

Business Enabling Environment

The Business Enabling Environment (BEE) includes norms and customs, laws, regulations, policies, international trade agreements and public infrastructures (roads, electricity) that either facilitate or hinder the movement of a product or service along its value chain. The business enabling environment at the national and local level encompasses policies, administrative procedures, enacted regulations and the state of public infrastructure. Analysis of the BEE at these levels may need to be further broken down in terms of firm size since there may be constraints and opportunities distinctly facing Micro- and Small Enterprises (MSEs). In addition to these more formal factors, social norms, business culture and local expectations can be powerful aspects of the business enabling environment. Understanding these unwritten rules of society is essential if practitioners are to understand why value chain actors behave the way they do, and reasonably predict how they will behave in response to value chain interventions (USAID, 2005).

Vertical Linkages

Value chain operators relate to each other both horizontally (among enterprises at the same stage of the value chain, pursuing the same type of activity) as well as vertically (between suppliers and buyers of produce). Vertical business linkages can range from accidental market exchanges to a full coordination of activities regulated by contracts. Horizontal business linkages range from informal networks to associations and business membership organizations (BMO) (GTZ, 2007).

Vertical linkages facilitate the delivery of benefits and embedded services and the transference of skills and information between firms up and down the chain.

MSEs are vertically linked to a varied range of market actors including wholesalers, retailers, exporters, traders, middlemen, input dealers, suppliers, service providers and others. The nature of vertical linkages—including the volume and quality of information and services disseminated—often defines and determines the benefit distribution along the chain and creates incentives for, or constrains, upgrading, defined as "innovation to increase value added." Moreover, the efficiency of the transactions between vertically linked firms in a value chain affects the competitiveness of the entire industry (USAID, 2005).

Horizontal Linkages

Horizontal linkages are longer-term cooperative arrangements among firms that involve interdependence, trust and resource pooling in order to jointly accomplish common goals. In addition to lowering the cost of inputs and services, horizontal linkages can contribute to shared skills and resources and enhance product quality through common production standards. Such linkages also facilitate collective learning and risk sharing, while increasing the potential for upgrading and innovation. Value chain analysis also considers competition between firms. While cooperation can help firms achieve economies of scale and overcome common constraints to pursue opportunities, competition can encourage innovation and drives firms to upgrade. The most successful horizontal linkages maintain a balance between these two contrasting, but critical and complementary concepts. One of the objectives of value chain analysis is to identify areas where collaborative bargaining power could reduce the cost or increase the benefits to small firms operating in the chain (USAID, 2005).

By associating, small enterprises qualify as business partners and increase their bargaining power vis-à-vis buyers. A related purpose of collaborating is the joint access to support services. Beyond the direct business advantages, entrepreneurs benefit from cooperating by resolving common problems, by organizing upgrading action and by joint learning. External facilitators need horizontal associations as multipliers of information to a wider group of people.

Farmers and micro enterprises do not qualify as clients of public support individually. This purpose can be achieved in enterprise networks – or by associations that are sufficiently big to organize service provision for their members (GTZ, 2007).

Horizontal linkages also offer excellent opportunities for value chain participants to obtain scale advantages through inter-firm coordination. By combining resources and sharing information, horizontal cooperation allows participating companies and producers to achieve improved quality, service, and savings through increased access to inputs, more leverage in sales negotiations, and greater ability to design initiatives that emphasize upgrading the value chain (Martin, W. & Austin J.E., 2010).

Supporting Markets

Supporting markets play an important role in firm upgrading. They include financial services; cross-cutting services such as business consulting, legal advice and telecommunications; and sector-specific services, for example, irrigation equipment or handicraft design services. Not all services can be provided as embedded services by value chain actors, and so vibrant supporting markets are often essential to competitiveness. Service providers may include for-profit firms and individuals as well as publicly funded institutions and agencies. Support markets operate within their own value chain—most service providers themselves need supplies, training and financing in addition to strong vertical and horizontal linkages. Value chain analysis should therefore seek to identify opportunities for improved access to services for target value chain actors in such a way that the support markets will be simultaneously strengthened, rather than undermined. Formal supporting markets are likely to expand as the value chain develops. Therefore, when analyzing emerging value chains, or ones predominated by MSEs, particular care should be taken to uncover informal sector service providers, which often go unnoticed (USAID, 2005).

Dynamic Factors

The firms in an industry create the dynamic elements described below through the choices they make in response to the value chain structure.

Value Chain Governance

Chain governance" refers to the way in which the coordination of chain operators is achieved along the chain stages (GTZ, 2007).

Value chain governance refers to the relationships among the buyers, sellers, service providers and regulatory institutions that operate within or influence the range of activities required to bring a product or service from inception to its end use. Governance is about power and the ability to exert control along the chain – at any point in the chain, some firm (or organization or institution) sets and/or enforces parameters under which others in the chain operate. Governance is particularly important for the generation, transfer and diffusion of knowledge leading to innovation, which enables firms to improve their performance and sustain competitive advantage (USAID, 2005).

Inter-firm relationships

This refers to the nature and quality of the interactions between stakeholders in a value chain. Relationships can be supportive of industry competitiveness that enhances MSE benefits or adversarial to it. Supportive relationships facilitate collaboration; enable the transmission of information, skills and services; and provide incentives for upgrading. They are based on a long-term view of the industry, while adversarial relationships are structured to maximize short-term profits. During value chain analysis interviewees should be asked questions that will reveal whether they consider their relationships to be mutually beneficial; whether their interactions are recurrent and substantial (involving the exchange of information, skills and services in addition to product and money) or are brief, isolated commercial interactions; and whether these relationships are entered into

freely from a motive of self-interest, without social or government pressure (USAID, 2005).

Characteristics of value chain relationships that have the largest effect on the level of trust between participants include (1) Length of trading relationship (2) Ordering procedures (3) Contractual relationship (4) Inspection (5) Degree of dependence (6) Technical assistance (7) Communication (8) Price determination (9) Credit extended and (10) Outsourcing payment terms (Kaplinsky and Morris 2002).

Upgrading

According to Martin, W. and Austin J.E. (2010), upgrading refers to the innovation that increases firm and/or value chain competitiveness. It is referred to as increasing the competitiveness of the value chain by moving it in a new direction – towards a new market, market segment, or customer; towards increased efficiency within the value chain; or towards adding operations within the value chain.

In order to respond effectively to market opportunities, firms and industries need to innovate to add value to products or services and to make production and marketing processes more efficient. These activities, known as firm-level upgrading, can provide MSEs with higher returns and a steady, more secure income through the development of knowledge and the ability to respond to changing market conditions. Upgrading at the industry-level focuses on increasing the competitiveness of all activities involved in the production, processing and/or marketing of a product or service and mitigating the constraints that limit value chain performance. Upgrading needs to be a continual process and can lead to national economic growth. In value chain analysis, the objective is to identify opportunities and constraints to firm- and industry-level upgrading; specifically the analysis looks for catalyst firms with the incentives, resources and willingness to promote and facilitate upgrading within the chain (USAID, 2005).

According to GTZ (2007), building a value chain upgrading strategy involves a sequence of steps to build: The first is agreeing on a vision and strategy for value

chain upgrading. This is to determine the outlook for the value chains in general - the vision of development of the value chain in future. The second task is analyzing opportunities and constraints to chain upgrading. This means that in light of that vision, the second step is to review value chain constraints as well as opportunities. The third task is setting operational objectives and preparing upgrading action. Further on, the vision is operationalized to arrive at objectives. The fourth task is identifying actors implementing the value chain upgrading strategy. A concrete action programme is required specifying fields of action and the chain actors responsible for implementing. The fifth and final task is anticipating the impact of value chain upgrading. This means that the final stage consists of formatting a results-framework or impact model in which the development logic of chain upgrading is presented.

A step-by-step summary of upgrading and deepening the value chain include the following two points: (1) Encourage value chain actors to consider vertical integration. Partners and facilitators in this integration may include intermediate and downstream businesses, and organizations such as farmers associations, service-provider associations, and marketing organizations, and (2) identify and develop facilitators for upgrading or deepening. This investment can be supported through sound business services (for example, technical capacities, access to skills, access to finance) and by good relationships and familiarity with the needs of the other actors in the value chain (Martin, W. & Austin J.E., 2010).

Kaplinsky, R. & Morris, M. (200), identified four trajectories which firms can adopt in pursuing the objective of upgrading, namely:

Process upgrading - increasing the efficiency of internal processes such that these are significantly better than those of rivals, both within individual links in the chain (for example, increased inventory turns, lower scrap), and between the links in the chain (for example, more frequent, smaller and on-time deliveries).

Product upgrading - introducing new products or improving old products faster than rivals. This involves changing new product development processes both within

individual links in the value chain and in the relationship between different chain links.

Functional upgrading - increasing value added by changing the mix of activities conducted within the firm (for example, taking responsibility for, or outsourcing accounting, logistics and quality functions) or moving the locus of activities to different links in the value chain (for example from manufacturing to design).

Chain upgrading - moving to a new value chain.

According to the researcher, value chain upgrading consists of typically, sequentially and strategically strengthening each single dynamic and structural factor within it, with an objective to deliver a valued final product to end-market consumer.

Among many theories reviewed above, the researcher based his study on the USAID (2005) according to which value chain analysis focuses on constraints to the opportunities identified in the end market analysis. The value chain framework defines the scope of the chain analysis, serving as a checklist and organizing framework for the research. Chain analysis examines both structural and dynamic factors affecting value chain competitiveness and the depth and breadth of benefits, including (1) Structural factors that comprise end markets, business enabling environment, vertical linkages, horizontal linkages, and supporting markets, and (2) Dynamic factors that comprise value chain governance, inter-firm relationships and upgrading.

This proved to be a more systemic and systematic theory that covers all the elements needed for a value chain analysis that claims to be standard. Not only the researcher used this theory, but also adapted its standard value chain analysis report format interview tool used in the study entitled "Global food security response: west-Africa rice field work protocol" in 2009. This was used for five countries (Senegal, Mali, Liberia, Ghana and Nigeria) to allow comparisons between countries and identify gaps in information and ensure consistency in the approach used.

The researcher's upgrading suggestions consisted of a systematic consideration of all factors constituting both structural and dynamic factors as depicted from the framework.

Introduction to Rice Industry in Rwanda

Rice was introduced in Rwanda in 1950s through various missions from China and Korea. After the initial success of growing rice in the valleys near Kigali and in the Southern province, a number of varieties became popular in 1960s. These varieties collectively referred to as Kigoli, are of short and bold type. In Bugarama, government introduced rice varieties from India such as Basmati 370 in 1980s. In 2001-02, the national agricultural research institution (Institut des Sciences Agronomiques du Rwanda (ISAR)), in collaboration with West Africa Rice Development Association (WARDA) evaluated a total of 990 rice accessions in farmers' field through a participatory approach in 4 marshland areas. Farmers selected 24 rice varieties based on tillering ability, early maturity, erect flag leaf, panicle length, big and heavy panicles, long and slender grains, awning, general disease occurrence, and grain yield. These varieties were subsequently introduced for cultivation in different marshland areas in the country in 2002. The new varieties are of long and slender type and generally yield higher than Kigoli varieties. However, the varieties are not as widely adapted as the Kigoli varieties in Rwanda (Jagwe, 2003).

Table 2.1:

Rice Schemes and Varieties in Rwanda

Scheme	Province	Rice grown by area (Ha)	Altitude	Edaphic conditions	Variety
Bugarama	Cyangugu /South	830	Low altitude < 1,200 M	Alluvial and clay Soils	Basmati 370 and IRAT
Butare	Butare /South	1,239	Mid altitude 1,200 – 1,700 M	Low organic matter Content High risk of iron toxicity	Unfilled
Mukunguri	Gitarama /South	240	Mid altitude 1,200 – 1,700 M	Sandy soils with eroded material	Zhong geng (Local name Kigoli, Yun keng 136,and Yunertian 01
Rwamagana	Kibungo /East	670	Mid altitude 1,200 – 1,700 M	Well maintained organic material content in soils	Zhong geng (Local name Kigoli, Yun keng 136, Yun yine 4, Yunertian 0, and IRAT
Mutara	Nyagatare /East	280	Mid altitude 1,200 – 1,700 M	Alluvial soils with vertisols that break down in dry season	Zhong geng (Local name Kigoli, Yun keng 136, Yunertian 0, and IRAT
Bugesera	South	200	Mid altitude 1,200 – 1,700 M	Low organic matter Content	Zhong geng (Local name Kigoli, Yun keng 136, and Yunertian 01
Kabuye	Kibuye /West	320	Mid altitude 1,200 – 1,700 M	Well maintained organic material content in soils	Zhong geng (Local name Kigoli, Yun keng 136, and Yunertian 01
Cyili		Unfilled	Unfilled	Unfilled	Fac V046

Source: ISAR, adapted from Marketing Survey of the Rice sub-sector in Rwanda (2003).

Variety Aspects

The Chinese varieties have been the most commonly grown for the past 30 years or more. These were introduced in the 1960s and when the government of Rwanda introduced large-scale production of paddy. Of recent, varieties such as Basmati, BG, IITA, IRON and FAC have been introduced in Rwanda and some of them are on high demand due to some of their attributes which include; good grain quality, good aroma, length of grain (long preferred), tolerance to diseases and yield. The specific variety aspects are:

Zhong geng, Yun keng 136, Yun yine 4, Yunertian 01, Fac V046 have, and IRON 280 varoeties have short grain, are resistant to rice blast and have a sheath brown rot (pseudomonas sp.). Xinun 175 variety has a short grain, is very susceptible to rice blast and has sheath brown rot (pseudomonas sp.). Basmati 370, IRAT and BG 400-1 have long grains, good aroma, low yield, are resistant to rice blast and have sheath brown rot (pseudomonas sp.).

Rice Diseases in Rwanda

The most important disease in most rice growing areas in Rwanda is Rice blast caused by P. Oyzae. It is common in Cyili and attacks the Yun yine 4 variety when grown for more than 3 consecutive seasons on a large scale. This disease is capable of causing 80% loss in terms of yield. Other diseases include Sheath brown rot caused by Pseudomonas fuscovaginae and this is found in areas above 1,500M such as Cyili, Rwamagana and Kabuye. The other disease is fungal caused by Sarocladium oryzae and is common in Bugarama.

Rice Demand in Rwanda

In 2008, rice were grown on 12,000 ha, the national annual production was 66,000 tons of paddy rice. Rwanda is to increase acreage for rice-growing to 35,000 hectares from 12,000 hectares to meet local demand. The East African nation produced 246,372 metric tons of rice against demand of 301,167 tons, and imported the deficit. In more recent years the Government's investment efforts have been directed towards the reclamation of vast areas of inland valleys swamps

(marshlands), construction of several small dams in the valleys, organization of farmers' co-operatives, privatization of rice mills, farm mechanization and facilitation of the supply of inputs such as seeds, fertilizers, and pesticides. As a result, the total area under rice cultivation has increased dramatically from 3,549 Ha in 2000 to 13,000 Ha in 2009. In parallel, the total milled rice production has also increased by 6-fold from 5,975 tonnes in 2000 to an estimated 36,000 tons in 2009 (Arumugam, 2010).

Rice Farming Systems in Rwanda

Although rice is not a traditional crop, it has emerged as the most suitable crop for marshlands and inland valleys in the recent years. Several reasons justify this recent shift in cultivation. Soil erosion in the hills and the associated slopes due to intensive cultivation of traditional crops such as banana, cassava, beans and potato has diminished the sustainability of farming in the uplands. Rice is the only crop that thrives well and produces better yield than any other traditional crops especially during rainy season. The recently introduced varieties can yield up to 7t/Ha. Thus rice provides a viable alternate for millions of resource-poor rural farm families in Rwanda (ibidem).

Marshland Development

Due to the mountainous nature of Rwandan geography, rice is grown mostly in swampy inland valleys that are referred to as marshlands. The top soil in marshlands is more heterogeneous and constantly changing. This is due to the various degrees of erosion of soil from the associated hills into the marshlands. Under marshlands, rice is grown in puddled soil in two seasons a year. During the wet season (January through June), the soil is constantly moist due to rains and the occasional flooding. In 2009, rice was grown in about 12,000 Ha of marshlands. Although water is increasingly becoming a constraint during the dry season, some marshlands in the country are comparable to the favourable lowland rain fed environment (ibidem).

Marshland ecosystem is comparable to lowland irrigated ecosystems in Asia except that marshlands are prone to occasional flooding particularly during the wet season. Marshlands in Rwanda can be found at various altitudes ranging from 1000 m above mean sea level (MSL) to >1700 m MSL. High relative humidity, cool night temperatures (10 to 15 degrees Celsius), warm day temperatures (20 to 30 degrees Celsius), and frequent rains are the salient features of marshlands. During the dry season (July through December) however, the soil moisture content drops significantly in marshlands. The inconsistent rains during the dry season can even expose rice crop to short periods of drought stress. Government spends enormous amount of resources in reclaiming swamps and developing marshlands for rice cultivation in the country (ibidem).

Related Studies

Findings from a marketing survey of the rice sub-sector in Rwanda indicated that there is potential for growth of the domestic market for rice especially with the advantageous attributes of rice as global modernization changes that are setting in. The national target was to produce sufficient rice to meet its national demand and then export by 2010. The study included "improvement of extension services and strengthening of farmer associations" as one of the prospects for a major breakthrough of Rwanda's rice sector into the regional and global market (Jagwe et al, 2003).

A study entitled "Enabling Self Sufficiency and Competitiveness of Rwanda Rice: Issues and Policy Options" conducted by the Rwanda Ministry of Agriculture and Animal Resources concluded that the rice sub-sector in Rwanda faces two challenges – insufficiency (volume) and inappropriateness (value). It further elucidated that Self sufficiency in rice production should be achieved by (a) rising the productivity of existing lands and (b) by further expanding the area under rice cultivation, and that the quality of locally produced grains on the other hand, needed to be improved through (i) handling and (ii) efficient processing of the harvest (Arumugam, K., 2010).

A study on access to finance through value chains highlighted a number of constraints and challenges which make formal financial institutions shy away from getting involved in value chains financing need to be addressed in Rwanda. These include (1) donors and government subsidies "crowding-out" private initiatives in value chain development (2) poor organisation among chain actors, particularly producers (knowledge about relationships between chain actors, tools for value chain analysis, capacity to develop appropriate products for value chain actors, capacity to assess credit risks and business plans related to value chains, and capacity to follow-up of loans distributed to chain actors) (Straton, H., 2007).

A participatory Rural Appraisal (PRA) was carried out to identify the major constraints to rice production in Bugiri district, Uganda, identified the major constraints to be water management, soil nutrient depletion, weeds, labor, pests and diseases (ACSCP, 2005).

All the above-reviewed studies highlighted ineffectiveness in terms lack of economies of scale and inappropriateness (lack of value). They present a need to strengthen farmers' associations (vertical and horizontal linkages), and poor post harvest handling and processing (inequality), constraints to access to finance, poor organisation among chain actors (inter-firm relationships and governance) as well as other elements related or have something to do with value chain supporting markets and business enabling environment. Each appears to the researcher as incomplete as none of them has ever addressed (entirely or partly) Rwanda rice value chain analysis to address its main factors namely end-markets, business enabling environment, vertical and horizontal linkages, supporting markets, value chain governance, inter-firm relationships, and upgrading.

CHAPTER THREE

METHODOLOGY OF THE STUDY

Research Design

This study constitutes of a qualitative descriptive correlation design in that it was interested in relating the level of value chain and the extent of rice production in Kabuye marshland, Rwanda.

Research Population

The CORIKA cooperative comprise many independent groups that have their own leadership and distributed according to the geographic side of the KM marshland they reside.

Thanks to its location in the heart of the marshland, Nyacyonga is a very dynamic group of 100 rice farmers that accommodates rice growers from all its bordering places, which made the researcher to choose it for his total population.

Sample Size

The Sloven's formula was used to calculate the sample size for each category of respondents. The formula is given as:

$$n = \frac{N}{1 + N(0.05)^2}$$

Where N (Total population), n (Sample Size) and 0.05 (Level of significance).

Table 3.1:

Sample Population of the Study

Function	Target Population (N)	Sample Size (n)
Farmers of Nyacyonga Group	17	16
Farmers of Kabuye Group	14	14
Farmers of Rutongo Group	24	23
Farmers of Karuruma Group	25	24
Farmers of Gasanze Group	26	24
Cooperative Leaders	7	7
Total	**113**	**107**

Source: KORIKA archives, 2010.

Sampling Procedures

The population of this study constitutes 113 rice growers of Kabuye Marshland, members of CORIKA Cooperative. These growers are spread in 5 rice grower groups in accordance to their location. Therefore, a cluster random sampling was used to reduce cost and save time of doing research and to increase the degree of accuracy of the study (Saunders et al. 2,000). Regarding sample size, the sampling frames (cooperative leaders and rice growers).

Research Instruments

Primary data were collected by means of questionnaires and documentation was used to collect secondary data such as books and reports. Questionnaires were designed using a Likert Scale (from 1 to 5) where 1 is Poor and 5 Excellent. Questionnaires were administered to farmers and the leaders of their cooperative.

Data Collection Methods

The researcher used secondary and primary data collection methods. Secondary date were gathered by reviewing books, journals, articles and internet

sources while primary data were collected by means of self-administrated questionnaires as the data collection instrument as it was easy and quick.

Validity and Reliability of the Instrument

The instrument used in this research is standardized. It was adapted from a standard interview format for staple food value chain studies called "Global Food Security Response: West Africa Rice Field Work Protocol" (USAID, 2009).

Data Gathering Procedures

Value chain analysis process requires four interconnected steps: (1) data collection, (2) value chain mapping, (3) analysis of data (to identify opportunities and constraints), and (4) vetting of findings (defence) (USAID, 2005).

Before the administration of the questionnaires

1. An introduction letter was obtained from the School of Post Graduate Studies and Research for the researcher to solicit approval to conduct the study from respective authorities for Kabuye Marshland.
2. When approved, the researcher secured a list of the qualified respondents from farmers of Kabuye Marshland in charge and select through systematic random sampling from this list to arrive at the minimum sample size.
3. The respondents were explained about the study and were requested to sign the Informed Consent Form (Appendix 3).
4. More than enough questionnaires were reproduced for distribution.
5. Research assistants who would assist in the data collection were selected, briefed and oriented in order to be consistent in administering the questionnaires.

During the administration of the questionnaires

1. The respondents were requested to answer completely and not to leave any part of the questionnaires unanswered.

2. The researcher and assistants emphasized retrieval of the questionnaires within a week from the date of distribution.
3. On retrieval, all returned questionnaires were checked to ensure all were answered.

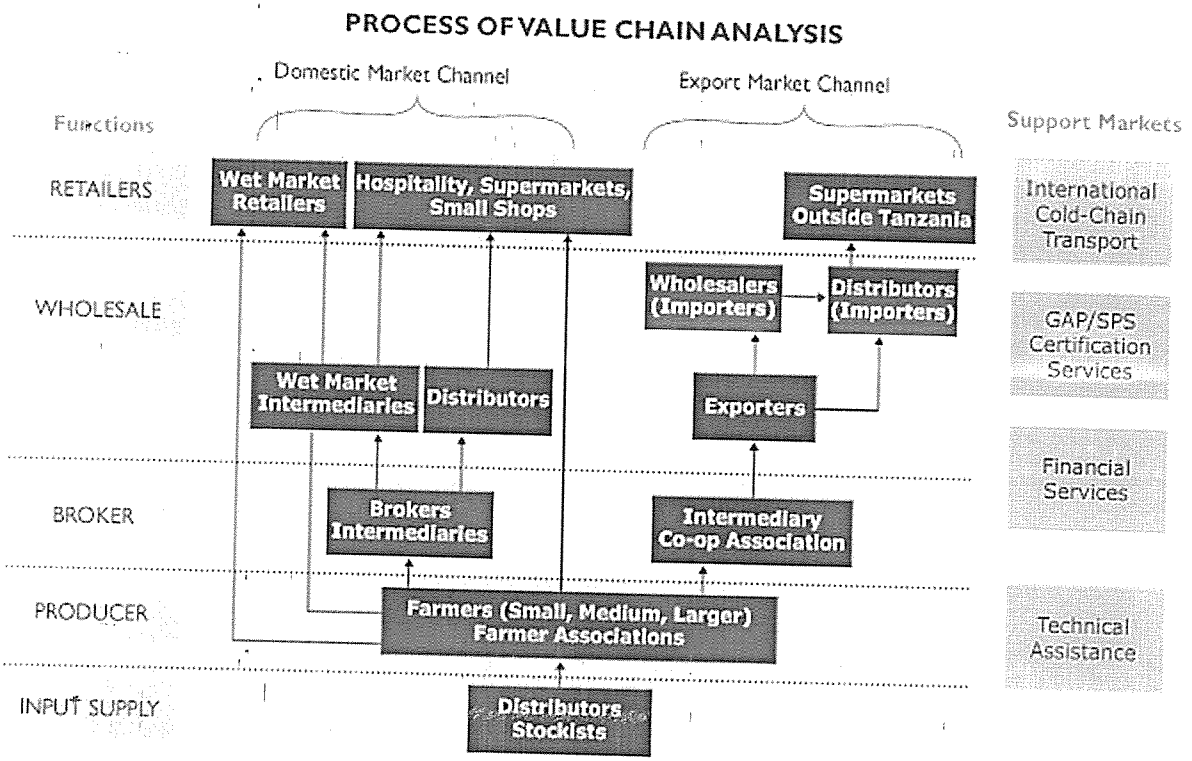
After the administration of the questionnaires

The data gathered were collated, encoded into the computer and statistically treated using the Statistical Package for Social Sciences (SPSS) and Excel.

Data Analysis

During data analysis, the researcher compiled the collected qualitative data to map the Kabuye rice value chain. Value chain mapping is the process of developing a visual depiction of the basic structure of the value chain. This was to illustrate the way the Kabuye rice product flows from raw material to end-markets and presents how the KM rice value chain functions. It is a compressed visual diagram of the data collected at different stages of the value chain analysis and supports the narrative description of the chain. The following table was used as a guide mapping framework.

Figure 3.1
Value Chain Mapping Function Worksheet



Source: http://apps.develebridge.net/amap/index.php/Value_Chain_Mapping_Process

Statistical Package for Social Science (SPSS) and Excel softwares were used to analyze quantitative (statistical) data to determine the Profile of the Respondents, the Level of Value chain and the Extent of Rice Production in Kabuye Marshland, Rwanda. More specifically, SPSS was used to determine and design tables for descriptive statistics (calculation of Mean for Level of Value Chain and Extent OF Rice production and Pearson's Chi-Square to establish if there is a significant relationship between the Level of Value Chain and the Extent of Rice Production). The interpretation of quantitative data based on the Likert emphasized on the calculated Mean in the Descriptive Statistics.

Table 3.2:

Mean Range and Interpretation

Mean Range	Interpretation
4.21-5.00	Excellent
3.41-4.20	Very Good
2.61-3.40	Good
1.81-2.60	Fair
1.01-1.80	Poor

Source: Computed as provided by the Researcher's Supervisor

An overall average mean was calculated to determine the overall Level of Value Chain and the Extent of Rice Production in Kabuye Marshland, Rwanda.

Also, the level of relationship significance between the independent variable (Level of Value Chain) and dependent variable (Rice Production) was measured using Pearson's Chi-Square. The Pearson's Chi-Square is significant when it below 0.05. As our null hypothesis according to which there is no significant relationship between the Level of Value Chain and the Extent of Rice Production in Kabuye Marshland, this will be rejected if the calculated Pearson's Chi-Square correlation between selected items from the Level of Value Chain and the Extent of Rice Production is below 0.05, and will be accepted if the it is above 0.05.

As derived from theoretical framework, the mapped qualitative data and the quantitative data analyzed by means of SPSS and Excel were further compiled and analyzed together using the USAID (2005) Value Chain Analysis Table.

As the theory provides, the Value Chain Analysis Table focused on the value chain framework Structural Factors (end markets, business enabling environment, vertical linkages, horizontal linkages, supporting markets) and Dynamic Factors that comprise of value chain governance, inter-firm relationships and upgrading factors.

Ethical Considerations

The researcher is committed to not violating nondisclosure agreements, breaking participants' confidentiality, misrepresenting results, deceiving people, invoicing irregularities, avoiding legal liability and more.

This research was designed so that the Kabuye rice value chain analysis participants do not suffer physical harm, discomfort, pain, embarrassment, or loss of privacy. To safeguard against these, the researcher followed the following guidelines including (1) clearly explain to participants the benefits of the Kabuye Rice Value chain under study; (2) explain participants their rights and protection and (2) obtain informed consents.

Limitations of the study

The anticipated threats to validity in this study were as follows:

- Intervening or confounding variables which were beyond the researcher's control such as honesty of the respondents and personal biases. To minimise such conditions, the researcher requested the respondents to be as honest as possible and to be impartial/unbiased when answering the questionnaire.
- The research environment are classified as uncontrolled settings where extraneous variables may influence on the data gathered such as comments from other respondents, anxiety, stress, motivation on the part of the respondents while on the process of answering the questionnaires. Although these are beyond the researcher's control, efforts were made to request the respondents to be as objective as possible in answering the questionnaires.
- *Testing:* The use of research assistants might have rendered inconsistencies such as differences in conditions and time when the data were obtained from respondents. This will be minimised by orienting and briefing the research assistants on the data gathering procedures.
- *Attrition:* A representative sample might not be reached as computed due to circumstances within the respondents and beyond the control of the

researcher. Exceeding beyond the minimum sample size was done by the researcher to avoid this situation.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter starts with narrative statements of the data in answer to the specific research questions then a tabular presentation of the data. Below the tables, the meaning and practical implications of the findings with consideration on the results of similar studies were discussed, following the objectives of the research.

The First section verifies the first objective that seeks to present the profile of the respondents in terms of age, gender, education background, qualifications and experience in growing rice.

The second section verifies the second objective that is to determine the level of Kabuye Marshland Value Chain. It seeks to determine the factors that influence the performance of the overall value chain. It also draws a compressed visual diagram (map) that illustrates the way the Kabuye rice flows from the supply of inputs to end-markets which helps to understand the way the Kabuye Marshland rice value chain functions and vertical linkages therein. This also supports the narrative description of the chain.

The third section verifies third objective that is to determine the extent of rice production in Kabuye Marshland. It seeks to understand the factors that influence the performance of farmers in production of rice.

In line with the fourth objective, the fourth section draws a correlation table to verify if there a significant relationship between the level of value chain and the extent of rice production in Kabuye marshland.

All the data were discussed in light of the USAID (2005) theory according to which the value chain framework constitutes of structural factors (end market, business enabling environment, vertical and horizontal linkages, and support markets) and dynamic factors (value chain governance and interfirm relationships), that were subsequently summarised in a value chain analysis table to identify opportunities, constraints and upgrading strategies.

Profile of the Respondents

This first section of the fourth chapter presents respondents' profile in terms of age, gender, number of qualified rice producers, education background, and length (number of years) of working experience in rice production as follows:

Table 4.1:

Profile of the Respondents

Items	Frequency	Percent	Valid Percentage	Cumulative Percentage
Gender				
Male	62	57.9	57.9	57.9
Female	45	42.1	42.1	100.0
Total	107	100.0	100.0	
Age				
<16 years	4	3.7	3.7	3.7
17-26 years	19	17.8	17.8	21.5
27-36 years	24	22.4	22.4	43.9
37-46 years	18	16.8	16.8	60.7
=>47years	42	39.3	39.3	100.0
Total	107	100.0	100.0	
Highest Level of Education				
Below primary schooling	63	58.9	58.9	58.9
Primary level	33	30.8	30.8	89.7
Post primary schooling	10	9.3	9.3	99.1
Secondary schooling certificate	1	.9	.9	100.0
Total	107	100.0	100.0	
Specific Qualifications				
Agronomy or related field	2	1.9	1.9	1.9
Certificate of training rice farming or agriculture	1	.9	.9	2.8
Other Qualifications	4	3.7	3.7	6.5
No qualification at all	100	93.5	93.5	100.0
Total	107	100.0	100.0	
Farming Experience				
< 1 year	6	5.6	5.6	5.6
2-3 years	5	4.7	4.7	10.3
4-5 years	11	10.3	10.3	20.6
6-7 years	14	13.1	13.1	33.6
8 years and above	71	66.4	66.4	100.0
Total	107	100.0	100.0	

Source: Primary data, 2011

It can be seen from the table above that the gender of respondents is roughly equally distributed but preponderantly men. More precisely nearly 54% of

the rice growers of Kabuye marshland are men while approximately 46% are women. Concerning the respondents' age, the table above shows that there are significant respondents' age disparities as nearly 5% of the rice growers of Kabuye marshland are youths below the age of 16 years. More than 50% of rice growers are above 36 years of age, and the majority (36%) are above 47 years of age. The same table shows that more than 55% of the respondents did not complete primary schooling and of them or they did no schooling at all. Only 12.3% of the respondents did post primary schooling and of them, only one holds a secondary school certificate. As far as respondents' qualification is concerned, it is also shown in the table above that slightly more than 2% of the respondents are professional farmers with a secondary school certificate in agronomy. Nearly 6% have qualification other than agronomy and rice farming training, and more than 92% have no qualification at all. As for farming experience, more than 75% of the respondents have been growing rice for 6 years and more. Briefly, rice growers in Nyacyonga have commendable experience in farming rice but they lack professional farmers who can help them adopt new farming methods. This has kept them in traditional and obsolete farming techniques. The overall observation is that the Kabuye Marshland rice value chain is constrained by the overage farmers that do not have enough physical energy to assume the hard work required by rice farming activity. The value chain is also constrained by lack of professional farmers who have agricultural academic skills, which leads to poor planning and mismanagement of cooperative property. Nevertheless, farmers have very proven experience in rice farming inherited from their parents.

Level of Value Chain

The first objective of this study is to determine the level of value chain of the production of rice in Kabuye marshland, Rwanda. In line with the USAID (2005) value chain framework, this was done through the assessment of business enabling environment to understand environmental conditions under which the rice value chain of Kabuye Marshland cannot achieve high level of output. These include the

quality and quantity of available public infrastructures and laws and procedures governing the rice farming in the marshland. It also examined the horizontal linkages to delineate joint activities in the chain, organisation, communication and collaboration among value chain actors, especially farmers. A value chain map for Kabuye marshland value chain was drawn to show vertical linkages existing within the chain so as to illustrate channels though which Kabuye marshland rice flow from input supply to end-market consumers. The level of Kabuye Marshland value chain could not also be determined without knowing the support markets existing therein, its governance, and interfirm relationships that in a way or another influence the level of performance of the value chain.

Table 4.2:

Level of Value Chain

Categories	Mean	Std. Deviation	Rank	Interpretation
The level predictability capacity of climate changes - change in rainfall patterns.	4.07	.949	1	Very Good
Availability of adequate rainfalls in wet seasons, natural wetland water, and water for irrigation in dry seasons	3.90	.941	2	Very Good
Procedures to access land for cultivation and to join the farmers' cooperative	3.84	1.117	3	Very Good
The quality of farming technology used in Kabuye Marshland	3.82	.920	4	Very Good
Hill Rain water management (to avoid accumulation of heterogeneous soils flooded into the marshland from associated hills)	3.81	.943	5	Very Good
The price/cost of inputs (seeds, pesticides, fertilizers) as opposed to the purchasing power of rice growers Availability of sources of inputs (seeds, pesticides, fertilizers)	3.58	.891	6	Very Good
Access to Finance (from banks, micro-finances, CORIKA and any other lenders)	3.52	1.313	7	Very Good
Participation and consultation of farmers in decision making	3.46	1.127	8	Very Good
Level of trust of farmers towards cooperative leaders in KM rice value chain actors	3.45	1.135	9	Very Good
Interest and profits sharing among rice farmers (cooperative members)	3.44	1.066	10	Very Good
The quality of Kabuye Marshland rice : taste and smell of Kabuye marshland rice compared to other rice varieties available in the market	3.35	1.082	11	Good
Level of exploitation of available area for cultivation in Kabuye Marshland	3.34	1.063	12	Good
Joint and collective activities among rice value chain actors especially (farming, processing, etc)	3.33	1.235	13	Good
Use of byproducts (bran, straw) of Kabuye marshland rice	3.24	.940	14	Good
Use of loans and follow-up of loans distributed to farmers (including loans on inputs, etc)	3.23	1.425	15	Good
The quality of Kabuye Marshland rice: elongation potential of Kabuye rice when cooked compared to other rice varieties available in the Rwandan market	3.16	.963	16	Good

Organization and relationships among rice value chain actors	3.07	1.439	17	Good
Collaboration and information sharing among Kabuye rice value chain actors	2.88	1.308	18	
The quality of post-harvest handling and processing technology/equipments used Kabuye Marshland	2.84	1.381	19	Good
Laws, regulations and other legal requirements infringed to farmers	2.75	1.297	20	Good
The quality of Kabuye Marshland rice: no mixture with other materials (sand, stones, herbs, counterfeit paddy, etc)	2.61	1.016	21	Good
The selling price offered to rice growers by their cooperative	2.49	1.348	22	Fair
The quality of transportation equipment used in Kabuye marshland rice	1.90	1.107	23	Fair
Fallowing and crop rotations in Kabuye marshland to avoid diseases and soil fading	1.78	1.003	24	Poor
The quality of available public infrastructure (roads, bridges, drying yards, etc)	1.76	1.148	25	Poor
The quality of Kabuye Marshland rice: time it takes to cook the Kabuye marshland rice as claimed by consumers	1.72	1.280	26	Poor
Availability of supporting services to Kabuye Marshland rice farming business	1.45	.893	27	Poor
Average mean	**3.03**			**Good**

Source: Primary data 2011: Descriptive Data of the items in the scales. Response Category: 1.01-1.80=Poor, 1.81-2.60=Fair, 2.61-3.40=Good, 3.41-4.20= Very Good, 4.21-5= Excellent.

On average, all items in the level of value chain present a mean of 2.9 which means that the level of rice value chain in Kabuye marshland is good.

The overall quality of Kabuye Marshland rice was examined using the following rice quality aspects: (1) mixture with other materials (like stones, sand, etc), elongation potential, taste and smell, and time it takes to cook it. The table above shows that compared to other rice products available in the Rwandan market, the quality of Kabuye marshland is very good. This is thanks to good selection of seed varieties that are suitable to the marshland soil, tailored distoning machines that radically separate paddy rice with other materials like stones, sand and counterfeit paddy grains.

In line with the USAID (2005) the Business Enabling Environment of Kabuye Marshland was evaluated considering laws that rice farmers have to abide to and procedures they have to go through while seeking to join cooperative or get land for cultivation. It was also evaluated considering the quality of available public infrastructures (roads, drying areas, transportation, post-harvest handling and irrigation equipments) that either facilitate or hinder the movement of Kabuye marshland rice along its value chain. The table above shows that rice farmers reported that laws and procedures are very good. This means that all laws and regulations regarding rice farming including procedures for land ownership and cooperative membership are facilitative to rice growers. Despite the very good quality of rice that has been observed, there is high risk to lose it as observation showed that not only drying areas are limited in number, they are also very old and broken, and are gradually deteriorating due to lack of care and maintenance. They are getting covered by wild grasses that wipe out the cement little by little and this will require more massive financial means that would not be spent if there was serious care and maintenance. Some drying areas do not have distoning machines and farmers make a long way to take their wet paddy rice on head to drying places that have distoning machines. Farmers do not have sheltered places where they can keep their paddy rice when it rains as many of their store buildings were completely demolished and the ones that are still standing have remained roofless for more than a decade.

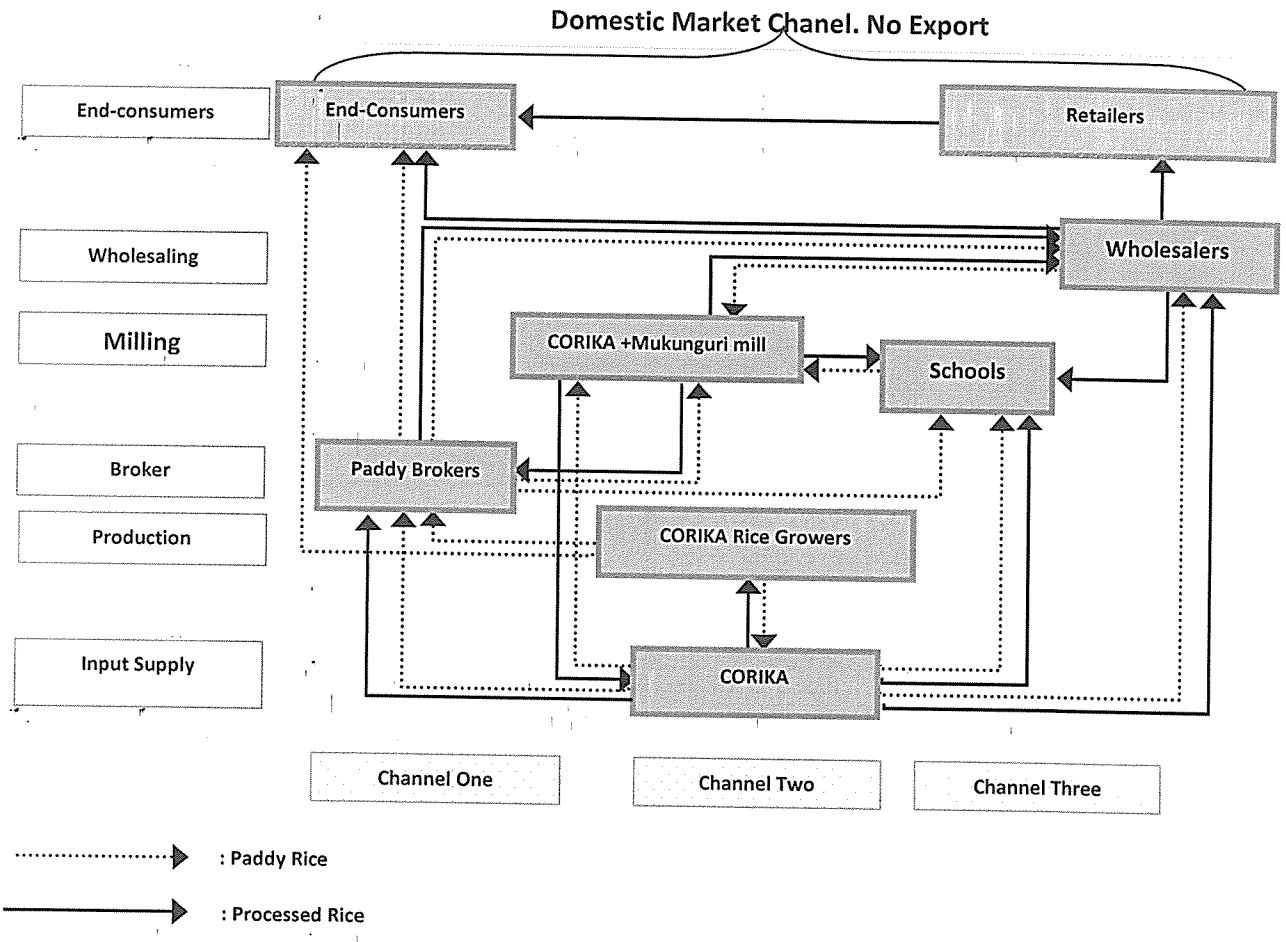
As far as horizontal linkages are concerned, the table shows that Collaboration, organisation, information sharing and joint activities are very good in the value chain, which has helped generate good production from the area under cultivation. This makes farmers participate in decision making. USAID (2005) theories that in addition to lowering the cost of inputs and services, horizontal linkages can contribute to shared skills and resources and enhance product quality through common production standards. According to Martin, W. & Austin J.E. (2010), by combining resources and sharing information, horizontal cooperation allows participating companies and producers to achieve improved quality, service,

and savings through increased access to inputs, more leverage in sales negotiations, and greater ability to design initiatives that emphasize upgrading the value chain. In light with the two theories there is no doubt that the 'very good quality aspects' of the rice made out by this research owe to the perceived very good collaboration and information sharing and participation of farmers in decision making regarding the choice of type of rice variety to be grown and the observed good organisation and relationships. This quality also owes to the fact that there is sufficient availability of water for irrigation, quality public infrastructures and Post-harvest handling and processing equipments. Nonetheless, as shown in the table above, the lack of interest and profit sharing has been lowering the level of trust that farmers have towards their cooperative leaders.

As can be seen from the table above, the Kabuye marshland value chain has been seriously constrained by lack of support markets. They have very limited access to finance of any kind, and they do not have worthwhile use of their rice by-products. They also lack transportation means which hardens the carrying of paddy rice from fields to drying places.

The level of value chain was also examined by determining the channels that bring the Kabuye marshland rice from input supply to the end-consumers. According to USAID (2005), end-market is where the end-user is located, meaning the individual or organization for whom the product or service has been created, and who is not expected to resell that product or service. It also theorises that vertical linkages comprise of market actors including wholesalers, retailers, exporters, traders, middlemen, input dealers, suppliers, service providers and others. According to (BMO) (GTZ, 2007), value chain operators relate to each other cortically (between suppliers and buyers of produce). Basing on the two theories, the following channels were determined and they show how rice falls from supply of inputs to end market consumers:

Figure 4.1:
Kabuye Marshland Rice Value Chain Map



Source: Primary Data, 2011

As can be seen from the figure above, there are three main channels though which the rice in Kabuye Marshland is brought to the end-market consumers.

Channel One - Inputs are distributed to rice growers on credits from their cooperative headquarters based at Kabuye (CORIKA). The cooperative members (rice growers) produce paddy rice and unseeingly, some of them sell some of their paddy rice to paddy brokers, or directly to end market consumers who traditionally pound it in mortars. The paddy brokers can directly sell the paddy rice to end market consumers, or directly to schools and wholesalers.

Channel Two - The farmers sell paddy rice production back to their cooperative (CORIKA) headquartered at Kabuye, where it gets stored. CORIKA sell the paddy rice either to paddy brokers, schools or wholesalers. The brokers, schools and wholesalers hull the paddy rice at CORIKA-MUKUNGURI Rice Processing Mill based at Kabuye, before they sell it to brokers, schools and wholesalers. The wholesalers then sell the hulled rice to supermarkets, hotels and restaurants, retailers and end consumers.

Channel Three – The paddy rice received from farmers is hulled by CORIKA itself at CORIKA-MUKUNGURI Rice Processing Mill. It is then sold to brokers, schools and wholesalers. When transacted to brokers, they sell it either to schools or/and wholesalers. Whether received directly from CORIKA or indirectly brokers, the wholesalers sell the hulled rice to supermarkets, hotels and restaurants, retailers and end consumers.

Briefly, first channel is altogether informal and is not allowed to farmers. According to CORIKA leaders, cooperative members (rice growers) are allowed approximately one third of their production for food, and the remaining two thirds are to be sold to CORIKA, and all depends on the quantity of production generated by the farmer. The more quantity of production they get, the lesser they are allowed for food. It is strictly banned that cooperative members engage in any form of rice transaction other than selling to CORIKA.

The most observable thing is that some farmers prefer to sell their paddy rice to brokers and other end market consumers to avoid the low price offered by their cooperative (CORIKA). Though the second channel is somewhat efficiently business oriented, but it is occasional and lucks business standards.

According to this channel, CORIKA acts as a mediator (broker) between farmers and clients whose most predominant role is to gather paddy rice from cooperative members and sell it for them to clients at a stumpy price that does not make the cooperative financially healthy. If this channel is kept, the cooperative members will not expect any form of interest and profits sharing other than playing the mediator role.

Extent of Rice Production

The third objective of this study was to determine the extent of the rice production in Kabuye Marshland, Rwanda. In order for Kabuye Marshland rice growers to get good production of paddy, the rice seeds cultivated have firstly to be suitable to the soil of the marshland, and the soil has itself to be fertile enough. Secondly, the size of the land under cultivation has to be large enough and the quantity of production they regenerate from it needs to be adequate though it depends on many other deferent factors. Thirdly, there have to be many sources of inputs (fertilisers, pesticides and seeds) in order for farmers to have varied choices and reduced costs resulting from competition of inputs suppliers. Fourthly, there have to be sufficient marshland wetness and rain water for irrigation, and irrigation equipments to be used in dry times, as well as farmers' capacity to predict the changes in rainfall patterns. Fifthly, it depends seriously on the quality of farming technology and equipment in place and the fallowing that helps rice farmers avoid and get rid of chronic diseases. Then, good management of the rain water that can accumulate heterogeneous soils (sands, stones and other materials) from the associated hills to cover the marshland natural soil and that affects negatively its fertility has to be ensured.

Table 4.3:

Extent of Rice Production

Categories	Mean	Std. Deviation	Rank	Interpretation
Soil fertility of Kabuye marshland (nutrients and other composites adequate for rice cultivation)	2.89	1.305	1	Good
The quantity of production generated from the cultivated area	2.79	1.099	2	Good
Suitability between the rice seeds varieties grown and the soil of Kabuye marshland	2.64	1.076	3	Good
Availability of irrigation equipments to be used by farmers to water their rice in dry seasons	2.10	.931	4	Fair
Average mean	**2.65**			**Fair**

Source: Primary data 2011: Descriptive Data of the items in the scales. Response Category: 1.01-1.80=Poor, 1.81-2.60=Fair, 2.61-3.40=Good, 3.41-4.20= Very Good, 4.21-5= Excellent.

On average, all items on the extent of rice production present a mean of 2.65 which means that the extent of rice production in Kabuye marshland is good. The table above shows that there is very good suitability of Kabuye Marshland soil and seed varieties of rice selected for cultivation. This is because Kabuye Marshland rice farmers are in one cooperative that oversees the activities of rice farming from the supply of inputs. It is for the leaders of the cooperative to know the time for cultivation and the seeds varieties that are suitable for the soil and in accordance to the season and tolerance of diseases.

The available area for cultivation is not fully exploited. This has much to do with poor farming technology and lack of appropriate farming machinery including irrigation equipment, which results in quantity of production generated from the area under cultivation that is not good enough. The fact that the production is not good enough is in close relationship with the deplorable soil fertility that also results from poor management of rain waters that accumulate heterogeneous soils (sandy, stony, herby, etc) flooded from associated hills into the marshland. These

heterogeneous soils cover the natural marshland soils that disappear and become infertile little by little. In addition, the accumulated waters and soils from neighbouring hills damage the plantations of rice, which also impacts negatively on the quantity of production generated from the area under cultivation. It was observed that sometimes heavy and stormy rains fall when rice is flouring or is not mature enough and some farmers lose nearly 100% of their production, though it does not happen very often. Also, as can be seen from the table above, there limited sources of inputs which renders their cost very high. Therefore, one way out of the soil infertility would be for farmers to be able to by enough fertilisers to increase the productiveness of the soil. But due to low purchasing power of farmers and lack of support markets the procurement of inputs has been a serious constraint.

There have been dramatic changes in rainfall patterns beyond the predictability capacity of farmers who do not have appropriate machines to measure it. According to them; they used to have machines inherited from Chinese sponsors but they were destroyed by the war and were not replaced. The machines could help them predict the time for rain and they were then able to plan the farming activities accordingly. Farmers reported that they have diseases that damage their rice. This is partly because they cost of inputs is very high in comparison with the purchasing power of farmers to buy pesticides and insecticides. Also, it was observed that instead of fallowing, farmers keep on cultivating the same fields while there others that are bushy and have not been cultivated for a long time. Not only had the overexploitation (overcultivation) little by little rendered the soil infertile, it has kept rice fields with chronic diseases.

Correlation between the Level of Value Chain and the Extent of Rice Production

The fourth objective of this study was to verify if there is significant relationship between the Level of Value Chain and the Extent of Rice Production. This was done through SPSS descriptive statistics where most important selected

items from the level of value chain and extent of rice production tables were crossed and were correlated using Pearson's R. For the correlation to be significant the Pearson R has to be below 0.05 and the lower it is, the more significant the correlation is.

Table 4.4:

Correlation between the Level of Value Chain and the Extent of Rice Production

Variables correlated	R-Value	Sig.	Interpretation	Decision on H_0
Value Chain Vs Rice Production	.339	.000	Significant relationship	Rejected

Source: Primary data, 2011

The table above shows that there is significant correlation between the Level of Value Chain and the Extent of Rice Production in Kabuye Marshland, Kigali, Rwanda (R-Value=.339 and Sig.=.000), which is by far below 0.05

Table 4.5:

Regression between Level of Value Chain and Extent of Rice Production

Variables Regressed	Adjusted R^2	F-value	Sig.	Interpretation	Decision on H_0
Value chain Vs Rice production	.014	.245	.052	No significant effect	Accepted
Coefficients	**Beta**	**T**	**Sig**		
(Constant)	2.522	6.521	.000	Significant effect	Rejected
Chain	.054	.527	.538	No significant effect	Accepted

Source: Primary Data, 2011

According to the regression analysis in table 4.5, the variables included for the model account for 14% variations in dependent variable, indicated by low adjusted r-square of 0.14 (F=.245, Sig.=.000). Results then shows that the Extent of Rice Production is insignificantly influenced by the Level of Value Chain. The coefficients table (B=.54, t=.527, sig.=.538) further shows that there is no

significant relationship between the Level of Value Chain and the Extent of Rice Production is significant.

CHAPTER FIVE

FINDINGS, CONCLUSIONS, RECOMMENDATIONS

FINDINGS

The first objective of this research was to determine the profile of the respondents in terms of age, gender, education background, qualifications, and working experience in rice production. Findings showed that the gender of respondents is roughly equally distributed. More precisely, 57.9% of the respondents were men while 43.1% were women. More than 39% of responders have more than 47 years of age. It was found out that more than 58% of the respondents did not finish primary schooling and more than 93% of them have no academic qualification. The findings also showed that more than 66% of the respondents have an experience of 8 years and above in rice farming.

The second objective of the research was to determine the level of value chain in Kabuye marshland, Rwanda. Findings showed that the Average Level of Value Chain is Good (3.03).

The third objective of the research was to determine the extent of rice production in Kabuye marshland, Rwanda. Research findings showed that average Extent of Rice Production is Good (3.03).

The fourth and final objective of the research was to establish if there is a significant relationship between the level of value chain and the extent of rice production in Kabuye Marshland. Research findings showed that there is significant relationship between the level of value chain and the extent of rice production in Kabuye Marshland, Rwanda.

CONCLUSIONS

The overall Level of Value Chain is good and the Extent of Rice Production is good. There was good level of value chain in terms of business enabling environment, horizontal linkages, vertical linkages, and governance and interfirm relationships. The overall quality of rice, laws and procedures, and joint activities are

all very good. There are good levels of costs of inputs, access to finance, use and follow up of loans, trust, public infrastructures and post-harvest handling technology. The level of value chain is constrained by lack of care and maintenance of the available public infrastructures, uneconomic use of rice by-products, lack of interest and profit sharing, transportation equipment and unavailability of support services.

The extent of rice production is also good. The soil of Kabuye marshland is suitable to rice seed varieties selected for cultivation. The exploitation of the available are for cultivation, the quantity of rice production generated from it, hill rain water management and availability of rain water and water for irrigation are all fair. This extent is constrained by insufficient capacity for farmers to predict changes in rainfall patterns, soil fertility, land fallowing, farming technology and equipment, limited sources of inputs (seeds, pesticides, fertilizers), and unavailability of irrigation equipments.

There is significant relationship between the level of value chain and the extent of rice production in Kabuye Marshland, Rwanda.

In view of the above, the Null Hypothesis according to which there is no significant relationship between the level of value chain and the extent of rice production in Kabuye Marshland, Rwanda is rejected.

RECOMMENDATIONS

In line with the objectives of this study, hypothesis, findings and conclusions, the some recommendations were proposed.

There should be adequate management of hill waters to avoid the accumulation of flooded heterogeneous soils from associated mountains that not only damage farmers' rice, but also gradually cause soil infertility and diseases.

The existing drying areas and their paddy stores should be refurbished and regularly maintained. New stores and drying areas should also be built near each rice farmers' group.

The cooperative of farmers (CORIKA) should be hulling their paddy rice, packaging, labelling and then themselves putting it in the market as a stand-alone Kabuye rice brand. The cooperative should also have a business orientation, provide farmers with benefits generated from their rice, and ensure good financial management of their business to increase the level of trust of members.

The following two studies are suggested for the future researchers: (1) End-market analysis of the Kabuye Marshland Rice, and (2) Analysis of the business enabling environment in the production of rice in Kabuye Marshland.

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APPENDIX IB

LETTER FROM FIELD

COOPERATIVE OF RICE FARMERS
OF KABUYE (KORIKA)
JABANA SECTOR
GASABO DISTRICT
KIGALI CITY

June 30, 2011

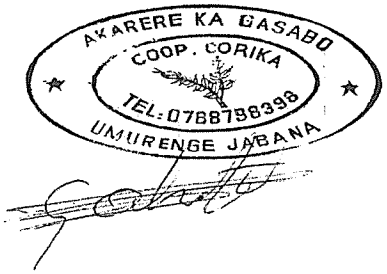
The Coordinator of
Business and Management (SPGSR)
Kampala International University (KIU)

Re: Certification that Mr. Theophile Hakizimana collected filed data in Kabuye Marshland, Rwanda.

Dear Sir,

This is to certify that Mr. Hakizimana Theophile, has presented an official letter from his university (Kampala International University – KIU), requesting to provide him with relevant information as a student collecting filed data for his topic entitled *Value Chain and the Production of Rice in Kabuye Marshland, Rwanda* and he was given permission to do so. This is to certify then that he has conducted his field research in Kabuye Marshland from the 13th to 30th of June, 2011 among the members of our cooperative (rice growers) and cooperative leaders.

Yours sincerely,



Mr. Gahutu Ignace

The President of KORIKA

APPENDIX IC

TRANSMITTAL LETTER FOR THE RESPONDENTS

Dear Sir/ Madam,

Greetings!

I am an MBA Management candidate of Kampala International University. Part of the requirements for the award is a thesis. My study is entitled, **Value Chain and the Production of Rice in Kabuye Marshland, Rwanda.** Within this context, may I request you to participate in this study by answering the questions? Kindly do not leave any option unanswered. Any data you will provide shall be for academic purposes only and no information of such kind shall be disclosed to others.

May I retrieve the questionnaire within five days (5)?

Thank you very much in advance.

Yours faithfully,

Mr. Hakizimana Theophile

APPENDIX IIIA

QUESTIONNAIRE FACE SHEET

DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

1 **GENDER** (please circle the number corresponding to your gender)
1 Male
2 Female

2 **AGE** (please circle the number corresponding to the range of your age)
1 <16 years
2 17-26 years
3 27-36 years
4 37-46 years
5 47 years and above

3 **EDUCATION BACKGROUND (**please circle the number corresponding to your highest level of Education)
1 Below Primary schooling (unable to write and read)
2 Primary Level (completed primary schooling)
3 Post Primary Schooling (incomplete secondary schooling)
4 Secondary Schooling Certificate
5 Diploma, University Degree and Above

4 **QUALIFICATIONS** (please circle the number corresponding to your qualification
1 Agronomy or related field
2 Business or related field
3 Certificate of training in rice farming or agriculture
4 Qualifications other the ones stated in 1, 2 and 3
5 No qualification at all

5 **FARMING EXPERIENCE** (Please circle the corresponding number)
1 <1 year
2 2- 3 years
3 4-5 years
4 6-7 years
5 8 years and above

APPENDIX IIIB

QUESTIONNAIRE TO DETERMINE THE LEVEL OF VALUE CHAIN

Direction: Using a scale of 5-1, please indicate the level to which you rate the Rice Value Chain in Kabuye Marshland. Please circle the number corresponding to your answer.

	Item	Excellent	Very Good	Good	Fair	Poor
6	Interest and profits sharing among rice farmers (cooperative members)	5	4	3	2	1
7	Participation and consultation of farmers in decision making	5	4	3	2	1
8	Collaboration and information sharing among Kabuye rice value chain actors	5	4	3	2	1
9	Level of trust of farmers towards cooperative leaders in KM rice value chain actors	5	4	3	2	1
10	Joint and collective activities among rice value chain actors especially (farming, processing, etc)	5	4	3	2	1
11	Organization and relationships among rice value chain actors	5	4	3	2	1
12	Use of loans and follow-up of loans distributed to farmers (including loans on inputs, etc)	5	4	3	2	1
13	Access to Finance (from banks, micro-finances, CORIKA and any other lenders)	5	4	3	2	1
14	Procedures to access land for cultivation and to join the farmers' cooperative	5	4	3	2	1
15	Laws, regulations and other legal requirements infringed to farmers	5	4	3	2	1
16	The quality of available public infrastructure (roads, bridges, drying yards, etc)	5	4	3	2	1
17	The quality of post-harvest handling and processing technology/equipments used Kabuye Marshland	5	4	3	2	1
18	The quality of transportation equipment used in Kabuye marshland rice	5	4	3	2	1
19	Availability of supporting services to Kabuye Marshland rice farming business	5	4	3	2	1
20	Level of exploitation of available area for cultivation in Kabuye Marshland	5	4	3	2	1
21	Fallowing and crop rotations in Kabuye marshland to avoid diseases and soil fading	5	4	3	2	1
22	Use of byproducts (bran, straw) of Kabuye marshland rice	5	4	3	2	1
23	The selling price offered to rice growers by their cooperative	5	4	3	2	1
24	The price/cost of inputs(seeds, pesticides, fertilizers) as opposed to the purchasing power of rice growers	5	4	3	2	1

25	Availability of sources of inputs (seeds, pesticides, fertilizers)	5	4	3	2	1
26	The quality of Kabuye Marshland rice: no mixture with other materials (sand, stones, herbs, counterfeit paddy, etc)	5	4	3	2	1
27	The quality of Kabuye Marshland rice: elongation potential of Kabuye rice when cooked compared to other rice varieties available in the Rwandan market	5	4	3	2	1
28	The quality of Kabuye Marshland rice : taste and smell of Kabuye marshland rice compared to other rice varieties available in the market	5	4	3	2	1
29	The quality of Kabuye Marshland rice: time it takes to cook the Kabuye marshland rice as claimed by consumers	5	4	3	2	1
30	The level predictability capacity of climate changes - change in rainfall patterns.	5	4	3	2	1
31	Availability of adequate rainfalls in wet seasons, natural wetland water, and water for irrigation in dry seasons	5	4	3	2	1
32	Hill Rain water management (to avoid accumulation of heterogeneous soils flooded into the marshland from associated hills)	5	4	3	2	1

APPENDIX IIIC

QUESTIONNAIRE TO DETERMINE THE EXTENT OF RICE PRODUCTION

Direction: Using a scale of 5-1, please indicate the extent to which you rate the production of rice in Kabuye Marshland. Please circle the number corresponding to your answer.

	Item	Excellent	Very Good	Good	Fair	Poor
33	The quality of farming technology used in Kabuye Marshland	5	4	3	2	1
34	Suitability between the rice seeds varieties grown and the soil of Kabuye marshland	5	4	3	2	1
35	The quantity of production generated from the cultivated area	5	4	3	2	1
36	Soil fertility of Kabuye marshland (nutrients and other composites adequate for rice cultivation)	5	4	3	2	1
37	Availability of irrigation equipments to be used by farmers to water their rice in dry seasons	5	4	3	2	1

RESEARCHER'S CURRICULUM VITAE

To document the details of the researcher, his competency in writing a research and to recognize his efforts and qualifications, this part of the research report is thus meant.

Personal Profile

Name: Theophile Hakizimana

Gender: Male

Nationality: Rwandan

Educational Background

Bachelor's Degree in Management obtained from Kigali Independent University (2008).

Advanced Certificate of Secondary Education in Primary Teaching obtained from Saint Joseph College (2001).

Work Experiences

Three years of Part-Time Consultancy (2009 to date).

Four years as Academic Administrator at Kigali Anglican Theological College (2007 to date).

Two years as Headmaster of La Berceuse Primary School (2005-2006).

Two years as English Teacher at APE Rugunga College (2003-2004).

Two years as Primary Six Class Teacher at Bugarura Primary School (2001-2002).