

PERFORMANCE OF RICE VALUE CHAIN IN KAHAMA DISTRICT, TANZANIA

PETER SADIKIEL KISANGA

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN
AGRICULTURAL AND APPLIED ECONOMICS OF SOKOINE UNIVERSITY
OF AGRICULTURE. MOROGORO, TANZANIA.**

2015

ABSTRACT

This study examined the profitability and marketing chain of rice in Kahama district, Shinyanga Region. The study was a cross sectional design. A total of 216 sample of farm households was selected by using simple random sampling from the 18 villages for the interview. Subsector mapping analysis was done to map rice value chain. Results indicate that there were a number of actors i.e. producers, middlemen, traders, millers, wholesalers, retailers and final consumers. Structure, conducts and performance in the rice market were analysed. Profits along the rice value chains were also computed. Analysis on the market structure shows that Herfindahl-Hirschman Index (HHI) computed from the three segments of collectors, wholesalers and retailers shows a strong competitive market structure existed in the rice market. Trade barriers analysis was done and the results shows that complexity in accessing finance and price fluctuation reduce the ability to participate in the market. The study also find that 77% of farmers store their paddy in places that can maintain its quality hence opportunity to have good prices. In addition it was found that 65.5% of the traders purchase rice through middlemen at fair price since they had price movements information in different markets before. Furthermore, regression analysis model was used to determine socio-economic factors which affects profitability of farmers. Findings show that, trainings to household head on best practices on farming was statistically significant at $P < 0.05$ and that it has ability to increase profit by Tsh 41 538 per hectare. The study recommends strengthening of market information system, improvements in the agricultural inputs provision systems to increase production, productivity and training on good agricultural practice to the farmers as well as key issues in marketing which will lead to sustainable paddy farming in the study area and other parts which are producing paddy in Tanzania.

DECLARATION

I, Peter Sadikiel Kisanga, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

Peter Sadikiel Kisanga
(MSc. Candidate)

Date

The above declaration is confirmed by:

Dr. Jeremia R. Makindara
(Supervisor)

Date

COPYRIGHT

No part of this dissertation may be reproduced, stored in any retrieval system, or transmitted in any form or by any means without prior written permission of the author or Sokoine University of Agriculture in that behalf.

ACKNOWLEDGEMENTS

I have had a sneaking conception that writing acknowledgements are a mere convention rather than conviction. Upon completion of this dissertation, I must confess with shame that this was a misconception. This is because successful completion of this work would not have been possible were it not for the support of a number of people and institutions in one way or another. It would, therefore, be unfair not to recognize their contributions.

First and foremost, I wish to express my profound gratitude and sincere appreciation to my supervisor Dr Jeremia R. Makindara for his tireless guidance, constructive criticism, suggestions and comments which broaden my understanding of the theme, thus helping to complete this dissertation.

I am also grateful to the Director General of Africa Rice Center for financing this research work. I owe a debt of gratitude to the center economist, Dr. Mujawamaria Gaudiose for consistent guidance and encouragement, particularly during proposal formulation and writing of this study.

Also, a special thanks to the entire staff of AERC/CMAAE and particularly Dr. O. George, for their support both financially and encouragements. To you I say thank you. Last but not least, I would like to acknowledge the support of my fellow students of MSc Agricultural Economics and MSc Agricultural and Applied Economics (2012/2013). Thank you all for your friendship.

Above all, I thank GOD for his wonderful mercies to enable me complete my study successfully. To Him I say thank you very much.

DEDICATION

To all those behind the scene in laying the foundation of my education.

TABLE OF CONTENTS

ABSTRACT	ii
DECLARATION	iii
COPYRIGHT	iv
ACKNOWLEDGEMENTS	v
DEDICATION	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	xiii
LIST OF FIGURES	xv
LIST OF APPENDICES	xvi
LIST OF ABBREVIATIONS AND SYMBOLS	xvii
CHAPTER ONE	1
1.0 INTRODUCTION	1
1.1 Background Information.....	1
1.2 Problem Statement and Justification.....	3
1.3 Objective of the Study	4
1.3.1 Overall objective	4
1.3.2 Specific objectives.....	4
1.4 Research Questions	5
1.6 Significance of the Study.....	5
1.7 Organization of the Study.....	5
CHAPTER TWO	6
2.0 LITERATURE REVIEW	6
2.1 Theoretical Perspectives on Key Concepts	6

2.1.1	Market	6
2.1.2	Marketing	6
2.1.3	Marketing chain.....	7
2.1.4	Value chain.....	7
2.1.5	Marketing channels	7
2.1.6	Marketing intermediaries	8
2.1.6.1	The merchants	8
2.1.6.2	Commission agent – broker.....	9
2.1.6.3	Facilitators	10
2.1.7	Marketing system	10
2.2	Agricultural Marketing.....	10
2.2.1	Approaches used to study agricultural marketing	11
2.2.1.1	Functional approach	11
2.2.1.2	Institutional approach	11
2.2.1.3	Commodity approach	11
2.2.1.4	Systems approach	12
2.2.1.5	Structural-evaluation approach.....	12
2.3	Rice Marketing and Value Chain	13
2.3.1	Rice marketing and value chain in Sub Saharan Africa (SSA).....	13
2.3.2	Rice marketing and value chain in Tanzania	15
2.4	Theoretical Framework and Empirical Methods.....	18
2.4.1	Theoretical framework	18
2.4.1.1	The structure – conduct – performance model.....	18
2.4.1.2	Profit maximization theory.....	19
2.4.2	Subsector mapping approach	20
2.4.3	Gross margin analysis	21

2.4.4	Market margin analysis	23
2.4.5	Factors influencing profitability of rice farmers	24
2.5	Conceptual Framework	25
CHAPTER THREE		27
3.0	METHODOLOGY	27
3.1	The Description of Study Area and Justification for Selection	27
3.1.1	Geographical location	27
3.1.2	Kahama district socio-economic characteristics	28
3.2	Research Design	30
3.3	Sampling Unit and Sample Size	31
3.4	Sampling Techniques	31
3.4.1	Villages sample selection	31
3.4.2	Selection of paddy producers	31
3.4.3	Trader's sampling	32
3.4.4	Selection of Paddy Processors	32
3.5	Data Collection Methods	33
3.5.1	Primary data	33
3.5.2	Secondary data	33
3.6	Data Processing and Analysis	33
3.6.1	Descriptive analysis	34
3.6.2	Sub-sector mapping analysis	34
3.6.3	Quantitative analysis	34
3.6.3.1	Gross margin analysis	34
3.6.3.2	Marketing margin analysis	35

3.6.3.3	Determinants of rice farmers' profitability Regression analysis	36
3.9	Limitation of the Study.....	37
CHAPTER FOUR.....		38
4.0	RESULTS AND DISCUSION	38
4.1	Demographic Characteristics of Respondents.....	38
4.1.1	Demographic characteristics of sampled farmers	38
4.1.2	Demographic characteristics of sampled assemblers.....	40
4.1.3	Demographic characteristics of sampled wholesalers.....	42
4.1.4	Demographic characteristics of sampled processors.....	43
4.1.5	Demographic characteristics of sampled retailers.....	45
4.1.6	Demographic characteristics of sampled consumers	46
4.2	Farming Characteristics.....	47
4.2.1	Land allocation and crop production.....	47
4.2.2	General crop establishments.....	48
4.2.3.	Livestock holdings	49
4.2.4	Farm income sources.....	50
4.2.5	Non farm income sources.....	51
4.3	The Support Services in Rice Production and Marketing	51
4.3.1	Market information and extension service	51
4.3.2	Quality of source of information.....	52
4.3.3	Agricultural training and clubs association	53
4.3.3.1	Agricultural trainings	53
4.3.3.2	Household head membership to associations.....	53
4.3.4	Agricultural input use.....	54

4.3.4.1	Fertilizer and seeds application	54
4.3.4.2	Labour use in paddy production	55
4.4	Profit Analysis of Rice Production	56
4.4.1	Unit and conversion factors	56
4.4.2	Cost of production of paddy	58
4.4.3	Net income	60
4.5	Rice Market Channels	60
4.6	Analysis of Structure of the Market	61
4.6.1	Degree of market concentration	61
4.6.2	Barriers to entry into the rice market	62
4.6.2.1	Capital investment	63
4.6.2.2	Price fluctuation	63
4.6.2.3	Lack of access to credit	63
4.7	Analysis of Market Conduct	64
4.7.1	Storage duration	64
4.7.2	Purchasing strategy	64
4.7.3	Selling strategies in rice marketing	65
4.8	Analysis of Market Performance	66
4.8.1	Marketing costs and marketing margin in rice value chain	66
4.8.1.1	Marketing cost and margin of assemblers	66
4.8.1.2	Marketing cost and margin of wholesalers	67
4.8.1.3	Marketing cost and margin of millers	67
4.8.1.4	Marketing cost and margin of retailers	68
4.8.1.5	Marketing costs, gross and profit margin of traders	69
4.9	Determinants of Rice Profitability at Farm Level	71
4.9.1	Model reliability	72

4.10	Production and Marketing Constraints of Rice.....	73
4.10.1	Producer's constraints	73
4.10.1.1	Shortage of farm inputs	73
4.10.1.2	Improved varieties	73
4.10.1.3	Diseases and pests	74
4.10.1.4	Shortage of seed supply.....	74
4.10.1.5	Lack of threshing machine	74
4.10.1.6	Malpractice in selling method (Scaling or Weighing)	75
4.10.1.7	Lack of market.....	75
4.10.1.8	Lack of information exchange.....	75
4.10.1.9	Transportation problem	75
4.10.1.10	Lack of capital and credit facility	76
4.10.2	Traders' constraints	77
4.10.2.1	Rice assemblers	77
4.10.2.2	Rice Wholesaler's.....	77
4.10.2.3	Rice millers.....	78
4.10.2.4	Rice Retailers	78
CHAPTER FIVE	79
5.0	CONCLUSIONS AND RECOMMENDATIONS	79
5.1	Conclusion.....	79
5.2	Recommendations	82
REFERENCE	85
APPENDICES	92

LIST OF TABLES

Table 1:	Kahama district administrative units and population distribution	29
Table 2:	Sample size summary.....	32
Table 3:	Regression analysis	37
Table 4:	Demographic characteristics of sampled farmers	40
Table 5:	Demographic characteristics of sampled assemblers.....	41
Table 6:	Demographic characteristics of sampled wholesalers.....	43
Table 7:	Demographic characteristics of sampled Processors	44
Table 8:	Demographic characteristics of sampled retailers.....	46
Table 9:	Demographic characteristics of sampled consumers	47
Table 10:	Total cultivated land allocation pattern for crops in Kahama district	48
Table 11:	Paddy crop establishment in Kahama district	49
Table 12:	Number of livestock owned by sample households.....	50
Table 13:	Sources of income of the respondents (‘000).....	50
Table 14:	Sources of non farm incomes of the respondents (‘000).....	51
Table 15:	Source of information to farmers	52
Table 16:	Quality of source of information on rice production	52
Table 17:	Agricultural training to rice farmers.....	53
Table 18:	Household head membership to associations.....	54
Table 19:	Fertilizer and seed input utilization by rice farmers	55
Table 20:	Labour employed in rice farming in 2011/12	55
Table 21:	Profit and cost of production of rice.....	58
Table 22:	Average cost per hectare of rice production.....	59
Table 23:	Average farm activities cost per hectare of rice production.....	59

Table 24:	Herfindahl Hirschman Index result for actors in the Kahama rice market.....	62
Table 25:	Barriers to entry into the rice market by traders.....	63
Table 26:	Paddy storage by farmers	64
Table 27:	Marketing cost and margin of assemblers.....	66
Table 28:	Marketing cost and margin of wholesalers	67
Table 29:	Marketing cost and margin of millers	68
Table 30:	Marketing cost and margin of retailers	69
Table 31:	Summary of marketing cost, marketing margins and profit of farmers and traders	70
Table 32:	Estimated regression model of factors influencing rice farmer profitability.....	72
Table 33:	Multi Colinearity Diagnosis	73
Table 34:	Production, marketing and institutional problems of farmers.....	76
Table 35:	Problems of assemblers (n=48)	77
Table 36:	Problems of wholesalers in rice market	77
Table 37:	Problems of millers in rice market	78
Table 38:	Main problems of retailers	78

LIST OF FIGURES

Figure 1:	Rice value chain map in Tanzania.....	16
Figure 2:	Conceptual framework	26
Figure 3:	Map showing Shinyanga Region.....	28
Figure 4:	Map of Shinyanga showing Kahama district	30
Figure 5:	Rice marketing channel.....	61

LIST OF APPENDICES

Appendix 1:	Rice production and consumption trend in Tanzania	92
Appendix 2:	Producers Questionnaire	93
Appendix 3:	Milling questionnaire	99
Appendix 4:	Traders questionnaire.....	104

LIST OF ABBREVIATIONS AND SYMBOLS

ACT	Agricultural Council of Tanzania
CFC	Common Fund for Commodities
DAI	Development Alternative Inc
ESA	Eastern and Southern Africa
ESRF	Economic and Social Research Foundation
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GM	Gross Margin
GMA	Gross Margin Analysis
Ha	Hectare
HHI	Herfindahl-Hirschman Index
JICA	Japan International Cooperation Agency
Kg	Kilogram
Km ²	Kilometer square
MAFAP	Monitoring African Food and Agricultural Policies
MAFSC	Ministry of Agriculture, Food Security and Cooperation
MC	Marketing Cost
MM	Marketing Margin
MMA	Match Maker Associates
NERICA	New Rice for Africa
NMM	Net Marketing Margin
PhD	Doctor of Philosophy
OLS	Ordinary Least Square

RLDC	Rural Livelihood Development Company
SNAL	Sokoine National Agricultural Library
SPSS	Statistical Package for Social Sciences
SRI	System of Rice Intensification
SSA	Sub Saharan Africa
SUA	Sokoine University of Agriculture
TCE	Transaction Costs Economics
TGMM	Total Gross Marketing Margin
TLU	Tropical Livestock Unit
TR	Total Revenue
TShs	Tanzanian Shillings
TVC	Total Variable Costs
URT	United Republic of Tanzania
USAID	United States Agency for International Development
VIF	Variance Inflation Factor

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Development of Sub Saharan African (SSA) countries depends heavily on the performance of the agricultural sector, which is essential for poverty reduction and food security. Cereals are among the major crops that have great potential to help achieve this goal (Kadigi, 2003). Rice is one of the major cereal crop produced in most SSA countries and has the potential of contributing to food security (Minot, 2010). Currently, SSA countries are experiencing a rapid increase in population, which is also accompanied by the increase in urbanization with changing of habit toward rice consumption (Kilima, 2006).

In many SSA countries rice is the second most important food crop and it is being produced in different ecologies from upland, hydromorphic and lowland ecosystems, in mangrove and in flooded environments (RLDC, 2009). Its production in SSA has increased from 2 million tons in 1961 to 16 million tons in year 2009 while during the same period the amounts of milled rice imports into SSA has increased from 0.5 million tons in 1961 to 10 million tons in 2009 due to insufficient domestic production to meet the growing demand (URT, 2009).

The importance of rice crops in SSA varies greatly from being a cash crop for small to medium scale farmers in the East and Southern Africa (ESA) region to a more of a subsistence crop in West Africa where most of the continent's rice is produced (Barreiro-Hurle, 2012). In East Africa countries, rice was firstly introduced to Tanganyika during the period of German colonization starting from the year 1884 and

currently it is the second most important food and commercial crop after maize (Minot, 2010). In year 2009, in average 720 000 hectares of land were used for rice cultivation out of more than 2 million hectares of land suitable for rice production in the country (MMA, 2010). Also in East Africa countries, Tanzania is the major producer which produced 880 000 tons of milled rice in year 2009 (CFC, 2012). Production activities are done mostly by small scale farmers which contributed to 90% of the total output and the remaining 10% is being produced by large scale farmers (Barreiro-Hurle, 2012).

In the country, rice is mostly grown in Mwanza, Shinyanga (Bariadi and Maswa), Morogoro (Kilombero and Wami-Dakawa), Tabora (Igunga), Kilimajaro (Lower Moshi), Coast (Rufiji), Mbeya (Mbarali, Kyela, Kapunga) and Rukwa Regions (RLDC, 2009). Twenty five percent of the national rice production comes from two regions which are Mbeya and Morogoro while five regions of Shinyanga, Morogoro, Mbeya, Tabora and Mwanza produces 70% to 80 % of total production (Kadigi, 2003). Rapid growth of cities and towns propelled by rapid population growth currently at 4% per annum and a shift in consumer preferences in favor of rice has led the country to experience increase in demand for rice (Kilima, 2006). This increase coupled with low productivity has led to deficit of rice supply in the country as shown in Appendix 1. However, the deficit has been met by rice importations from Asian countries like Vietnam, India and Thailand (MAFAP, 2012).

Deficit of rice supply in the country have led to formulation of different policies and programmes in an effort to raise productivity in the country (Benard *et al.*, 2014 and Deus *et al.*, 2014), however challenges in the marketing aspects have proven critical to the sector (RLDC, 2009). These challenges have been recognized as an impediment to the improvements of country market structure for staple crops which is still informal and

underdeveloped as 65% of farmers in Tanzania sell their produce to small scale traders who dominate local and regional market who often offer low prices to farmers (Eskola, 2005).

1.2 Problem Statement and Justification

Agricultural marketing is the main driving force for economic development and has a guiding and stimulating impact on the production and distribution of agricultural produce (Takele, 2010). The increasing proportion of the population living in urban centers and rising level of income requires more organized channels for processing and distribution of rice (Omofonmwan *et al.*, 2013). In Tanzania, rice has high market value compared with most other cash crops but the return to producers is lower and it is difficult for the farmers to realize its benefits as long as productivity remains low and constraints of selling and marketing the produce remains untackled (RLDC, 2009).

The country marketing systems have been facing a lot of challenges such as information asymmetry in the market, lack of tailored credit facilities, insufficient facilities for storage and transportation and lack of common grade standards among others (ESRF, 2010). These challenges, however affect smallholder farmers to the greatest extent as they depend on intermediaries who deprived the producers of equitable returns (Match Maker Associates (MMA), 2010). Also, it argued that high production and transaction costs along the chain reduces competitiveness of local rice in the market as compared to the imported rice (Common Fund for Commodities, 2012).

Several studies has focused on options and ways to expand rice production and productivity (DAI 2003; Shayo *et al.*, 2006 and Minot, 2010), however to the best of author's knowledge little have been researched on rice value chain in the Western part of

the country where rice is grown extensively especially in Kahama district. This study will establish the current rice market structure and determine its conducts and how it affects value chain performance in the district. This makes the undertaking of market chain analysis of rice in the district imperative.

This study is designed to address the prevailing information gap on the subject and contribute to proper understanding of the marketing systems and provide information to improve marketing strategies to the benefit of smallholder farmers, traders, and other market participants. This research will also serve as a reference for researchers to embark on similar or related work in other parts of the country as the Africa Rice Center was also mandated to coordinate the national rice research work in the Eastern and Southern African countries.

1.3 Objective of the Study

1.3.1 Overall objective

The overall objective is to analyze performance of rice value chain in Kahama district in Shinyanga Region.

1.3.2 Specific objectives

The study had the following specific objectives:

- i. To map the marketing channels of rice value chain in the study area;
- ii. To analyze the structure of the rice market in Kahama district;
- iii. To analyze performance of actors along the rice value chain;
- iv. To determine socio-economic factors affecting rice farmers' profitability in Kahama District

1.4 Research Questions

The study was guided by the following questions:

- i) What are the key rice value chain actors at Kahama district?
- ii) What is the structure of the rice market in Kahama district?
- iii) What is the marketing margin of various actors along the value chain?
- iv) What are the factors affecting profitability of rice farmers in Kahama district?

1.6 Significance of the Study

This study covers rice value chain in Kahama district, and maps existing marketing channels, analyzes the performance of the market through the evaluation of the marketing activities along the different marketing channels of the crop and evaluation of factors affecting profitability of actors along the value chain. This could be a major input in the formulation for appropriate marketing policies and procedures according to specific zones of rice production.

1.7 Organization of the Study

This study is organized into five chapters. The first chapter provides a general background to the study, problem statement, study objectives and research questions. The second chapter gives a review of the literatures on marketing analysis from different sources while the third chapter narrates methodologies used in this study, in line with description of the study area. The fourth chapter deals with the results and discussions of the findings, while conclusion and recommendations are presented in the fifth chapter.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Perspectives on Key Concepts

2.1.1 Market

The term market has a number of definitions; Abbott and Makeham (1990), define “a market” as an area in which one or more sellers by giving products/services and their close substitutes exchange with and compete for the patronage of a group of buyers. Kotler (2002) define market as a place or sphere within which price-making force operates and in which exchanges of title tend to be accompanied by the actual movement of the goods affected. Conceptually, however, a market can be visualized as a process in which ownership of goods is transferred from sellers to buyers who may be final consumers or intermediate users. Therefore, markets involve sales locations, sellers, buyers, and transactions.

2.1.2 Marketing

The term marketing can be defined as a system that is usually comprised of several interrelated structures along the production, distribution and consumption units underpinning the economic process (Mendoza, 1995). It encompasses all of the business activities performed in directing the flow of goods and services from the producer to the consumer or final user, and these activities are usually classified into six stages which are production, assembly, processing, wholesaling, retailing and consumption (Schrimper, 2000).

2.1.3 Marketing chain

Market chain is the process of following a product from production to the consumer by looking at all points of the chain, prices in and out of each point, functions performed by each point, demand and supply (trends), market constraints and gain insight to the operation of the specific market channels, activities and efficiency of actors along the chain, business support services involved and policy and regulatory frameworks (Mendoza, 1995).

2.1.4 Value chain

The value chain is defined as the full range of activities which are required to bring a product or service from conception passing through different actors up to the final consumers and looks at activities implemented by various actors (Kaplinsky *et al.*, 2000). These actors range from primary producers, harvesters, processors, traders, service providers and upstream suppliers to the downstream customers (Roduner, 2005). In addition, value chain analysis encompasses issues such as organizational, coordination, power relationship between actors, linkages, and governance aspects (Trienekens, 2011). Also value chain enables analysis of the implication of who does what, at which stage in the chain and what this means for risk, capital needed and profit margins (Ingram, 2009).

2.1.5 Marketing channels

The term channel is derived from the Latin word *Canalis*, which means canal; hence literally marketing channel can be viewed as a large canal or pipeline through which products and their ownership, communication, financing, payment, and accompanying risk flow to the consumer (Backman and Davidson, 1962). It is also an alternative route of flow of goods and services from their producers to their final destinations (consumers)

and in along these channels it comprises of intermediaries who perform a variety of functions (Kohls *et al.*, 1985).

2.1.6 Marketing intermediaries

These are participants who perform physical marketing functions in order to obtain economic benefits (Minot *et al.*, 2000). Generally, three groups of marketing intermediaries can be distinguished; merchants, agents/brokers and facilitating intermediaries (Luu, 2002).

2.1.6.1 The merchants

It's a group within which four main actors are categorized, and which are:

Assemblers

These are the first link between the farmer and other middlemen. They collect several smaller bags of farm output scattered in the rural areas with their own capital and combines them into a single load in one location, from here they arranges for transport to other traders (Mendoza, 1995).

Wholesalers

This is an actor on the channel that concentrates various loads and puts the product into large, uniform units (Mendoza, 1995). Wholesaling is concerned with the activities of those persons who sell to retailers, other merchants and commercial users, but do not sell in significant amounts to final consumers (Kotler, 1997). The wholesaler provides information to suppliers (e.g. farmers, rural assemblers) and assumes to a varying degree the risks associated with the transfer of property rights attached to the goods and services being bought and sold.

Millers/food processing companies

These are enterprises that use agricultural commodities as raw material. In the case of rice business, processors or rice millers have a very important role in the marketing channel. They change the form of the product from paddy rice to milled rice (RLDP, 2009). Moreover, processors or rice millers not only provide the milling services, but sometimes they are also rice traders/wholesalers. They can buy paddy directly from the farmers or rural assemblers and sell the milled rice to wholesalers and retailers.

Retailers

The main function of the retailer is to buy wholesale agricultural produce and sell to consumers at convenient locations and times in various forms and quantities. In general, retailers found in the markets of agricultural products are retailer-assemblers which are involved in buying to complement their stock and retailer-distributors involved in selling from their stock. In town, retailers often buy from wholesaler-distributors or their brokers and resell to the consumers and sometimes they may also travel to assemble themselves in agricultural production areas especially during harvest time (Kotler, 2007).

2.1.6.2 Commission agent – broker

These are agents who work for a commission on behalf of other participants. They operate at all levels of the marketing channel and usually they work for either a flat rate or percentage (of the selling price) commission (Kotler, 1997). Brokers bring buyers and sellers together and assist in negotiations on a more adhoc basis (Kizito, 2011). Brokers do not invest in trade, nor do they take any price- risks, they normally just provide an insight into the functioning of the market as they are relatively better informed than wholesalers (Kotler 1997).

2.1.6.3 Facilitators

Traders not only use brokers, but also facilitating intermediaries. There are three types of facilitators: first, physical distribution facilitators such as warehousing firms and transportation firms; second, facilitators providing marketing service such as market research firms, advertising agencies, media firms, marketing consultancy firms and the third are the firms that help finance and/or insure risks associated with the buying and selling of goods (Kotler, 1997).

2.1.7 Marketing system

A marketing system is a set of interacting participants, markets and flows that are involved in an organized arena of exchange (Branson and Norvell, 1983). It can also be defined as a chain of business units that takes product from the point of inception to final consumers (Corey *et al.*, 1981). It may include the retailers, wholesalers and agents in the firm's channel of distribution. All marketing systems evolved within the constraints and conditions placed upon them by the production sector and by the nature of the goods being marketed. The type of product, the number, size and density of producers, the infrastructure and the policy and institutional environments all determine the type of marketing system and the effectiveness with which it operates (Poole *et al.*, 2010).

2.2 Agricultural Marketing

Agricultural marketing refers to all operations involved in moving farm products from farms to consumers, in providing production and consumption incentives to producers, marketing firms, and consumers, and in distributing farm supplies feed, seed, fuel, fertilizer, and machinery to farmers (Norris, 1969).

2.2.1 Approaches used to study agricultural marketing

There are five different approaches which have been developed to study agricultural marketing that can be served as the framework (Brason *et al.*, 1983). However, Mendoza (1995) adopted five the following approaches to study marketing;

2.2.1.1 Functional approach

This is the study of activities performed in changing the product of the farmer into the product desired by the consumers. It involves the business activities performed by firms in the marketing system. The most common classification of the functions performed is exchange functions, physical and facilitating function. This approach allows easy identification of the utilities being created and serves to identify the activity being examined in the other approaches.

2.2.1.2 Institutional approach

This is the second common approach to studying marketing by covering all market participants. The institutional approach identifies the business organization and managers that add utility to the product. These are the people often considered “parasitic middlemen” by agricultural producers. These middlemen are classified as merchant middlemen (retailers, wholesalers), agent middlemen (broker and commission men), speculative middlemen (buy and sell on their own account, but expect profit made from price movement), processors, manufacturers and facilitators.

2.2.1.3 Commodity approach

It's a less emphasized approach, as it follows only one product and studies what is done for the commodity and who does it as the commodity moves through the marketing system. It is extremely useful to the person who is interested in only one product since it

does allow in-depth analyses. Argument on its disadvantageous is because it ignores between product and market alternative and ignores multi-product firms.

2.2.1.4 Systems approach

This is an approach which puts emphasis on the system of marketing which dwells on the interaction of subsystems rather than on individual function or firms is the systematic approach. This behavioral system allows systems to be identified with the particular problem being addressed. System type includes input-output, which identifies motives and means of affecting the input–output ratio. However, its disadvantage is that it is abstract in nature and the reliance on intimate knowledge of individual’s firm characteristics and behavioral interactions. Such data and with intimate knowledge are rarely available.

2.2.1.5 Structural-evaluation approach

It’s the last approach which evaluates the ultimate performance of the marketing system by examining the level of competition existing in the industry. The industry structure, including the number and size of firms combined with firm conduct which includes price behavior, advertising and product development denote a performance that can be evaluated as good or bad. It’s extensively used to achieve the goods of competition and avoid the problems of monopoly power. However, the lack of precise norm against which to judge performance has caused a minimal use of this approach by economists studying marketing.

2.3 Rice Marketing and Value Chain

2.3.1 Rice marketing and value chain in Sub Saharan Africa (SSA)

Takele (2010) studied the profitability and marketing chain of rice in Fogera Woreda, South Gondar zone of Amhara Regional State, Ethiopia. The results show that wholesalers and millers are the most important buyers of rice from the producers of about 45% and 27%, respectively, the market concentration ratio was 0.77, which show rice market was oligopolistic in nature. On the profitability analysis, the study used cost benefit analysis which shows rice production is a profitable business to farmers while assemblers obtain much profit than the rest of the actors.

Femi *et al.* (2014) examined the profitability and marketing channels of rice in Menchum River Valley in Cameroon. Sub sector mapping analysis was used and results showed that there are nine main marketing channels exist in the study area illustrate the movements of rice from farmers to consumers. Also the study found that the channel that went out of the production region hosted the largest volume of rice, which means rice production is the main economic activity in the area, and the main actors who were involved in the marketing channels of rice produced in Menchum river valley were; individual's farmers, producer organizations, processors, wholesalers, retailers and consumers. The study found that production and marketing of rice in Menchum river valley is a profitable venture, however, profit margins of the rice business are unevenly distributed and varied depending on the number of actors involved and their role in the marketing channel and conclude that in general farmers receive the smallest margins among actors in the channel. On the other hand, rice millers receive the greatest share of the profit margins in the rice channel of about 18.69%, followed by the producers 12.77%, wholesalers 8.5% then retailers 8.33%.

Also, according to Femi *et al.* (2014), paddy produces seven to ten percent of rice bran and on average the quantity of rice bran obtained per ha was 322.15kg rice bran per hectare. Risks were also identified to actors along the channel such as 14.69% of the actors agreed that transport was a major problem to them, also 17.56% of traders agreed that poor quality of rice is a major challenge to their marketing activities.

A study by Inuwa *et al.* (2011) to determine the profitability of rice processing and marketing in Kano State in Nigeria used farm budgetary technique to analyze data. The study found that the millers accrue higher net milling income followed by wholesalers, retailers and lastly parboiler's. Also parboiling activities were dominated by women with lower net income accrued due to high operating costs and low bargaining power. Inuwa *et al.* (2011) further found that wholesalers who purchased milled rice in large quantity with high bargaining power to farmers and those wholesalers who are involved in value addition processes like re-milling and winnowing attract a higher price. This explained why wholesalers of processed rice attracted higher net marketing income than retailers.

Bassey *et al.* (2013) examined the inter market performance and pricing efficiency of imported rice marketing in Akwa Ibom State traders in Southern Nigeria. The results show that rice prices were higher in the rural than the urban markets, the correlation coefficient between the urban market pair was higher of about 0.81, than those between the urban and the rural market pairs which ranged from 0.21 to 0.46. This means that, the flow of market information was higher among the urban market pairs and very low between the rural and urban market pairs which imply that the urban market pair was highly integrated than the rural-urban market pairs.

Also, Bassey *et al.* (2013) compared the mean wholesale prices between urban markets and rural markets and the results shows that there is a significant difference in the mean wholesale prices between the urban and rural market pairs while there were no significant differences in the mean wholesale prices between the two urban market pair due to differences in the level of market integration. However, there were a number of challenges facing rice traders in Southern Nigeria, which are high cost of transportation (53.3%), high rent and taxes (21.7%), lack of credit facilities (13.3%) and rampant incidence of theft (6.7%).

2.3.2 Rice marketing and value chain in Tanzania

In Tanzania, most rice traded is milled and broken (Barreiro-Hurle, 2012). As shown in Figure 1, rice market in the country is fragmented into three main channels: (1) the traditional rice producers channel; (2) the irrigated farmer/traders channel; and (3) the larger irrigated farmer's trader with millers and brokers playing a central role in the trading process. The first and second supply channels for rice are generally long and many actors are involved before the crop reaches final consumers (Barreiro-Hurle, 2012).

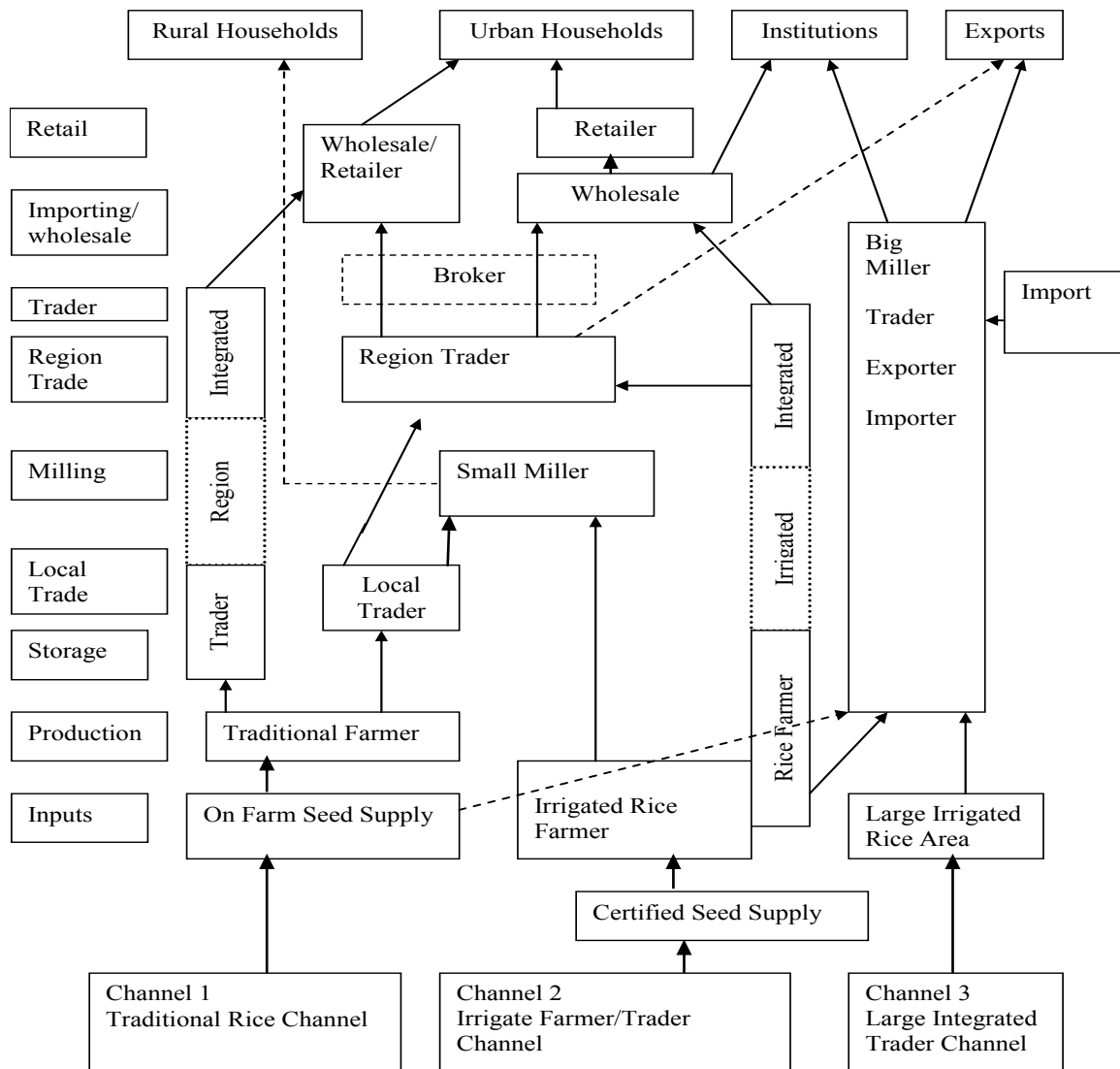


Figure 1: Rice value chain map in Tanzania

Source: Modified map adapted from Barreiro-Hurle (2012)

The rice value chain involves stages starting from production, followed by storage, local trade, milling, and regional (local) traders, wholesale/importing and finally retailing. Once paddy is harvested, it is sold to local traders, who either trade it at the regional market as paddy or send it to a mill for processing. The milled rice is then sold at the wholesale level to traders from the local markets/retail shops or the paddy might be sold to larger millers, who export large quantities of processed rice.

In the country, however Barreiro-Hurle (2012) argued that, imported and domestic rice follows different paths into the markets. For imported rice and rice under the Food Aid Counterpart Fund, 50% is distributed through wholesalers, 30% through traders or importers' own distribution system and 20% through retail shops (MAFAP, 2012).

Development Alternative Inc, DAI (2003) found that in Mbeya and Morogoro regions most rice is consumed primarily on the farms in the rural areas, however main commercial forces driving the sub-sector is related to urban markets and four major rice marketing channels were identified. It further shows several challenges facing the marketing system such as weak linkages of market information to the farm level from main consumer markets in Dar es Salaam, low productivity of smallholder farmers, lack of credit services to support and remarkable price fluctuations over the course of the year due to price speculation rather than production patterns.

According to Benard *et al.* (2014) in assessing the information needs of rice farmers in Tanzania using rice producers in Kilombero district as a case study. Purposive sampling technique was used to select four villages in the district and the data were analyzed by using SPSS and content analysis. The results found that 96.3% of rice farmers need information on marketing, 91.25% of them needs information on agricultural loan and 85% needs information on storage methodology. It further found that information needs to paddy producers are not met sufficiently, and this information asymmetry in the market has effects on farmers' prices, which will have no relationship with retail prices in a big consumer market like Dar es Salaam.

Deus *et al.* (2014) explores impediments to beneficial trade and their resultant market transaction arrangement in maize and rice value chain in Tanzania and adopted

Williamsonian Transaction Costs Economics (TCE) approach to identify market arrangements based on transaction costs of producing and trading in the two grain crops. The results show that 87% of the farmers perceived that important rice buyers were other fellow farmers, 71% perceived that they were nearby traders, also results shows that government (Food security department) is a more important buyer of maize than of rice.

Deus *et al.* (2014) argued that farmers perceived various marketing activities that add value to their crops were completely not important to them and therefore they decided not to participate. Perception toward these activities were; weighing and assembly (56%), transportation (52%), storage (53%), grading and classification (84%), processing (89%), packaging (90%) and distribution and retailing constitutes (86%) as they were perceived to be buyers' responsibilities. This suggests that farmers can rarely attract high prices for their commodities as they seem to sell primary and unprocessed crops. Further, the study found that there was no single and dominant market system (channel) through which trade transactions between buyer and sellers of both crops were carried out.

2.4 Theoretical Framework and Empirical Methods

2.4.1 Theoretical framework

2.4.1.1 The structure – conduct – performance model

The Structure-Conduct-Performance Model (S-C-P) is widely used to study marketing issues. It was made popular under the theory of industrial organization. In this field of industrial organization, as Scherer, F. (1980) stated it, "...we try to ascertain how market processes direct the activities of producers in meeting consumer demands and how these processes may break down or how they can be adjusted (e.g. through government intervention) to make actual performance conform more closely to the ideal".

The S-C-P model tends to focus on individual horizontal segments of economic activity (e.g. input supply, farm-level production, assembly, processing or retailing). Performance in particular markets or industries is said to depend upon the conduct of sellers and buyers in such matters as pricing policies and the like while conduct depends upon the structure of the relevant market such as the number, size and distribution of sellers and buyers, degree of product differentiation and entry conditions (Scherer, 1980).

The S-C-P model was used by Nancy and John (2014) to analyse Irish potato market structure and price in Kenya. The study showed that potato market is oligopolistic in nature for rural brokers and transporters while for consumers is polyopsonist. It further claims that in its market structure there were no barriers to entry to rural brokers while in urban market centres barriers to entry exist as cartels of brokers provide the link between wholesalers and retailers. Ashenafi, A. (2010) analysed grain marketing in Southern Zone of Tigray Region, Ethiopia by adopting S-C-P model to ascertain structure of the market and claims that structure of the market is fairly competitive; however the existence of barriers to entry to traders have a negative impact on the performance of the grain marketing system.

2.4.1.2 Profit maximization theory

This theory asserts that producers seek to maximize profit or minimize costs, by efficient resource allocation in the production of goods and services. Firms operating efficiency depends on their ability to maximize output from the given resources (Technical), use of appropriate input mix (Allocative) and produce with optimized size of the firm (Farrel, 1957).

Technical Efficiency (TE) can be defined as the ability to achieve a higher level of output, given a similar level of production inputs; it measures the effectiveness or competence with which the physical aspects of marketing are performed (Ajani and Olayemi, 2000). These physical aspects include storing, transportation and other activities meant to reduce waste and prevent deterioration in quality.

Allocative Efficiency (AE) deals with the extent to which farmers make efficient decisions by using inputs up to the level at which their marginal contribution to production value is equal to the factor cost, where profit efficiency is defined as the ability of a firm to achieve highest possible profit given the prices and levels of fixed factors of that firm (Ali *et al.*, 1989).

2.4.2 Subsector mapping approach

Subsector mapping is the schematic map that summarizes the economic relationship between producers and other actors in the economic system (Steven *et al.*, 1991). It is being used to understand the opportunities and constraints facing small producers and develop policies to promote their growth. Also it examine the large firms that compete with them, supply inputs and market small producer's output. Hellin *et al.* (2010) used qualitative market mapping in the study to explore Aflatoxin contamination along the maize and groundnut value chains in Mali and Kenya, with the aim of identifying different value chain actors, their roles, and the relationships between them and to shed light on the awareness, attitudes, perceptions, and knowledge of value chain actors regarding Aflatoxin. It also helps in identifying factors that determine market efficiency and constraints in the policy and institutional environment that limit the efficiency of the maize and groundnut markets, as well as the accessibility and availability of support services (such as input supplies, market information, financial services, etc.) to value chain actors.

Nature and conduct of Subsector analysis can potentially contribute to small enterprise development whereby it narrates the small producers from developing world operating in a simple production/distribution channel characterized by a high degree of vertical integration (Boomgard *et al.*, 1986). However, future prospects to small enterprises will depend on the viability of these simplified arrangements in the face of competition of complex production/distribution channel and how do these simplified arrangements evolve in ways leading to specialization and complexity.

Rudenko (2008) used the subsector mapping approach to show the flow of cotton and wheat crops from the production stages, inputs and output involved interaction among the actors in Uzbekistan, were data were streamlined via functional and institutional analyses.

2.4.3 Gross margin analysis

A gross margin is simply an estimate or a budget of the income and costs associated with a specific crop or activity in a farming business and it is not an absolute measure of profit as its left fixed cost elements, but will determine the best financial result when a number of different crop alternatives are compared (Debertin, 1993). Despite its usefulness there are some limitations to gross margin analysis and they need to be considered when is being used. Ponte (2002) explains these limitations as follows;

- i. Labor can be difficult to allocate as most businesses have permanent labor and casual labor. Gross margin analysis, focus on the casual labor associated with that particular activity such as harvesting labor.
- ii. If a farm operates a nursery to establish seedlings for production, it is advised that complete a gross margin analysis for the nursery business, so that its operation costs can be measured and they do not impact on the ordinary crop production

activities. If the costs of a nursery business are included in a gross margin analysis they can misrepresent the results.

- iii. There is inherent risk in agricultural production, such as pricing in markets, crop failure and variable input costs. If a gross margin analysis showed that there was a single crop that was far more valuable than others, this does not mean that it is the best decision to plant only that particular crop; rather an assessment needs to be made so that the risks can be managed. The result may be that some less profitable crops may be grown alongside the most profitable crop in order for the business to manage risk.
- iv. Gross margins do not take into account overhead costs. Some crops/businesses have high debt loads or high overhead costs or both. If this is the case, then a gross margin analysis may show a good result for one particular crop; however, after all the overhead costs are included such as in a cash flow budget or a profit and loss budget, the business may still make a loss. It can be concluded that, a gross margin analysis is an excellent tool, but it needs to be used in conjunction with other financial management tools.

In analyzing rice value chain in Northern Uganda, Elepu *et al.* (2014) computed gross margin for actors along the rice value chain in three districts of Amuru, Nwoya and Otuke and the results show that rice production was generally profitable in all the districts as shown by the positive margins obtained by farmers, that is Ush 195 000 per acre in Amuru District, Ush 330 000 per acre in Nwoya District and Ush121 500 per acre in Otuke District. However, it was noted that higher profit for farmers of Amuru and Nwoya was contributed by their rice being sold in milled form due to the presence of milling machines in their areas in contrast to Otuke farmers where majority sold their rice in unmilled form. The estimated profit margins obtained by producers range from USh 45 to

Ush 155 per kilogram depending on the type of rice produced. Marketing margins obtained by paddy rice traders and millers vary whereby millers get a gross margin of USh 389 to Ush 455 per kilogram while wholesalers earn a gross margin of USh 800 to Ush 1 100 per kilogram and retailer's gross margin was USh 200 to Ush 300 per kilogram.

Olorunsanya *et al.* (2004) in determining profitability of maize based cropping system in a purposefully chosen local government area in Oyo state. Gross margin analysis shows that the three identified major maize based cropping system were profitable. These were maize with yam with a gross return of N 234 000, maize with cassava with gross profit of N 104 250 and maize with soybeans with gross profit of N 130 500. Also Somaratne (2010) examined the relationship between System of Rice Intensification (SRI) and food security, and to identify opportunities and constraints in promoting the SRI paddy production to maintain food security among the poor. In analyzing the economics of SRI versus Non-SRI (Conventional Transplanting) practices, gross margin analysis was done to assess the return per hectare and return to labor. The results show that the gross margin of Rs 165 104 per hectare and Rs 165 104 per hectare with a net return to labor of Rs 1251 and Rs 1240 per man day for the production of paddy under SRI and Non-SRI respectively.

2.4.4 Market margin analysis

Marketing margin represents the difference in price paid to the first seller and that paid by the final buyer (Abbott and Makeham, 1990). It's a measure of the total value added in the marketing process. A wide marketing margin means usually high prices to consumers and lower prices to producers.

The marketing margin may be sub divided into different components which are the costs of marketing services and the profit margins. The marketing margin in an imperfect market is likely to be higher than that in a competitive market because of the expected abnormal profit (Wolday, 1994). Marketing margins were examined under the assumption that margins will decline if markets become more competitive and traders become more efficient. Behrooz *et al.* (2013) analyzed marketing margin for greenhouse cucumbers and tomatoes in Boyerahmad province in Iran. By using the markup model in the marketing margin function, results show that the marketing margin for wholesalers and retailers are 1800 Rials and 2870 Rials for greenhouse cucumber and 1980 Rials and 2520 Rials for greenhouse tomato, respectively. It also found that retail price, transportation cost and the dummy variables of spring; summer and winter seasons have a direct and significant relationship with the marketing margin and a significant and an inverse relationship with other marketing costs.

2.4.5 Factors influencing profitability of rice farmers

2.4.5.1 Regression analysis

Regression analysis is a statistical forecasting model that is concerned with describing and evaluating the relationship between given variables, i.e. the dependent and independent variables. The regression analysis can be used to predict the outcome of a given dependent variable based on the interaction of other related explanatory variables (Rawlings *et al.*, 1998). Regression models depend on several assumptions. First, the predictors must be linearly independent, i.e. it must be possible to express any predictor as a linear combination to others. Second, the error terms must be normally and independently distributed and the last assumption is that, the variance of the error term must be constant (Hoffmann, 2010).

In analyzing factors influencing profitability of sweet potato and cassava in Mvomero district, Takele (2010) employed multinomial regression model and the result showed that farm size, experience of household in farming and farm location both affects profitability of producers. Ashenafi (2010) determined factors affecting the productivity and profitability of vegetable production in Swaziland whereby gross margin per hectare was used as a proxy variable for profitability and argue that level of education was significant at 1%, land size under vegetable production was statistically significant at 5% and type of marketing agency was statistically significant at 5% and negatively related to profitability.

2.5 Conceptual Framework

The conceptual framework for analysing rice value chain in Kahama district, Shinyanga region is presented in Figure 2, derived from S-C-P framework to explain how the rice market structure determines its market conduct, which in turn determines the performance along the rice value chain. In this study, performance along the value chain between actors will depend on the market structure and conduct with which the marketing functions are carried out. The physical marketing functions of rices start at the farm gate when the commodity leaves the farmer to the middlemen, transporters, processors, wholesalers and end to the retailers. Participants on the channels perform different activities and thus different channels seem to offer different service outputs depending on the intended consumers need. Market conduct explains the existing market structure which determine price behaviour, purchasing and sales strategies, financial policy and collusion in the market. The performance of these channels can then be evaluated by considering price relative to the marketing costs.

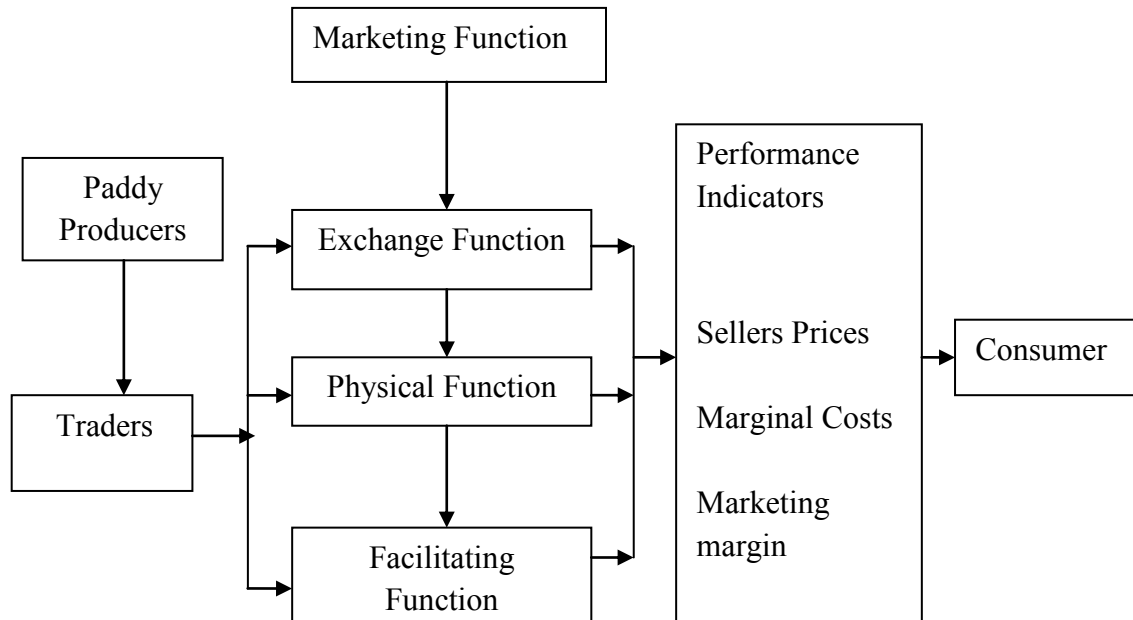


Figure 2: Conceptual framework

CHAPTER THREE

3.0 METHODOLOGY

3.1 The Description of Study Area and Justification for Selection

3.1.1 Geographical location

The study was conducted in Tanzania, specifically in Kahama District, which is located in Shinyanga region. The district is among eight districts in Shinyanga region. The current district was formerly in combination with Bukombe District, which was split in the year 2000. The District borders Mwanza Region to the North, Shinyanga Urban and Shinyanga Rural to the East, Tabora Region to the South and Bukombe district to the West (URT, 2000). The district has been designated as a hub by Africa Rice center for the promotion of rice in the Western part of the country. It's among the three districts chosen and operates as a hub in the country, others were Kilombero and Kyela, with the sole aim of promoting best and efficient practices in rice production and marketing.

Kahama District is known for production of rice varieties like *Kalamata*, *Mpyakambili*, *Mabeyenge*, *Bisholi* and *Kahogo* but in the market all of these rice varieties have been grouped as Shinyanga rice. The area was chosen mainly because it lies in one of the key ecologies for rice production in Tanzania. The location of the study area is presented in Figure 3.



Figure 3: Map showing Shinyanga Region

Source: URT (2013)

3.1.2 Kahama district socio-economic characteristics

National Census conducted in the year 2012 shows the population of the Kahama district was 766 010 which was equivalent to 49.90% of the Shinyanga region population which was 1 534 808 (URT, 2013). Out of the total population, 51.18% are female accounted for 392 049 and 48.88% are males accounted for 373 961. The population growth rate is estimated to be 1.31%. It has 5 divisions, 34 wards and 221 villages as shown in Table 1.

Table 1: Kahama district administrative units and population distribution

Characteristics	Kahama
Area (sq. Km)	9 461
Division (No.)	5
Wards (No.)	34
Villages (No.)	221
Population (2012 Census)	766 010

Source: RCO, Shinyanga Region, 2013

Geographically, the Kahama district as shown in Figure 4, covers a total surface area of 9462 Km² with grazing land amounted to 361 740 ha while land used for grazing is 482 320 ha which shows that there are overgrazing challenges in the district. The district has a tropical type of climate with clearly distinguished rainy and dry seasons. According to meteorological statistics the average temperature for the district is about 28 °C. The region experiences rainfall of 600 mm as minimum and 900 mm as maximum per year. The distribution pattern of rainfall is generally unpredictable. This implies that rainfall as a source of water for domestic and production purposes in the district is less reliable for sustainable water supply.

Rivers in Kahama district, with the exception of its eastern part, drain into the Malagarasi River basin which has a very low gradient. Consequently, there are large marshy areas along rivers with stagnant water. The topography of the district is characterized by flat, gently undulating plains covered with low sparse vegetation according to Shinyanga Region Investment Profile (2007).

Despite the presence of mining activities in Kahama district, agriculture has continued to dominate livelihood and economic performance of the district. The sector contributes about 75% to the district economy and employs about 90% of the working population in

the region. Agriculture is dominated by peasantry farming, and the main cash crops are cotton and tobacco while the main food crops are maize, sorghum, paddy, sweet potatoes, millet and cassava. In Shinyanga region, paddy constituted approximately 30% of area under major food crops from year 1996 to year 2007.



Figure 4: Map of Shinyanga showing Kahama district

Source: URT (2013)

3.2 Research Design

Cross sectional research design was used in this study which involves the analysis of data collected from a sampled population at one specific point in time. It has several advantages such as avoiding the problem of serial correlation of residuals, no need of assuming that relationships between variables is stable over time. However, this comes at the cost of requiring caution if the results for one time period are to be assumed valid at some different point in time.

3.3 Sampling Unit and Sample Size

This study used probabilistic sampling as different categories of participants in the rice market chain were known, their division into subgroups exists, and the researcher could not make an artificial subdivision of samples. The absence of reliable statistical information about small-scale farmers in the country as well as the difficulties in obtaining an exact number of market participants necessitated an adapted approach. A total of 438 respondents was selected and interviewed as shown in Table 2.

3.4 Sampling Techniques

For the purpose of assessing performance along the rice value chain and identification of factors influencing profitability of farmers, multistage random sampling, stratified random sampling and simple random sampling were used.

3.4.1 Villages sample selection

Multi stage random sampling technique was used in the selection of villages. The first stage was to obtain all villages in the district and then selection of villages that do grow rice were done and those that do not were removed from the list, second stage was done by selecting villages that grow rice as a dominant crop whereby 18 villages were selected by using simple random sampling technique. These villages are under Africarice project and are presented in Appendix 2.

3.4.2 Selection of paddy producers

The list of the population of paddy growing farmers from the sampled villages was obtained from the village agricultural officer and sample size was determined proportionally to the farmer's population. Then 12 sampled farmers from each village was randomly selected using a systematic random sampling technique as presented in Appendix 2.

3.4.3 Trader's sampling

To have the possible level of representative traders, markets were stratified into three categories basing on location. First category was of market located in the village (rural market or market of collection), second category was on market located in sub-urban area (millers) and third was market located in an urban area (market for wholesalers, retailers and consumers). In urban and sub-urban markets, list of all rice traders were obtained from a trader's office representative. However, there were no recorded data on assemblers/collectors in the district. Both rural and urban assemblers were randomly selected during marketing days in their areas. Simple random sampling was used to select the sample size for wholesalers from the sample size obtained from the market offices. Purposively sampling was used to select a sample for retailers from the markets. Hence, 22 assemblers were selected as shown in Appendix 3, 30 wholesalers and 70 retailers were selected as shown in Appendix 5 and Appendix 6 respectively.

3.4.4 Selection of Paddy Processors

A Stratified sampling technique was used to select paddy processors in the district. First, the area was divided into two zones, which are villages and peri-urban basing on the accessibility of rice mills. Second step was to identify processors and by using a simple random sampling technique, the list of processors was selected as shown in Appendix 4.

Table 2: Sample size summary

Actor	Paddy/Rice
Farmers	216
Collectors/Assemblers	22
Miller	30
Wholesaler	30
Retailers	70
Consumers	85
Total	453

3.5 Data Collection Methods

Data for the study was obtained during a survey carried out between May 2013 up to July 2014.

3.5.1 Primary data

The study used multiple methods of data collection. These included surveys, interviews with key informant, focus group discussions and structured questionnaires. The questionnaires are attached (Appendices 2-4). In order to collect the required data, questionnaires were used for the survey and semi-structured interview as instruments for group discussions.

3.5.2 Secondary data

In this study secondary data were obtained from the AfricaRice center in Dar es Salaam, District Agricultural Office (DAO), various publications from the Ministry of Agriculture, Food Security and Cooperation (MAFSC), Sokoine National Agricultural Library (SNAL) and Internet.

3.6 Data Processing and Analysis

The data collected from paddy producers, millers, wholesalers and retailers were coded and summarized. The data entry was done by using the Statistical Package for Social Science (SPSS) computer program version 16 before transferring to STATA for further analyses. The data were cleaned to remove missing values and outliers. Both qualitative and quantitative analyses were carried out based on specific objectives of the study as described below.

3.6.1 Descriptive analysis

Descriptive analysis involves the computation of descriptive statistics such as frequencies, means and percentages. These were used to summarize the characteristics and interactions among actors in the mapping of rice value chain.

3.6.2 Sub-sector mapping analysis

Sub-sector mapping analysis was used to map rice value chain linkages between actors, processes and activities in the value chain. The aim was to visualize networks in order to get a better understanding of the connections between actors and processes in a value chain. The analysis was extended by mapping the specific positions and roles of men and women in value chains and identifying their specific constraints and opportunities.

3.6.3 Quantitative analysis

Quantitative analysis involved sub sector mapping analysis, gross margin analysis, marketing margin analysis and marketing efficiency.

3.6.3.1 Gross margin analysis

The gross margin (GM) was used to determine the returns realized by the farmers, traders and processors. It estimated the profit for actors along the rice value chain. The formula below was used;

$$GM_i = TR_i - TVC_i \dots \dots \dots (1)$$

Whereby:

GM = Gross Margin of farmers, transporters, millers, wholesalers, semi-wholesalers and retailers (Tshs/kg).

TR = Average total revenue of farmers, transporters, millers, wholesalers, semi-wholesalers and retailers (Tshs/kg).

TVC = Average total variable cost of; farmers, transporters, millers, wholesalers, semi-wholesalers and retailers (Tshs/kg).

i = **1-nth** farmers, transporters, millers, wholesalers, semi-wholesalers and retailers

3.6.3.2 Marketing margin analysis

Marketing margins was calculated by using average consumer price as a base to allow for comparison of margins between actors as they all belong to the same chain. Total gross marketing margin (TGMM) for the various rice value chain participants were estimated using the following formulas;

$$\text{TGMM} = \frac{\text{consumer price} - \text{Farmers price}}{\text{Consumer price}} * 100\% \dots\dots\dots(2)$$

The producer who acts as a middlemen receives marketing margin.

The producer margin is calculated as a difference;

$$\text{GMM}_p = \frac{\text{consumer price} - \text{Marketing Gross Margin}}{\text{Consumer price}} * 100\% \dots\dots\dots(3)$$

Whereby: GMM_p - The producer gross margin.

If a chain has only one trader between producer and consumer, then the net marketing margin (NMM) is calculated. Also, in agricultural marketing chains gross marketing margin (GMM) and not the net marketing margin (NMM) is calculated. Thus, the ‘Marketing margin’ should be understood as the Gross marketing margin (GMM).

$$\text{NMM} = \frac{\text{Gross Margin} - \text{Marketing costs}}{\text{Consumer price}} * 100\% \dots\dots\dots(4)$$

Also gross market margin (GMM) calculation for all actors along the rice value chain are shown below;

$$GMM_{RA} = \frac{\text{Selling price for RA} - \text{Farmers price}}{\text{Consumer price}} * 100\% \dots\dots\dots(5)$$

$$GMM_W = \frac{\text{Wholesaler Selling price} - \text{RA selling price}}{\text{Consumer price}} * 100\% \dots\dots\dots(6)$$

$$GMM_R = \frac{\text{Retailer selling price} - \text{Wholesalers price}}{\text{Consumer price}} * 100\% \dots\dots\dots(7)$$

Whereby:

GMM_{RA} = The percentage of the total gross marketing margin received by the rural assembler/transporter

GMM_W = The percentage of the total gross marketing margin received by the wholesaler

GMM_R = The percentage of the total gross marketing margin received by the retailer

3.6.3.3 Determinants of rice farmers' profitability Regression analysis

A Multiple linear regression model was used to analyze the determinants of farmers' profitability whereby gross profit margin was taken as a proxy variable for profitability, and was set as a function of other seven variables such as Age, gender, education level, experience of household head, paddy farm size, output price and farm location.

The model for profitability was specified as follows:

$$\Pi = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \delta_1 D_1 + \delta_2 D_2 + \delta_3 D_3 + \delta_4 D_4 + \mu \dots\dots\dots(8)$$

Whereby the detail of the variables are presented in Table 3.

Table 3: Variables included in the regression analysis model

Π	=	Gross Profit margin (Tshs/acre)
$B_1 - \beta_5$ and $\delta_1 - \delta_4$	=	Parameters to be estimated
X_1	=	Farm size was expressed as the total amount of land in acres under paddy cultivation for 2011/2012 growing season
X_2	=	Distance to the market from the farm area (Farm location)
X_3	=	Age of the respondents
X_4	=	The education level of the household head measured in years spent in schooling
X_5	=	Experience of household head in paddy production expressed in years
D_1	=	Gender of household head expressed as dummy (1= Female, 0 = Otherwise)
D_2	=	Access to Credit (1= Yes, 0 = Otherwise)
D_3	=	Access to Market (prices) information (1= Yes, 0 = Otherwise)
D_4	=	Access to farming training (1= Yes, 0 = Otherwise)
μ	=	Error term

3.9 Limitation of the Study

In the study, most of the millers were found in Kahama urban and Isaka town, however the study aimed at interviewing all millers in the district, but due to infrastructure challenges and the extent of the information obtained it necessitated to concentrate to urban millers to save time and costs. Also due to infrastructure problems it was very difficult to arrange for interview in some selected villages as the roads were impassable and this led to extension of time for reorganization of the interview. Therefore, respondents from other villages were chosen to be interviewed to represent the required area.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Demographic Characteristics of Respondents

The socio-economic characteristic of key actor's identified in rice value chains has important effects to participation and decision they made concerning marketing produce. This section therefore describes the characteristics of the respondents based on age, sex, marital status and education level in relation to rice marketing within producers, millers, wholesalers and retailers.

4.1.1 Demographic characteristics of sampled farmers

Table 4 shows the demographic characteristics of paddy producers in Kahama district. The age of the household is considered a crucial factor, since it determines whether the household benefits from the experience of an older person, or has to base its decisions on the risk-taking attitude of a young farmer. Based on the Table 4, the age of the household head respondents were ranging from 22 years to 60 years. This is an active age for production. The youngest head be about 22 years old, while the eldest is 60 years of age, the overall mean age of the household head were 47 years. This shows that most of the decisions are being made by the adult's household head with experience enough to handle all farm responsibilities.

Normally the head of the household is responsible for the co-ordination of the household activities. As such it is pertinent to include some attributes such as sex and education of the head in the specification of paddy production decisions. Of the 216 sampled respondents about 81.5% were male headed and 18.5% were female headed household. This support the facts that the patrilineal system has roots in most of the African

household, hence any effort to change production system Kahama district must be gender sensitive to have positive effects. In regards to marital status of the respondents, study revealed that 86% were married, 9.3% are widow/widower, 2.8% are single and the remaining 1.4% of the respondents is divorced (Table 4). This result shows that the majority of the respondents are married and having family hence committed to their level of seriousness to the farming activities are undoubted high.

Another attribute of importance is the level of education attained by the heads of the household, who, normally, are the decision-makers. Education also enables the person with the ability to do basic communications with any support service providers like extension officers and other stakeholders in the farming business. From all household heads 7.9% were found to be illiterate, 84.7% attained primary school education and the rest 7.4% were found to be with secondary school education (Table 4). The majority of these groups was found to be able to interpret good farming practices and other information being given to them through many channels better than those who have less or no education.

Table 4: Demographic characteristics of sampled farmers (n=216)

Factors	Frequency	Percentage
Age (Years)		
<22	0	0.0
22 < X < 60	196	90.7
60	20	9.3
Total	216	100
Sex of Household Head		
Male	176	81.5
Female	40	18.5
Total	216	100
Marital status of Household Head		
Married	187	86.6
Single	6	2.8
Divorced	3	1.4
Widow/widower	20	9.3
Total	216	100
Education level		
No formal education	17	7.9
Primary education	183	84.7
Ordinary Secondary education	13	6.0
Advanced Secondary School	3	1.4
Total	216	100

4.1.2 Demographic characteristics of sampled assemblers

The demographic characteristics of rice assemblers in Kahama district are presented in Table 5. The result shows that all of rice assemblers in Kahama district were aged between 24 years and 57 years, with the mean age of 37 years and younger assemblers was 24 years and the eldest was 57 years of age. This revealed that most of rice

assemblers were within the economically active age and mostly independent that has significant effects on decision making in that particular segment.

Table 5: Demographic characteristics of sampled assemblers (n=22)

Factors	Frequency	Percentage
Age (Years)		
<22	0	0
24-57	22	100.0
>57	0	0.0
Total	22	100
Sex of Household Head		
Male	17	77.3
Female	5	22.7
Total	22	100
Marital status of Household Head		
Married	15	68.2
Single	7	31.8
Total	22	100
Education level		
No formal education	2	9.1
Primary education	16	72.7
Ordinary Secondary education	4	18.2
Total	22	100

Regarding the sex of the respondents, the findings show that assembling business is dominated by male, which is represented by 77.3% and female are 22.7%. This is probably due to the nature of the assembling business that requires extensive organization with farmers. Regarding the marital status it was found that 68.2% of all paddy assemblers in Kahama district are married and about 31.8% are single as shown in Table 5. This implies that most paddy assemblers in the district are married people, hence committed to their activities due to family responsibilities.

With regard to the educational status of the assemblers, results revealed that 72.7% of the respondents attained primary education, 18.2% attained secondary education and 9.1% have no formal education, however the majority of the respondents have more than 5 years of experience in dealing with the assembling of cereal crops for sale to traders.

4.1.3 Demographic characteristics of sampled wholesalers

The socio-economic characteristics of wholesalers in Kahama district are presented in Table 6 whereby the results revealed that most of the respondents are within the active age of the population ranging from 19 years of age to 54 years of age. The average mean of the respondent's age is 33.8 years and a standard deviation of 9.6 years. The findings also show that the respondents are 70% male and 30% female, which implies that the majority of wholesaling businesses are dominated by male traders. Regarding the marital status it was found that 60% of all wholesale traders in Kahama district are married and about 40% are single as shown in Table 6. This implies that most paddy assemblers in the district are married people, hence committed to their activities due to family responsibilities.

In regard to the educational status of the assemblers, results revealed that 83.3% of the respondents attained primary education, 13.3% attained secondary education and 3.3% have no formal education, this shows that despite that most traders has no advanced education but they attained basic education which remove some barriers to trade (Table 6).

Table 6: Demographic characteristics of sampled wholesalers (n=30)

Factors	Frequency	Percentage
Age (Years)		
<18	0	0.0
19-54	30	100.0
>54	0	0.0
Total	30	100
Sex of Household Head		
Male	21	70.0
Female	9	30.0
Total	30	100
Marital status of Household Head		
Married	18	60.0
Single	12	40.0
Total	30	100
Education level		
No formal education	1	3.3
Primary education	25	83.3
Ordinary Secondary education	3	10.0
Advanced Secondary School	1	3.3
Total	30	100

4.1.4 Demographic characteristics of sampled processors

The socio-economic characteristics of processors in Kahama district show that 86.7% of the respondents are within the active age ranging from 31 years to 60 years, while the average of 13.3% of the respondents are above active age of 60 years as shown in Table 7. The youngest processor has 31 years while the eldest one has 62 years. The average mean of the respondent's age is 47 years and standard deviation of 9.6 years, mostly in this sub-segment most of the respondents are older enough due to the nature of the ownership of the milling machine, where they are owned by family members who mostly raised their own capital through farming and shifted to processing business through acquiring milling machine.

Also results revealed that the respondents are 83.3% male and 16.7% female, which implies that the majority of millers are male traders, however, it doesn't mean that most decisions are made by male due to marital status and mode of ownership. In regards to marital status it was found that 96.7% of all millers in Kahama district are married and only one miller was a widow as shown in Table 7. This implies that most millers in the district are married people and it gives an explanation that most decisions in the industry are based on marital relationships, as both family members shares the ownership of the business hence its decisions. In the educational status of the millers, results revealed that 56.7% of the respondents attained primary education, 30% attained secondary education and 13.3% have no formal education, this shows that most millers have attained basic education which simplifies communications and removes barriers in trading.

Table 7: Demographic characteristics of sampled Processors (n=30)

Factors	Frequency	Percentage
Age (Years)		
≤ 30	0	0.0
30 < X ≤ 60	26	86.7
>60	4	13.3
Total	30	100
Sex of Household Head		
Male	25	83.3
Female	5	16.7
Total	30	100
Marital status of Household Head		
Married	29	96.7
Widow	1	3.3
Total	30	100
Education level		
No formal education	4	13.3
Primary education	17	56.7
Ordinary Secondary education	6	20.0
Advanced Secondary School	3	10.0
Total	30	100

4.1.5 Demographic characteristics of sampled retailers

The demographic characteristics of sampled retailers in the Kahama district show that 100% of the respondents are in their active age, which are ranging from 20 years for the younger retailer to the eldest retailer aged 54 years as shown in Table 8. The mean age is 31.4 years with the standard deviation of about 7.7 years. Also results revealed that 57.1% of the respondents were male, while 42.9% were female, which implies that retailing business is open to any participants regardless of the sexes.

The result also shows that 51.4% of sampled retailers are married, 44.3% of retailers are single, 2.9% of retailers are widow and just 1.4% is divorced respondents as shown in Table 8. This shows that marital status is not a barrier into rice retailing business. In the aspect of educational status, results show that 78.6% of the respondents attained primary education and 21.4% have attained secondary education. Educational status shows the barrier into business in terms of effective communications to respond to various factors which affects demand and supply of rice in the market.

Table 8: Demographic characteristics of sampled retailers (n=70)

Factors	Frequency	Percentage
Age (Years)		
< 20	0	0/0
$20 \leq X \leq 54$	70	100.0
>54	0	0.0
Total	70	100
Sex of Household Head		
Male	40	57.1
Female	30	42.9
Total	70	100
Marital status of Household Head		
Married	36	51.4
Single	31	44.3
Divorced	1	1.4
Widow/Widower	2	2.9
Total	70	100
Education level		
No formal education	5	7.1
Primary education	55	78.6
Ordinary Secondary education	10	14.3
Total	70	100

4.1.6 Demographic characteristics of sampled consumers

The socio-economic characteristics of consumers in Kahama district are presented in Table 9, which shows that age of the respondents are ranging from 18 years to 65 years which accounts 98.8% of the total respondents, with the mean age of 30 years and a standard deviation of 9 years, this shows that majority of the consumers are in their middle ages which also support the norms that rice is mostly preferred by young and middle aged consumers, as its being perceived as a high income earners food.

The findings show marital status of consumers as 47.1% of the respondents were married, 43.5% were single, 7.1% of them were widow and 2.4% of the respondents are divorced. This shows that marital status has no influence in making decision in the consumption of rice (Table 9). In terms of education, most consumers have attained primary education by

61.2% and 38.8% have secondary education. It shows that advanced education is not a factor to influence a decision to consume rice as a food in Kahama district. This is contrary to the results of Takele (2010) which found that education is an important variable that tends to influence the choice of food commodities consumed by individuals and households.

Table 9: Demographic characteristics of sampled consumers (n=85)

Factors	Frequency	Percentage
Age (Years)		
<18	0	0.0
18-60	84	98.8
>60	1	1.2
Total	85	100
Sex of Household Head		
Male	66	77.6
Female	19	22.4
Total	85	100
Marital status of Household Head		
Married	40	47.1
Single	37	43.5
Divorced	2	2.4
Widow/widower	6	7.1
Total	85	100
Education level		
Primary education	52	61.2
Ordinary Secondary education	32	37.6
Advanced Secondary School	1	1.2
Total	85	100

4.2 Farming Characteristics

4.2.1 Land allocation and crop production

A total of 216 households was selected and interviewed from 16 villages and all of them were producers of rice as the dominant crop. Table 10 shows the level of land utilization to the household, such that land allocated to food crops on average is 5 hectares for rice and 3.5 hectares for maize.

Also, the result as indicated in Table 10 shows that, in average the size of land allocated to rice accounted to 38.95 percent of the total land cultivated by respondents in 2012 growing season. The maximum land held by farmers in Kahama district is 9 hectares while the minimum is 1.3 hectares. The highest proportion of the cultivated land in the 2012 cropping year was allocated to rice with 38.95 percent. In addition to rice and maize, most of sampled farmers cultivate other food and oil crops like cassava, sweet potato, groundnuts and sunflower in the upland areas as paddy farms are in the lowland. Also the study shows the existence of intercropping in the district between rice and maize by using irrigation during dry season.

Table 10: Total cultivated land allocation pattern for crops in Kahama district

Types of crops	No. of Farmers	Farm size (Ha)	Average Farm Size (Ha)	Percent	Max	Min
Maize	216	749.7	3.5	29.59	9	1
Rice	197	987	5.5	38.95	16	1
Cassava	76	106	1.4	4.18	2	1
Sweet Potatoes	60	89.5	1.5	3.53	3	1
Bambara Nuts	15	37	2.5	1.46	4	1
Sunflower's	19	88.5	1.7	3.49	20	1
Cotton	22	139	2.3	5.49	10	2
Groundnuts	65	337	1.2	13.30	15	0.5
Total		2533.7		100.00		

4.2.2 General crop establishments

According to the interviewed respondents about common planting methods used in paddy production as presented in Table 11, the result shows that 55.09 percent of the farmers are using direct seeding through broadcasting while 30.56 percent of the farmers used transplanting as a means of paddy establishment on the farm. Also it shows that 14.35 percent of the farmers are using both means as a mechanism of crop establishment in the fields.

Table 11: Paddy crop establishment in Kahama district (n=216)

Planting Means	No. of farmers	Percentage
Direct seeding	119	55.09
Transplanting	66	30.56
Both means	31	14.35
Total	216	100.00

4.2.3. Livestock holdings

This is the total number of livestock holding per household in the tropics and is measured as a Tropical Livestock Unit (TLU). To farmers, livestock is the important source of income when its products are sold (meat, hides, skin and milk), supply manure to farms, provide family foods, draught power for crop cultivation and transportation of the crop from the fields to the market and store areas. It is assumed that the household with larger TLU can have a better economic strength and financial position to purchase farm inputs and hire labor during peak season.

To assess the livestock holding, the Tropical Livestock Unit (TLU) was employed to calculate resource ownership per households as shown in Table 12. Among the 216 sampled households, the cows owned was about 13.05 mean tropical livestock units (TLU). However, this must not misleading figure as there were widespread deviation among cow keepers as the minimum number of cattle owned is one (1) while the maximum number of cattle owned is 80. Also, among 216 sampled households, the average livestock holding was 4.2 TLU, 2.63 TLU and 1.07 TLU for oxen, donkeys and goats per person respectively. Except for the mentioned livestock, all the other livestock holding on average were less than one per person.

Table 12: Number of livestock owned by sample households

Types	Observation	Total	Min	Max	TLU	Mean TLU
Cows	105	1 957	1	80	1 369.90	13.05
Oxen	16	96	4	16	67.20	4.20
Donkeys	4	15	2	6	10.50	2.63
Goats	111	1 187	2	32	118.70	1.07
Sheep	15	146	2	40	14.60	0.97
Poultry	52	930	4	76	9.30	0.18
Local Chicken	67	867	1	60	8.67	0.13
Ducks	15	93	3	12	0.93	0.06

4.2.4 Farm income sources

All of sampled households were practicing rice farming activities, and its production gives the household an average annual income of Tsh. 1 123 874 as shown in Table 13. Some farmers also claimed that they were taking part in other income generating activities like rearing of farm animals and the processing of paddy for value addition. From the result, it was shown that processing activities were generating more income than farming activities, whereby its average annual income was Tsh. 1 930 000. On average, the annual farm income for all of the respondents were Tsh. 1 328 304 (Table 13).

Table 13: Sources of income of the respondents ('000)

	Income Sources			Other farm sources
	Paddy	Rearing	Processing	
Total No. of Observation	216	56	7	76
Monetary value (Tsh)	205 669	35 305	13 510	32 429
Mean Value (Tsh)	1 123	630	1 930	426
Maximum	5 832	3 000	9 900	4 000
Minimum	86	250	710	125
Std. Dev.	1 133	628	3 638	558

4.2.5 Non farm income sources

In Table 14, out of 216 sampled households, 79 were participating in income generating activities other than rice farming. In comparison to the income from the farm, non farming activities generate on average Tsh. 2 186 202 which is higher than Tsh. 1 328 304 of the farming activities. This shows that despite farming being the major economic activity for the respondents' their earnings is lower than the earnings of other sector's.

Table 14: Sources of non farm incomes of the respondents ('000)

Income Sources	S/N	Total (Tsh)	Mean	Std. Dev.	Max	Min
Handcraft	4	6 100	1 525	684	2 500	960
Salary	35	83 470	2 384	1 224	5 334	823
Rent	2	2 280	1 140	56	1 200	1 080
Service	4	24 100	6 025	2 735	9 900	4 200
Trade	33	56 160	1 701	1 816	7 500	250
Pension	1	600	600	-	600	600
Total		172 710	13 375	6 515	27 034	7 913

4.3 The Support Services in Rice Production and Marketing

4.3.1. Market information and extension service

The distribution of market information refers to the availability of relevant market information to farmers, about demand, supply and price of the crops. The survey result shown in Table 15, indicated that all of the farmers had information concerning the movement of rice prices of different market, rice crop diseases and farming techniques from different channels both informal and formal means. This shows that most of the farmers i.e about 39.35% receive farming information during village meetings. Also mobile phone and word of mouth means play a crucial role in marketing information with 24.07% and 17.59% respectively. Other means which received less than 10% are posters, radio, and Television programs.

Table 15: Source of information to farmers (n =216)

Source of information	Frequency	Percentage
Word of Mouth	38	17.59
Mobile Phone	52	24.07
Posters	18	8.33
Radio	15	6.94
Village meetings	85	39.35
Television programs	8	3.70
Total	216	100

4.3.2 Quality of source of information

The quality of source of information from the farmers interviewed is shown in Table 16 in terms of accuracy of information (Reliability) and availability of enough information (Adequately), where 39.5% indicated that information quality was reliable, adequately and timely. Also, 26.1% of the respondents claim that they were satisfied with the reliability of the information and 18.7% of the respondents claim that they were satisfied with both adequacy and reliability of information. This was due to the provision of information from the extension officers available in the area from different stakeholders.

Table 16: Quality of source of information on rice production (n=216)

	Frequency	Percentage
Reliable	56	26.1
Adequate	16	7.5
Timely	5	2.2
Reliable and Adequate	40	18.7
Reliable and Timely	6	3
Adequate and Timely	6	3
Reliable, Adequate and Timely	85	39.5
Total	216	100

4.3.3 Agricultural training and clubs association

4.3.3.1 Agricultural trainings

The higher the education level, the better would be the knowledge of the farmer towards better farming practices. Under normal conditions, those farmers with higher education are in a better position to adopt best practices of rice production, which will yield optimum output at the minimum costs. Table 17 below compares training provided to household head and another member of the family and shows that 79% of the household head had accessed agricultural trainings of a certain kind and 12% had trainings specifically for rice farming while more than 90% of the household member did not have any training on rice farming or any other agricultural practices. This means that the household head still has a significant role in the performance of the rice production system in Kahama district.

Table 17: Agricultural training to rice farmers (n=216)

Type of training			Not		Total
	Trained	%	Trained	%	
Agricultural trainings to household head	170	79	46	21	216
Rice farming trainings to household head	25	12	191	88	216
Agricultural trainings to any household member	16	7	200	93	216
Rice farming trainings to any household member	10	5	206	95	216

4.3.3.2 Household head membership to associations

Membership of farmers to any association gives them access to trainings and any other information from rice crop stakeholders which found it easier to train organized farmers. There is a relationship between being a member of an organization and trainings, as it's easier for members to be organized and trained. Twenty seven percent of the respondents

were members of different associations but 38% of the population who were not interested to join in any association and 31% are not members as no association is available in their vicinity as shown in Table 18.

Table 18: Household head membership to associations(n=216)

Variables	Obs.	Percentage
Members of an association	59	27.0
Poor management of associations	9	4.0
Not aware/No association in the village	67	31.0
No Interest to join	81	38.0
Total	216	100

4.3.4 Agricultural input use

4.3.4.1 Fertilizer and seeds application

It is evident that chemical fertilizer could boost farm productivity, however, despite this fact, rice producer in Kahama district used a very small amount of inorganic fertilizer on their rice field. Results in Table 19 shows that few producers actually use these fertilizer's as 68.06% of the farmers are not using any fertilizer, 26.39% were using organic mainly from livestock kept and remaining of the straws in the field and only 4.17% was using industrial fertilizer. The major reason behind the low utilization of inorganic fertilizer is that 80.56% of the farmers are claiming that their field soil are fertile while 19.44% are claiming that their field soil have poor fertility (Table 19).

Table 19: Fertilizer and seed input utilization by rice farmers (n=216)

Variable	Type	Obs.	Percentage
Soil Fertility	Very rich	9	4.17
	Rich on Average	165	76.39
	Poor	42	19.44
	Total	216	100.00
Fertilizer used	Organic Fertilizer	57	26.39
	Chemical Fertilizer	9	4.17
	Both Fertilizers	3	1.39
	No Fertilizer Application	147	68.06
	Total	216	100.00
Herbicides	Not Used	-	-
Pesticides	Not Used	-	-
Seed variety	India	5	2.31
	Kalamata	200	92.59
	Mabeyenge	26	12.04
	Supa India	1	0.46
	Total	216	100.00
Seed selection	Winnowing	96	44.44
	Physical sorting	112	51.85
	Floating	8	3.70
	Total	216	100.00

4.3.4.2 Labour use in paddy production

Laborers' are employed in the rice cultivation from soil preparation to harvest. In Kahama district rice farming, family labour force consists of the highest percent in rice cultivation of about 43.52%, followed by the use of external labour which consist of 30.9% and are mostly hired as shown in Table 20.

Table 20: Labour employed in rice farming in 2011/12 (n=216)

Source	Frequency	Percentage
External labour	65	30.09
Household labour	94	43.52
Owned + Hired	57	26.39
Total	216	100

4.4 Profit Analysis of Rice Production

4.4.1. Unit and conversion factors

Paddy rice after being harvested is dried, either mechanically or in the open-air. Dried rice is then milled to remove inedible hull. Hulled rice also called "brown" rice consists of an average weight of 6-7% bran, 90% endosperm and 2-3 % embryo (Chen *et al.*, 1998). Bran layer can be removed to get white rice through further milling processes. On average, paddy rice produces 25% hulls, 10% bran, and 65% white rice (Elepu *et al.*, 2014). There are several degrees of milling which can take place, depending on consumer preferences and desired degree of whiteness or opacity. Milled rice is referred to as polished or whitened and there are various degrees or fractions of polishing. White rice implies 8-10% bran removal (Takele, 2010).

The calculation of profit and margins of farmers has to be done basing on several explicit assumptions. The present study calculations have tried to estimate and fix the conversion rate that is used to convert milled rice from paddy. For example a common conversation factor of paddy to milled rice in The Philippines is 0.65 but it applies to dry paddy. However, most paddy hauled to mills is wet, for which conversion factor of 0.58 was assumed. In this study based on farmers' response, an average of 0.60 was taken as the conversion factor for paddy yield. Hence the following assumptions were considered in the calculation of profit margin.

1. The conversion factor of paddy yield is 0.60 which means 0.40 is Husk yield.
2. The average selling price of paddy is TShs 390 per kilogram at home, while when transported to the village market the average price was TShs 470 per kilogram.
3. A straw yield is measured per number of ox carts in one acre whereby 5 ox carts full of straws will be obtained. According to farmers, each costs an average of

TShs 2 500 therefore an average of TShs 12 500 will be the value of straw per acre.

4. Since each farmer has plots with different soil fertility and flooding status. Therefore, the opportunity cost of each farm will vary accordingly. The good land where there is sufficient water system, an average land rent charged is TShs 80 000 while TShs 60 000 was charged on farms not well connected to the irrigation system. Hence, an average of TShs 70 000 will be used as an opportunity cost per hectare.
5. Transportation cost by oxen from farm to collection point was calculated based on the amount of bags to be transported.
 - i) If it is transported from farm in areas where soil is soft and still watery, it requires TShs 2 000 per bag of 90 Kg.
 - ii) Transporting from collection point to farmers, home/stores costs an average of TShs 1000 per bag of 90 Kg.
6. Labor cost and price of oxen transport were estimated based on the wage of labor and oxen rental value in each of the locality.
7. Labor costs of chasing birds ranging from TShs 40 000 to TShs 50 000 per hectare per season, therefore an average of TShs 45 000 per season will be used for all sampled areas.
8. Most farmers don't have access to loans, therefore the interest rate calculation will not be used to find opportunity costs of capital.

Cost and return components were employed to determine rice production profitability as shown in Table 21 where costs and profitability were calculated on a channel basis.

Table 21: Profit and cost of production of rice

Items	Channel I	Channel II
1. Revenue		
Paddy yield (Kg/ha)	855	855
Price of paddy (Tsh/kg)	390	470
Straw yield (No. of Ox-cart)	5	5
Price of straw/Ox-cart	2 500	2 500
Value of paddy/ha	333 450	401 850
Value of straw/ha	12 500	12 500
Total revenue (TR)	345 950	418 180
2. Cost		
A. Opportunity cost of land	70 000	70,000
B. Farm Activities cost (Average)		
Cost for oxen plowing (Tsh/ha)	30 000	30 000
Cost for oxen leveling (Tsh/ha)	25 000	25 000
Cost for hand-hoe leveling (Tsh/ha)	22 500	22 500
Labor wage to planting (wage/ha)	27 500	27 500
Labor wage to weed (Tsh/ha)	26 667	26 667
Labor wage to prevent birds (wage/ha/months)	45 000	45 000
Labor cost for harvesting (Tsh/ha)	42 000	42 000
Collection charges from farm (Tsh/ha)	9 000	9 000
Labor cost for trashing and winnowing (Tsh/ha)	5 400	5 400
Oxen transport from collection point to store (Tsh/ha)	18 000	18 000
Oxen transport to the village market (Tsh/ha)	-	18 000
Total labour cost	251 067	269 067
C. Material input cost		
Amount of seed (kg/ha)	14	14
Seed cost (Tsh/kg)	1 000	1 000
Total seed costs	14 000	14 000
Material input cost	14 000	14 000
Total cost (TC)	335 067	353 067
Profit (TR-TC)	10 883	65 113

4.4.2 Cost of production of paddy

The costs per hectare of various inputs used in the production of rice was shown in Table 22. The result shows that the total cost per acre was Tshs 335 067 both for the home market and on village market respectively. Farm activity costs had a maximum share of total cost of 74.93%, followed by opportunity cost (rental value of land) of land

with 20.89% and seed with 4.17% which consists of the minimum share of production cost.

Table 22: Average cost per hectare of rice production

Type of costs (Cost/TShs)	Channel I		Channel II	
	Costs (TShs)	% share	Costs (TShs)	% share
Opportunity cost (land rent)	70 000	20.89	70 000	19.83
Farm activities cost	251 067	74.93	269 067	76.21
Material Input costs	14 000	4.18	14 000	3.97

4.4.2.1 Labor cost

Costs in the rice crop are usually high due to its nature of production in the third world, therefore, from Table 23, labor to prevent farm birds usually ranked first. About 17.92% of the cost expenditure goes for bird preventing purposes. Also harvesting, plowing, planting and weeding contributes much to the farm activities cost components for rice production.

Table 23: Average farm activities cost per hectare of rice production

Type of costs (Tshs/Ha)	Channel I		Channel II	
	Costs	% share	Costs	% share
Cost for oxen plowing	30 000	11.95	30 000	11.15
Cost for oxen leveling	25 000	9.96	25 000	9.29
Cost for hand hoe leveling	22 500	8.96	22 500	8.36
Labor wage to planting	27 500	10.95	27 500	10.22
Labor wage to weed	26 667	10.62	26 667	9.91
Labor wage to prevent birds (wage/ha/months)	45 000	17.92	45 000	16.72
Labor cost for harvesting	42 000	16.73	42 000	15.61
Collection charges from farm to the collection point	9 000	3.58	9 000	3.34
Labor cost of threshing and winnowing	5 400	2.15	5 400	2.01
Oxen transport from collection point to store	18 000	7.17	18 000	6.69
Oxen transport to the village market	-	-	18 000	6.69

4.4.3 Net income

The cost benefit analysis of paddy production on per acre basis shows that production is profitable in both business channels. However, those farmers selling their crops at home received less profit than those farmers selling directly to the buyers (millers and wholesalers) and bypassing middlemen due to price differences. The average net income for the channel I is Tshs 10 882 while for channel II is Tshs 65 113 per hectare.

4.5 Rice Market Channels

Market channel analysis is intended to provide systematic information on the flow of the goods and services from their point of origin, which are producers and to the final destination of consumer's. The rice market channel was constructed based on the data collected from different marketing actors. Four main channel were identified whereby three channels are traders based and do transport and sell rice out of the district, while one channel direct rice to the consumers within the district. The main receivers of farmers output were wholesalers, millers, assemblers and consumers with an estimated share of 45.73%, 22.07%, 23.55% and 8.67%, respectively. The major channels identified were the following;

- i. Farmers – wholesalers – Out of district (O/D)
- ii. Farmers – Assemblers - Wholesalers – O/D
- iii. Farmers – Assemblers –Millers – wholesalers –O/D
- iv. Farmers – Assemblers – Millers – Wholesalers-Retailers-Consumer

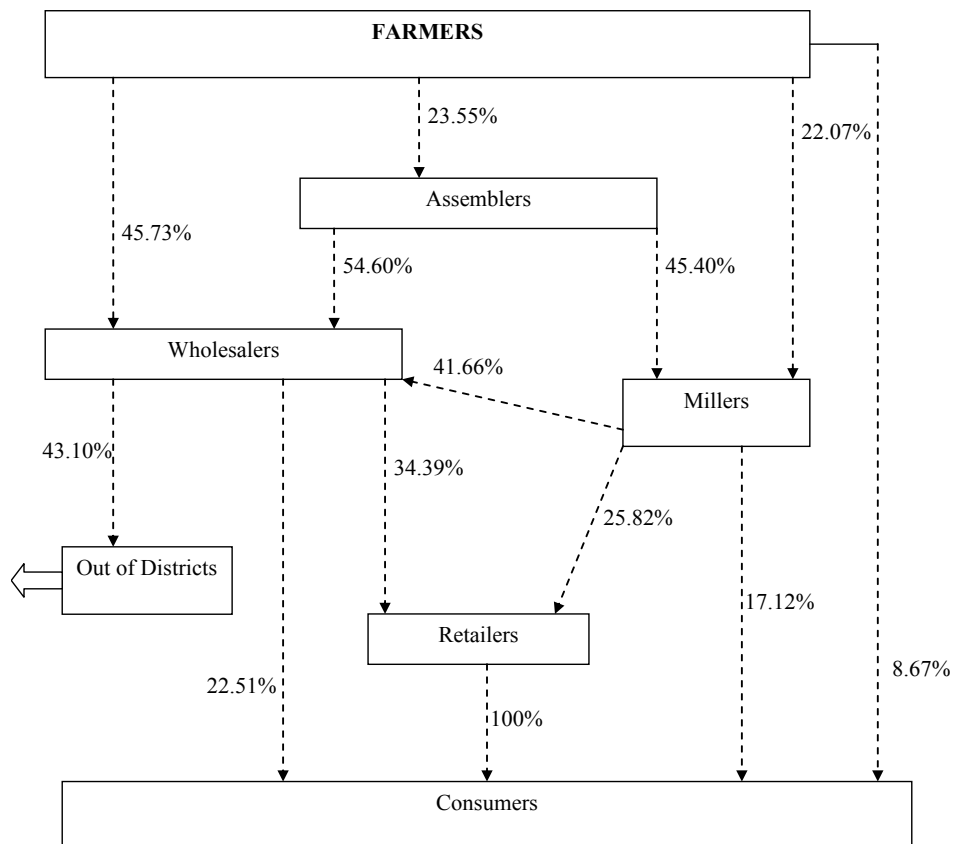


Figure 5: Rice marketing channel

4.6 Analysis of Structure of the Market

4.6.1 Degree of market concentration

Market concentration may be used to measure the level of competition, which is theorized to be positively related to the rate of profit in the industry. Seller concentration in the market refers to the number of sellers in the industry together with their comparative shares of industry sales and will be assessed by the Herfindahl-Hirschman Index (HHI). The HHI reflects a larger variation in relative firm size, even though the number of firms may be greater (Church and Ware, 2000).

The HHI is a measure of the size of firms in relation to the industry and an indicator of the amount of competition among them. It is defined as the sum of the squares of the market shares of each individual firm. Decreases in the HHI generally indicate a loss of pricing/market power and an increase in competition, whereas increases imply the opposite. At HHI <0.1 indicates an unconcentrated index; an index between 0.1 and 0.18 indicates a moderate concentration. HH index above 0.18 indicates higher concentration and an index below 0.01 indicates a highly competitive market (Basey *et al.*, 2013).

Note: $HHI = \sum_{i=1}^n S_i^2$, where S_i is the market share of firm i in the market, and n is the number of firms.

Table 24: Herfindahl Hirschman Index result for actors in the Kahama rice market

Actors	Computed HHI
Collectors	0.054
Wholesalers	0.058
Retailers	0.020

From Table 24, it indicates the HHI for the collectors and wholesalers to be 0.054 and 0.058 respectively. These small indices show a strong competitive market structure with no dominant player, as result shows that, rice trade in these segments is in the hand of many traders and no one has an influence of controlling the price over others.

4.6.2 Barriers to entry into the rice market

The barriers to entry into the market reflect the competitive relationships between existing traders and potential entrants. If the barriers to entry are low, new traders can easily enter into rice markets and compete with established traders. However, the study shows that there were presence of barriers to entry into the rice market.

4.6.2.1 Capital investment

Capital is the major entry barrier to most of the rice traders as shown in Table 24, where 87.10% of the traders identify liquidity as the major entry barrier. To enter in the market more capital is needed, especially to millers and wholesalers because they have to invest to purchase more rice during harvesting time when there is low price.

4.6.2.2 Price fluctuation

Price fluctuation is reported to be one of the entry barriers in rice marketing as shown in Table 25. The results shows that 69.03% percent of traders consider price fluctuation as the entry barrier into the rice market as it lower their profits. They claim that price are due to the nature of production as most farmers depends on rainfall for production as there were no developed irrigation systems.

4.6.2.3 Lack of access to credit

The results shows that poor accessibility to credit facility is among the barrier to many wholesalers in buying rice in bulk to store as a hedge against price fluctuation. In general, 81.94 percent of traders agreed that they face challenges in accessing credit services as shown in Table 25.

Table 25: Barriers to entry into the rice market by traders

Barriers to entry	Frequency	Percent
Capital	135	87.10
High competition to control farmers	41	26.45
Price fluctuation	107	69.03
Information asymmetry	59	38.06
High rent of stores to assemblers	92	59.35
Lack of credit access	127	81.94

4.7 Analysis of Market Conduct

4.7.1 Storage duration

Storage services to farmers helps for smooth and continuous flow of products to the market and create a time utility. The result in Table 26 shows that 31.94% of farmers store paddy in family store while 45% put them in different village stores. In average 77% of the outputs are stored at least in places where they can retain their quality after harvest. In a minimum of two days, farmers were able to transport the entire paddy harvest from the field to the stores.

Table 26: Paddy storage by farmers

		Obs.	Percentage
Storage form	Paddy grain	209	96.76
	Paddy husked	7	3.24
	Total	216	100.00
Place of storage	Village stores	98	45.37
	Household stores	69	31.94
	On-farm stores	49	22.69
	Total	216	100.00
Days left in the field	1-2 days	202	93.52
	Above 3days	14	6.48
	Total	216	100.00
Storage time before milling	1-4 Weeks	88	40.74
	5-8 Weeks	69	31.94
	9-12 Weeks	6	2.78
	Above 12Weeks	53	24.54
	Total	216	100.00

4.7.2 Purchasing strategy

The survey result shows that 59% of purchases of wholesalers and millers depending on ethnicity and family linkage relationship by 59%. However, 65.19% of wholesalers, buy their rice from middlemen due to availability of rice in large quantities which reduce the

costs for search to producers. No contract based purchases were observed in the district. The rice farmers in Kahama district were observed to have weak organizations to negotiate the farm gate price. During the study, all of the farmers identified price as one of the major determinants in their decision to production. The selling behavior of farmers depends upon social linkages as they also use them as their sources of market information.

4.7.3 Selling strategies in rice marketing

During the survey, there was no serious competition observed for selling of rice from farmer to traders. It was observed that most assemblers have communications networks with farmers and if a farmer has rice to sell he/she will know who to contact to get the buyers. There were no government restriction on the location of selling or purchases. The financial position of the purchasers and the profitability are the only factors considered at the point of buying or selling. Subsequently, about 50% of assemblers preferred purchasing rice from the same village and 64% sell it the wholesalers rented stores in urban areas. The assessments of the quality of rice are made by the purchasers and determine its price in relation to the market prices.

This condition indicates that purchasers at each market level are the main decision-makers. The survey also indicated that no formal contractual agreements are made between producers and purchasers. As a result, assemblers and other traders of rice purchased what is available on the markets. However, assemblers reported that based on prior knowledge of individuals or family linkage also there is an informal agreement made between assemblers and farmers, such that farmers are supplying their rice to the assemblers who helped them during financial problems and this is the case as farmers as they do not seek loans in fear of losing their farms in case of default. Price risk has

limited buyers from making contractual agreements with rice producers and force traders to purchase whatever is available on the market in order to minimize the risk as they adjust the purchase price when there is low sales price in the absence of a contractual agreement.

4.8 Analysis of Market Performance

4.8.1 Marketing costs and marketing margin in rice value chain

4.8.1.1 Marketing cost and margin of assemblers

The marketing cost of rice for rural and urban assemblers is summarized in Table 27. The study shows that the main cost of rural assemblers is transport charges from the assembly point to customers in the urban areas, assembly charges and market tax holding 38.76%, 36.64% and 15.02% respectively of the unit cost per bag of 90 Kg.

Table 27: Marketing cost and margin of assemblers

Costs item	Unit costs (Tsh)	Std. Dev.	Percentage
Assembling charges	1 333.2	174.6	36.64
Market Taxes	546.6	118.2	15.02
Rent for Market places	51.6	85.8	1.41
Rice Transport costs	1410	578.4	38.76
Personal Travel costs	102	60.6	2.80
Security costs	91.5	13.67	2.51
Market search costs	35.76	7.8	0.98
General costs	67.11	3.45	1.84
Total costs	3 637.77	1 042.52	100
Average selling price	45 000	5 100	
Average Buying price	36 900	1 200	
Margin	8 100	3 900	
Profit	4 462.23	2 857.48	

4.8.1.2 Marketing cost and margin of wholesalers

The unit marketing cost of rice wholesalers in the study area is summarized in Table 28, whereby on average the marketing cost of rice of wholesalers is Tsh. 2 351 per 60 Kg. Cost of transport of rice from the assembly point to the wholesalers' stores captures more than 50% of the total costs. Also electricity and labor contribute significantly to the cost structure of wholesalers by 13.27% and 7.52%.

Table 28: Marketing cost and margin of wholesalers

Cost Item	Unit costs (Tsh)	Std. Dev.	Percentage
Motor vehicle maintenance	25.33	36.42	1.08
Electricity	311.96	161.69	13.27
Family Labor	4.22	2.17	0.18
Hired Labor	176.82	96.09	7.52
Market Taxes	107.24	63.24	4.56
Rent for Market place	77.31	56.99	3.29
Rice Transport costs	1 242.54	150.65	52.85
Personal Travel costs	154.84	47.03	6.59
Security costs	40.11	12.95	1.71
Market search costs	80.77	28.01	3.44
General costs	130.08	74.23	5.53
Total Costs	2 351.22	729.47	100.00
Average selling price	58800	1450	
Average Buying price	45000	5100	
Margin	13800	-3650	
Profit	11 448.78	(4 379.47)	

4.8.1.3 Marketing cost and margin of millers

Table 29 shows the marketing cost of a miller's bag of 90 Kg. The major cost items are electrifying, mortar repair and operational staff cost which contributed to 51.16%, 13.40% and 11.11% of the total marketing cost respectively. In an assumption that the miller's only engage in dehusking activities with which the rice bran are left to millers, and sold as

animal feed. In average 90 kg of husked rice gives out an average of 30 Kg with average price of Tsh. 828.57 which increases revenue to millers.

Table 29: Marketing cost and margin of millers

Cost Item	Unit costs (Tsh)	Std. Dev.	Percentage
Electricity	857.14	139.48	51.16
Fuel	224.46	90.47	13.40
Operating staff	146.33	61.09	8.73
Supporting Staff	39.84	30.29	2.38
Lubricant	74.24	110.64	4.43
Oil Change	45.96	23.38	2.74
Repair Mortar	28.16	35.99	1.68
Repair Sieving	48.44	70.54	2.89
Repair Welding	32.37	36.66	1.93
Spare belt	49.48	79.33	2.95
Spare segment	33.59	24.92	2.00
Spare sieving	95.55	113.38	5.70
Total Costs	1 675.56	816.17	100.00
Average selling price	64 500.00	2 200.00	
Rice Husks revenue	828.57	157.21	
Average buying price	58 800.00	1 450.00	
Margin	6 528.57	907.21	
Profit	4 853.01	91.04	

4.8.1.4 Marketing cost and margin of retailers

The marketing cost of rice for retailers is summarized in Table 30, which shows their costs per bag of 60 Kg. The result shows that the main cost of rural assemblers is transport cost, rent for market places, market taxes and hired labor costs, which is consisting of 28.01%, 10.66%, 15.92% and 17.74% of the total cost respectively.

Table 30: Marketing cost and margin of retailers

Cost Item	Unit costs (Tsh)	Std. Dev.	Percentage
Assembling charges	248.26	0.42	3.92
Electricity	291.53	4.94	4.61
Family Labor	362.36	23.79	5.73
Hired Labor	1 122.86	11.04	17.74
Market Taxes	1 007.62	14.77	15.92
Rent for Market place	674.56	144.53	10.66
Rice Transport costs	1 772.52	46	28.01
Personal Travel costs	330.68	6.37	5.22
Security costs	237.89	25.65	3.76
Market search costs	103.22	11.74	1.63
General costs	177.66	10.78	2.81
Total Costs	6 329.16	300.03	100.00
Average selling price	75 000	2 800	
Average Buying price	64 800	1 450	
Margin	10 200	1 350	
Profit	3 870.84	1 049.97	

4.8.1.5 Marketing costs, gross and profit margin of traders

Distribution of profit margin among different actors in the channel is shown in Table 31, where wholesalers get the highest gross marketing margin (value added), which is TShs 10 648. Rice retailers and assemblers got an almost equal gross margin of Tsh. 4300. Also millers get little higher than the two actors of about Tsh. 5 653, millers profits are, however, contributed by engaging themselves in more than one function of dehusking and wholesaling, by buying unmilled rice from different assemblers in Kahama district and sell milled rice to wholesaler, retailers and consumers.

Table 31: Summary of marketing cost, marketing margins and profit of farmers and traders

Cost Items	Costs per 60Kg (Tsh)	Gross Marketing Margin	Total Marketing Costs	Profit Margin	
				Amount (Tsh)	As % of cost price
I Farmers					
1. Production cost	35 270.21	-	-	1 629.79	4.62
2. Marketing cost	-				
3. Cost price	35 270.21				
4. Selling price	36 900.00				
II Assemblers					
1. Buying price	36 900.00	8 100.00	3 637.77	4 462.23	11.01
2. Marketing cost	3 637.77				
3. Cost prices	40 537.77				
4. Selling price	45 000.00				
III Wholesalers					
1. Buying price	45 000.00	13 000.00	2 351.22	10 648.78	22.49
2. Marketing cost	2 351.22				
3. Cost prices	47 351.22				
4. Selling price	58 000.00				
IV Millers					
1. Buying price	58 000.00	7 328.57	1 675.56	5 653.01	9.47
2. Marketing cost	1 675.56				
3. Cost prices	59 675.56				
4. Selling price	65 328.57				
IV Retailers					
1. Buying price	64 500.00	10 500.00	6 329.16	4 170.84	5.89
2. Marketing cost	6 329.16				
3. Cost prices	70 829.16				
4. Selling price	75 000.00				

Note:

1. Gross marketing margin (value added) = Average selling price – Average buying price.
2. Average selling and/buying price at different level was based on the Africa Rice survey in 2012
3. The time dimension for profit margin is one year of 2012.

4.9 Determinants of Rice Profitability at Farm Level

The regression analysis results in Table 32, shows the variables that are contributing to 82% of the variation of rice farmers' profitability in Kahama District. It means the regressand explained the dependent variable (profit margin) by 82%, while the remaining 18% is explained by error term.

Also, the findings in Table 32 show that, training of rice farming with the household head was statistically significant at $P < 0.05$ level. This implies that a household head who had received training on rice farming have good chances of increasing his earnings by Tsh. 41 538.72 per acre by improving his/her production methods per attended seminar compared to the farmer who had never attended any training. Moreover, farm size was also statistically significantly at $P < 0.01$ and positively related to rice profit margin as shown in Table 32. This suggests that farmers with large farms have higher chances of earning larger gross margin than those with small farms. An increase in one unit of farm size leads to increase in profit margin of Tshs 27 663 as Masuku (2013) claimed that farm size was statistically significant at $P < 0.05$ and positively related to profit margin. The parameter estimates of each of these variables also carried a sign that conformed to a priori expectations.

The study also found that farm location was statistically significant at $P < 0.01$ and positively related to profit margin. This implies that farmers with rice farms near main market or have the short distance to the market have higher chances of getting a larger gross margin than those with farms far from the main market, as in Table 32, which shows that a unit increase in the distance of rice farm from the main market decreased profit margin by Tshs 3 374.73. The findings are similar to those of Takele (2010) who

reported that farm location was statistically significant at $P < 0.01$ but negatively related to gross margin.

The study found further that the seed variety which are being prepared locally and education level per household head measured in a number of years in schooling have no statistically significant in increasing profitability of farmers, as it shows that a farmer are recycling seed varieties from themselves instead of acquiring new improved ones. Also, as the number of years spent in school increased there is a tendency of labor to shift from farming activities to other sectors of the economy.

Table 32: Estimated regression model of factors influencing rice farmer profitability

Variables	Coefficient	Std. Error	VIF	Probability
Farm size	27 663.410	1 617.537	1.04	0.000***
Farm distance to Market	-3 374.730	222.598	2.87	0.047**
Age of respondents	-5 825.192	1 759.565	1.02	0.001***
Educ. Level	-6 164.510	7 175.527	1.02	0.391
Experience of H/H	11 386.044	1 550.343	1.06	0.046**
Gender of respondents	8 752.800	1 274.15	1.02	0.003***
Access to credits	195.235	58.436	1.92	0.000***
Access to market information	49 236.570	40 678.09	1.02	0.027**
Access to farm trainings	41 538.720	69 426.09	1.04	0.018**
R Square	0.82			
Adjusted R Square	0.77			
F-value	61.09			

(***) and (**) Significant at 1 and 5 percent level respectively

4.9.1 Model reliability

Reliability of the regression model was checked to determine presence of the problem of multicollinearity. This is the problem which occurs when two or more predictors in the model are correlated and provide redundant information about the response. Variance

Inflating Factor (VIF) was used to test for the presence of multicollinearity. VIF greater than 5 indicates the presence of multicollinearity problem. Since all independent variables for rice farmers have VIF of less than 5 as shown in Table 33 multicollinearity problem was not encountered in the model.

Table 33: Multi colinearity diagnosis

Variables	VIF
Farm size	1.92
Farm distance to Market	1.87
Age of respondents	1.06
Educ. Level	1.04
Experience of H/H	1.04
Gender of respondents	1.04
Access to credits	1.02
Access to market information	1.02
Access to farm trainings	1.02

4.10 Production and Marketing Constraints of Rice

4.10.1 Producer's constraints

4.10.1.1 Shortage of farm inputs

Shortage of farm implement is the primary problem for most farmers in the sampled area. From Table 34 shows that 39% of the farmers respond to this problem. This situation reduces directly rice production and forces the farmers produce rice by using less manual way of production which is inefficient in the resource use.

4.10.1.2 Improved varieties

Lack of improved varieties was responded positively by 42% of the farmers as shown in Table 34. Most farmers cultivate local Variety of *Kalamata*, *Beyenge* and *Mabeyenge* (local variety) and the improved once are not yet widely disseminate and used by farmers. Only one variety called *Supa India* has been cultivated by farmers. Africa rice developed

improved rice varieties referred to as the New Rice in Africa (*Nerica*) but the NERICA lines were not found in the field yet. The local varieties yield about 0.885 tons to one ton per hectare under the technology used by most farmers as compared to improved varieties with 3.5 tons per hectare. Hence, raise the needs for improved early maturing, resistant to diseases and better yielding variety.

4.10.1.3 Diseases and pests

Thirty three percent of the farmers also indicate having faced problems of diseases and pests as shows in Table 34. According to DAI (2003), the identified Diseases/pests for rice in Kahama district where wave worm, birds, rice high-speed (weevil), termites and rice blast. Also, most of the herbicides and pesticides proved ineffective in fighting these challenges for farmers.

4.10.1.4 Shortage of seed supply

Forty two percent of farmers respond that, they face a shortage of seed supply whereby they are being enforced to use their own best seed selected from last season harvest. It's also observed that 19.4% of the farmers lack improved post harvest management technologies such as storage and storage facilities as shown in Table 34.

4.10.1.5 Lack of threshing machine

The survey result also shows that 55.4% of the farmers are not using machines for harvesting as shown in Table 34. It has been caused by the low incomes of farmers, small plots which can not allow mechanization on an individual basis. This has led to manual harvesting affect quality of rice obtained due to the presence of impurities in the rice.

4.10.1.6 Malpractice in selling method (Scaling or Weighing)

The survey results in Table 34 show that 32.5% of the farmers are complaining about malpractices in scaling, over weighing and quoting of lower prices than that available in the market by the buyers and middlemen as shown in Table 34. This has led into farmers to realize low profit as compared to other actors along the rice value chain.

4.10.1.7 Lack of market

The survey results show that, nearly 30% of respondents reveals that there were market problems associated with low output price, maintenance of standards and grades as shown in Table 34. For Example, during husking, grains are broken into pieces (farmer usually used traditional threshing i.e. by beating with sticks) and this broken grain decreases market demand. Also price setting mechanism doesn't include farmers' interest to ensure recovery of production costs; this is due to largely of lacking of bargaining power like strong association.

4.10.1.8 Lack of information exchange

The results in Table 34 shows that 21.6% of respondents said poor contact or communication was also one of the problems of farmers. Information asymmetry on market price, demand and supply in different areas is mentioned as a problem by sample households.

4.10.1.9 Transportation problem

From Table 34, findings shows that 33.2% of the sampled farmers indicated that they face transportation problem, especially during rainy season where excessive flooding is a common problem which makes movements of vehicles difficult.

4.10.1.10 Lack of capital and credit facility

The results in Table 34 also show that 48.8% of the farmers have capital shortage and 45.6% of the farmers were unable to access credit facility from financial institutions. Most of the time, lack of post-harvest credit facilities, farmers to sell their produce immediately after harvest, when prices are low and this explains why the gross margin for the farmer are low compared to other actors along the chain.

Table 34: Production, marketing and institutional challenges facing the farmers

No	Description	No. of Respondents	Percentage
A Production Aspect			
1	Problems of farm implement	95	44
2	Seed supply problem	91	42
3	Shortage of land	84	39
4	Disease problem	71	33
5	Problems of fertilizer supply for rice production	51	23.6
6	Problems of post harvest technology (storage loss)	42	19.4
7	Problems of availability of improved rice variety (lack of improved and high yielding varieties)	38	17.4
8	Chemical supply problem	26	12
B Marketing aspect			
1	Problems of threshing machine or miller (quality)	119	54.9
	Malpractice in selling method (scaling or weighing)	70	32.5
3	Lack of market	68	31.4
4	Problem of price setting	63	29.3
5	Information exchange problem	47	21.6
6	Problem of storage facilities	37	17
C Financing and institutional aspect			
1	Lack of capital availability	105	48.8
2	Problems of credit facility	98	45.6
3	Transport problem	72	33.2
4	Loan repayment problem	55	25.3
5	Lack of institutional support	40	18.5
6	Problems of excess water (flooding)	39	18
7	Problem of theft	26	11.9

4.10.2 Traders' constraints

4.10.2.1 Rice assemblers

The results in Table 35 shows that 80% of the assemblers were facing storage problems, 88% of them responds that they face capital shortage and difficulties in accessibility of credit facility. Also, 81% are facing low supply of paddy as farmers were reluctant to sell their crops due to low price in the market.

Table 35: Challenges facing assemblers

Problems	No. of Respondents	Percentage
Storage and lack of market	20	80
Capital shortage and credit access	22	88
Farmers reluctant to sell due to low price	20	81
Quality problem	13	52
Adulteration	17	68
Information flow	12	48

4.10.2.2 Rice Wholesaler's

As indicated in Table 36 shows that 72% of wholesalers face shortage of capital which was supported by a lack of bank guarantee. Also, 51% of whole sellers face unreliability of high quality rice supply due to poor post harvest management by farmers and 38% said they face the problem with the tax system.

Table 36: Challenges facing wholesalers in rice market

Problems	No. of Respondents	Percentage
Lack of capital	20	67
Lack of bank guarantee	22	72
Double taxation	11	38
License procedure	4	13
Unreliability in supply of high quality rice	15	51

4.10.2.3 Rice millers

The major problem that affect millers directly is the fluctuation of electricity supply which was responded with 92% of the respondents as shown in Table 37. Also, unreliable spare parts have resulted in a surge in operational costs as the operators have to change the spares regularly. Further more, the results in Table 36 shows the 71% of millers have inadequate capital and that they failed to access credit from established financial services. This has cause inability to acquire morden machine that will mill quality rice at low costs.

Table 37: Challenges facing millers in rice market

Problems	No. of Respondents	Percentage
Lack of capital	20	67
Fluctuation of electricity supply	28	92
Lack of credit services	21	71
Low quality of spare parts	4	13

4.10.2.4 Rice Retailers

The common problem experienced by sample retailers in Kahama district is rice quality and adulteration which compose 44% of the respondents as shown in table 38. Kahama rice is known for its composition of foreign matter as compared to other locally known rice like *Super Mbeya* varieties and *Basmati rice* from Pakistan most sold to higher end market in a supermarket for few high income earners. This lower the price and ultimately lower profit to value chain actors.

Table 38: Main challenges of retailers

Problems	No. of Respondents	Percentage
Shortage of rice supply	4	5
Storage	7	10
Quality	16	23
Adulteration	31	44
Information flow	7	9
Access to credit	23	33

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

The study aimed at analyzing the performance of rice value chains so as to identify potential area for intervention in order to improve efficiency along the chain in Kahama districts. The study specifically focused on the profitability of rice production of farmers and traders and structure of the rice market and conduct was assessed. Support services in the rice production were also examined. Investigation on production, marketing and institutional factors that are constraining development of both farmers and traders in the study area were also assessed.

The data were generated by using pre-tested structured questionnaires, where both primary and secondary sources were used. Primary data were collected by interviewing farm households head and traders participating in the marketing chain. Secondary data were obtained from different sources like Africa Rice Centre, Region and rural agricultural development office, Agricultural Research Institutes, publications and research studies, websites and agricultural magazines. A total of 216 farmers proportionately sampled from 18 villages, 25 assemblers, 30 wholesalers, 30 millers and 70 retailers were interviewed across the district.

The first objective was to map the marketing channels of rice value chain in Kahama District. The findings show that there were major four (4) channels that exist in the district whereby three (3) channels were directing rice out of the district. Farmers mostly sold their produce at home/farm gate where they receive low price per kilogram of paddy, about Tsh 390 through assemblers, as compared to farmers who avoid assemblers and sell

directly to the wholesalers, millers and consumers sold at Tsh 470 per kilogram, this has resulted in different profits received by most of these two types of farmers as the former receive in average of Tsh. 10 883 per bag of 90kg while the latter receives on average of profit of Tsh. 65 113 per 90Kg as a margin. Rice varieties as Kalamata and Mabeyenge are very popular among Kahama district farmers due to the tastes and preferences of consumer which also affects prices and ultimately raises farm margin to farmers.

In assessing the profitability of actors along the chain, the study found out that, wholesalers are getting higher profit than the rest of the actors by receiving Tshs 10 648 per 90 Kg followed by millers with Tsh 5 653 per 90 Kg and assemblers and retailers with an average profit of Tshs 4 462 per 90 Kg and Tshs 4 170 per 90 Kg respectively. The highest contributor to the cost structure of the actors is electricity, which accounts for 51% and 13% for millers and wholesalers respectively. Also transport costs accounted for 52%, 38.72% and 28.01% for wholesalers, assemblers and retailers respectively.

Further analysis in the rice value chain in Kahama district shows that, there were productions, marketing and institutional challenges. The major challenges facing the production sector was the problem of unavailability of improved rice varieties to the farmers, traditional method of seed selection is being applied by 100% of farmers. There is no supply of modern and improved seed from known seed producers. Despite that this current seed selection method increase yield, but it doesn't give the farmers the opportunity to exploit the full potential in their fields. Also, 93% of farmers are not using fertilizer in their fields which result in having an average of 9bags per acre, which is less than the optimal output revealed by research officers of about 20bags per acre from good farming practices. Also, it has been found out that even organic fertilizer, it's hard to be obtained, as most cattle's are being managed in a free range system by farmers

themselves. Also postharvest management to most farmers is poorly with a lack of modern winnowing and storage facilities led farmers resort into use of local equipment resulting in low quality of much of the rice from Kahama. The rice from the district therefore usually has impurities like stones and the level of broken rice from some farmers is high, hence a reduction in price and ultimately farmers' profits.

In the marketing aspects, challenges of rice quality were present due to lack of proper threshing, winnowing and milling machines. Also, 41% of marketers responded that information asymmetry has negative effects to price settings. Further more, 65% of the respondents revealed that, lack of financial institutions to offer credit have been found to affect their operation by failure to operate on economies of scale. Also finances available is being hindered by the mode of payment as most lenders wish to have a monthly repayment while most traders operate in seasonal, hence its lead into defaults and lack of trust between the two sides involved.

In assessing factors that contribute to the profitability of farmers, study found that education measured in a number of years spent in school has got no significance directly in farmer's profitability. This is due to most of the educated farmers shift into town and have less work on farms; however their remittances help parents and relatives to employ labor in rice farms. Instead rice farming training has been found significant with a 5 % level of significance as it has direct impacts to most farmers which are being given through village meeting, seminars and field visits by extension officers. Farm size, output price and farm location have found to be significant at the 1 % level of significance. Rotational seed taken as improved seeds by most farmers has been found to have no significance in raising farmers' income as most of the seeds are still local varieties with low output, rather it helps them in maintaining the status quo in the level of production.

5.2 Recommendations

In Kahama district, rice is becoming a strategic crop for the livelihood of many farmers in terms of food security and economic values. However, actors along the rice value chain are facing a lot of challenges to raise their operational efficiencies. The following recommendations are given so as to raise efficiency of producers and traders:

- i. **Strengthening the existing price and market information system:** Generally, commercial farmers are capable of information on market price from different sources, whereas poor farmers rely on other farmers and government extension staff for the same information. There is a need to make information available to farmers at the right time and place. In response to this challenge, it is good to develop an integrated agricultural marketing information system that will be linked to the Kahama rice information center owned by farmers themselves, and link them to the government's program, with daily reporting on information of rice to their respective places.

- ii. **Intervention to increase production and productivity of rice:** The quantity of rice produced at the farm level affects the level of rice surplus to be marketed by farmers positively and significantly. However, Kahama rice farmers are constrained by working on limited plots of land coupled with other socio-economic factors which led them into low farm productivity. They are not using inputs like improved seeds, pesticides and insecticides and modern technologies. Therefore, intervention to increase farm productivity should take into consideration, introduction of improved varieties, application of chemical fertilizers, use of modern technologies, improved disease and pest control measures. Hence increasing production and productivity of rice per unit area of

land is a better alternative in increasing surpluses of rice at household level and creating a market for the surpluses.

- iii. **Facilitating extension services:** The availability of the extension services in the area has a positive impacts to the farmers, however, due to lack of working tool like transport equipments hinders the officers not to be utilized fully to help farmers. As the study found the importance of linking farmers to market to meet the required standards of consumers, advisory services to farmers is essential to integrates them with the marketing system. Advisory on proper methods of handling, storing, transporting, and with major focus on improving quality of rice has to be emphasized by private institutions and other stakeholders, but government extension officers has the role to play, hence to empower extension officers will improve not only production but also parts of the marketing system such as organizations of farmer's group and cooperatives.
- iv. **Promoting trainings in production and marketing:** Trainings are being provided to rice farmers to Kahama, however, it has much focus to meet food security in the country and it has little attention to the production and marketing of specialty rice that can raise income to farmers and meet the consumer's preferences of quality rice. Therefore, stakeholders have to create awareness and promote quality rice varieties through special training to meet the special market which offer special prices.
- v. **Promoting potential collective organizations (Co-operatives):** Kahama farmers should form strong cooperatives, which are assumed to play an important role in improving the bargaining position of producers, lowering transaction costs,

increasing the level of competitions in the market. Also, it might act as a financial service provider to farmers and prevents loan sharks from exploiting farmers with high interest rates or being an intermediary to financial services that will provide loans to farmers basing on group bond as collateral.

- vi. **Areas for further research:** This study, conducted a research on performance of rice value chain, therefore separate studies on market intergration between producers market and main Kahama rice consumer market to give an in-depth analysis in the rice sector.

REFERENCE

- Abbott, C. and Makeham, P. (1990). *Agricultural Economics and Marketing in the Tropics*. (2nd Edition), Longman Group Limited, Harlow, England. 176pp.
- Ajani, O. Y. and Olayemi, J. K. (2000). Relative efficiency of food crop farmers in Oyo North Area of Oyo State. *Journal of Economics and Rural Development* 14 (1): 171 – 197.
- Ali, M. and Flinn, J. C. (1989). Profit Efficiency among Basmati rice producers in Pakistan Punjab. *American Journal of Agricultural Economics* 71: 303-310.
- Ashenafi, A. (2010). Analysis of grain marketing in southern zone of Tigray region. Dissertation for Award of of MA Degree at Mekelle University College of Business and Economics, Adis Ababa, Ethiopia, 102pp.
- Backman, T. N. and Davidson, W. R. (1962). *Marketing Principle*. The Ronal Presses Company, New York. 240pp.
- Bain, J. (1956). *Barriers to New Competition*. Harvard University Press, Cambridge, USA. 379pp.
- Barreiro-Hurle, J. (2012). *Analysis of Incentives and Disincentives For Rice*. Technical Notes Series, MAFAP, FAO, Rome. 50pp.
- Bassey, N. E., Okon, U. E. and Ibok, O. W. (2013). Intermarket performance and pricing efficiency of imported rice Marketing in South-South Nigeria: The Case of Akwa Ibom State Traders. *Agricultural Science* 1(2): 53 – 63.
- Behrooz, H., Morteza, H. and Hossien, Y. (2013). Economic analysis of marketing margin for greenhouse cucumbers and tomatoes in Kohgiluyeh-va-Boyerahmad province, Iran. *Annals of Biological Research* 4(2): 146 – 153.

- Benard, R., Dulle, F. and Ngalapa, H. (2014). Assessment of information needs of rice farmers in Tanzania; A case study of Kilombero District, Morogoro, *Library Philosophy and Practice* 1071: 331 – 347.
- Boomgard, J. J., Davies, P. S., Haggblade, S. and Mead, D. C. (1986). Subsector Analysis: Its nature, conduct and potential contribution. *Small Enterprise Development*. 26: 41 - 64.
- Branson, R. E. and Norvell, N. (1983). *Introduction of Agricultural Marketing*. McGrawHill Book Company, New York. 365pp.
- Branson, R. E. and Norvell, N. (1983). *Introduction of Agricultural Marketing*. McGraw Hill Book Company, New York. 365pp.
- Chen, H., Siebenmorgen, T. and Griffin, K. (1998). Quality characteristics of long-grain rice milled in two commercial systems. *International Journal of Agriculture Rural Development* 75(3): 560 – 574.
- Church J. and Ware R. (2000). *Industrial Organization: A Strategic Approach*. McGraw-Hill Companies, New Delhi. 202pp.
- Common Fund for Commodities (2012). *Rice Sector Development in East Africa report*. European Cooperative for Rural Development, Amsterdam, The Netherland. 73pp.
- Cramer, G. L. and Jensen, W. (1982). *Agricultural Economics and Agribusiness*. 2nd Edition. McGraw Hill Book Company, USA. 222pp.
- Debertin, D. F. (1993). *Agricultural Production Economics*. Macmillan Press, University of Kentucky, New York. 88pp.
- Deus, D. N., Magreth, B. and William, P. (2014). Trade impediments and market transaction arrangements formaize and rice in Tanzania. *World Journal of Social Science Research* 1(1): 413 – 427.
- Development Alternative Inc (2003). Rice sub-sector study: Private Enterprise Support Activities Project Tanzania. USAID, New York, USA. 45pp.

- Elepu, G. and Dalipagic, I. (2014). *Agricultural value chain analysis in northern Uganda: maize, rice, groundnuts, sunflower and sesame. Action Against Hunger. International, Kampala, Uganda. 74pp.*
- Eskola, E. (2005). *Agricultural Marketing and Supply Chain Management in Tanzania: A Case Study*. Working Paper No 16. Economic and Social Research Foundation, Dar es Salaam, Tanzania. 23pp.
- Eskola, E. (2005). *Agricultural marketing and supply chain management in Tanzania*. Working Paper No. 16. Economic and Social Research Foundation, Dar es Salaam, Tanzania. 31pp.
- Farrel, M. J. (1957). The measurements of productive efficiency. *Journal of the Royal statistical society* 120(3): 253 – 290.
- Femi, T. M., Fouda, M. J. and Bong, J. K. (2014). Analysis of the profitability and marketing channels of rice: A Case Study of Menchum River Valley, North-West Region, Cameroon. *Asian Journal of Agriculture and Rural Development* 4(6): 352 – 360.
- Hellin, J., Trench, C. P., S. Kimenju, C. N., and Groote. H. D. (2010). *Aflatoxin and the Maize Value Chain among the Resource Poor in Kenya: A Qualitative Study*. Aflacontrol Working No. Paper 3. International Food Policy Research Institute, Washington, DC. 48pp.
- Hoffmann, J. P. (2010). *Linear Regression Analysis: Applications and Assumptions*. (2nd Edition), Brigham Young University Press, Utah, USA. 285pp.
- Ingram, V. (2009). Bees trade and success. *Leisa Magazine* 25: 22 - 24.
- Inuwa, I. M. S., Kyiogwom, U. B., Ala, A. L., Maikasawa, M. A. and Ibrahim, N. D. (2011). Profitability Analysis of Rice Processing and Marketing. Kano State, Nigeria. 27pp.

- Joseph, N. and Ian, A. (2013). The Rice Market in East Africa. *Invited Paper Presented at The 4th International Conference of the African Association of Agricultural Economists*, Hammamet, Tunisia. 125pp.
- Kadigi, R. M. J. (2003). *Rice Production Economics at the Local and National Levels: The Case of Usangu Plains in Tanzania*. RIPARWIN Project, DFID. Dar es salaam, Tanzania. 33pp.
- Kaplinsky, R. and Morris, M. (2000). *A Handbook for Value Chain Research*. International Development Research Centre, Ontario, Canada. 324pp.
- Kilima, F. T. M. (2006). *Are Price Changes in the World Market Transmitted to Markets in Less Developed Countries? A Case Study of Sugar, Cotton, Wheat and Rice in Tanzania*. Discussion Paper No. 160. Institute for International Integration Studies. 38pp.
- Kizito, A. M. (2011). The Structure, Conduct, and Performance of agricultural market information systems in Sub-Saharan Africa. Thesis for Award of Phd Degree at Michigan State University, USA. 241pp.
- Kohls, R. L. and Uhl, J. N. (1985). *Marketing of Agricultural Product*. McMillan Publishing Company, New York. 52pp.
- Kotler, P. (1980). *Principal of Marketing, Prentice-Hall International*. Englewood Cliff, New Jersey, USA. 281pp
- Kotler, P. (1997). *Marketing Management: Analysis, Planning, Implementation, and Control*. (9th Edition). Prentice Hall International, New Jersey, USA. 289pp.
- Kotler, P. (2002). *Marketing management, Millennium Edition*. Pearson Education Company, Boston, United states of America. 456pp.
- Luu, T. D. H. (2002). *The Organization of the Liberalized Rice Market in Vietnam*. Natural Resources Institute, London. 166p.

- MAFAP (2012). Review of food and agricultural policies in the United Republic of Tanzania. MAFAP Country Report Series. FAO, Rome, Italy. 222pp.
- Match Maker Associates (2010). Value chain analysis of rice and maize in selected districts in Tanzania, Tap Rice and Maize Context Report, Dar es salaam, Tanzania. (1). 89pp.
- Mendoza, G. (1995). *A primer on marketing channels and margins. Prices, Products and People: Analyzing Agricultural Markets in Developing Countries*. Lynne Reinner Publishers, Boulder, London. 498pp.
- Minot, N. (2010). Staple food prices in Tanzania. *Paper Prepared for The Comesa Policy Seminar on Variation in Staple Food Prices: Causes, Consequence, and Policy Options Under the African Agricultural Marketing Project*. Maputo, Mozambique, 25 – 26 January 2010. 29pp
- Minot, N., Lemma, S. and Golleti, F. (2000). *Rice Market Liberalization and Poverty in Vietnam*. Research Report No. 114. International Food Policy Research Institute, Washington DC. 48pp.
- Nancy M. L. and John M. O. (2014). Market Structure and Price: An empirical analysis of Irish potato markets in Kenya, Early Career Fellowship Programme Reports, Future Agricultures, Nairobi, Kenya. 20pp.
- Norris, T. P. (1969). A framework for analysis of agricultural marketing systems in developing countries. *Agricultural Economics Research* 21(3): 89 - 107.
- Olorunsanya, E. O. and Akinyemi, O. O. (2004). Gross margin analysis of maize based cropping systems in Oyo State, Nigeria. *International Journal of Rural Development* 5: 129 -133
- Omofonmwan, E. I., Ada-Okungbowa, C. I. and Oghorodi, O. (2013). Profitability of palm oil marketing in Ethiope East local government area of Delta State, Nigeria. *Journal of Applied Science and Agriculture* 8(4): pp. 342 – 345.

- Ponte, S. (2002). The latte revolution regulation, markets and consumption in the global coffee chain. *World Development* 30(7): pp. 1099 – 1122.
- Poole, N., Maureen, C., Msoni, R., and Tembo, I. (2010). Constraints to smallholder participation in cassava value chain development in Zambia. All ACP Agricultural Commodities Programme, Paper Series 15(2): 52pp
- Rawlings, J. O., Pantula, G. S. and Dickey, A. D. (1998). *Applied Regression Analysis: A Research Tool*. (2nd Edition), Springer, New York, USA. 671pp.
- RLDC (2009) *Improving Rice Profitability through Increased Productivity and Better Marketing Focusing on Tanzania's Central Corridor*. Rice Sector Strategy, Dar es salaam, Tanzania. 37pp.
- Roduner, D. (2005). Value-Chains: What is behind this new key word? And What is the role of development agencies in value chain development in developing countries? Rural Development News. Information magazine, 2/2005. 6pp
- Rudenko, I. (2008). Value chains for rural and regional development: the case of cotton, wheat, fruit and vegetable value chains in the lower reaches of the amu darya river, Uzbekistan. Thesis for Award of PhD Degree at University of Leibniz, Hannover, Germany, 235pp.
- Scherer, F. M. (1980). *Industrial Market and Economic Performance*. Second Edition. Houghton Mifflin, Boston, USA. 259pp.
- Schrimper, A. R. (2000). *Economics of Agricultural Markets*. North Carolina State University, Prentice Hall, Upper Saddle River, New Jersey, United States of America. 342pp.
- Shayo, N., Mamiro, P., Nyaruhucha, C. and Mamboleo, T. (2006). Physico - chemical and grain cooking characteristics of selected rice cultivars grown in Morogoro. *Tanzania Journal of Science* 32(1). 201 – 226.

- Somararatne, W. G. (2010). *The System of Rice Intensification and Food Security among the Poor: Opportunities and Constraints*, Oxfam Report. Colombo, Sri Lanka. 10pp.
- Steven, J. H. and Mathew, S. G. (1991). *Tools for Microenterprise Programs: Nonfinancial Assistance Section. A field Manual For Subsector Practitioners Tool, Technical Notes Series*. GEMINI project, USAID.
- Takele, A (2010). Analysis of rice profitability and marketing chain: The case of Fogera Woreda, South Gondar Zone. Dissertation for Award of MSc Degree at Haramaya University, Ethiopia. 150pp.
- Takele, A. (2010). Analysis of rice profitability and marketing chain: The case of Fogera Woreda, South Gondar Zone. Dissertation for Award of MSc Degree at Haramaya University, Ethiopia, 77pp.
- Trienekens, J. H. (2011). Agricultural Value Chains in Developing Countries: A Framework for Analysis. *International Food and Agribusiness Management Review* 14(2): 32
- URT (2000). *Agricultural Marketing Policy*. Ministry of Industry, Trade and Marketing, Dar es Salaam, Tanzania. 147pp.
- URT (2013). *National Rice Development Strategy*. Ministry of Agriculture Food Security and Cooperatives, Dar es Salaam, Tanzania. 109pp.
- Wolday, A. (1994). Food grain marketing development in Ethiopia after the market reform 1990: A case study of Alaba Sirarao district. Thesis for Award of PhD Degree at University of Berlin, Berlin, Germany. 292pp.

APPENDICES

Appendix 1: Rice production and consumption trend in Tanzania

Year	Production ('000MT)	Growth Rate	Area Harvested ('000 Ha)	Growth Rate	Domestic consumption ('000 Tonnes)	Rice Deficit (%)	Rice Import ('000 Tonnes)
2003	720	11.63%	570	14.00%	920	27.78%	200
2004	556	-22.78%	650	14.04%	686	23.38%	140
2005	764	37.41%	702	8.00%	693	20.94%	130
2006	818	7.07%	634	-9.69%	888	8.56%	90
2007	886	8.31%	558	-11.99%	951	7.34%	85
2008	938	5.87%	896	60.57%	949	2.71%	40
2009	881	-6.08%	806	-10.04%	961	9.08%	100
2010	1320	49.83%	1136	40.94%	1030	4.04%	60
2011	1484	12.42%	1219	6.80%	1064	10.37%	120

Appendix 2: Producers Questionnaire

1. Prior Information On The Survey

- a) Questionnaire number:
- b) Name of area:
- c) Name of village/city area.....
- e) Date of contact:

2. Identification and socio-demographic structure of the household

General information on the household

- a) Name of respondent:
- b) Household characteristics, refer to Table 1

3. Household structure (all members)

Code individual (order number)	Name	Sex	Age (1 if less than one year)	Marital status	Education level (Code 4)	Main activitiy (Code 5)

1. Organisations linked to the household

Name of structure/ organisation	Structure/ organisation type (see code)	Type of relationship (see code)	Duration of relationships (in years)	If No, since why is it non operational?(year)

Relationship-type code: 1=training, 2=credit in kind, 3=credit in cash, 4= equipment allocation (farming equipment), 5=fertizer donation, 6=other (specify)

3.1 Have you attended any agricultural training course? [] **1=Yes 0=No**

3.1.1 If yes, for how long? [] **days.**

3.1.2 Have you attended a rice farming training course? [] **1=Yes 0=No.**

3.1.3 Has any other member of the household attended any agricultural training course?

[] 1=Yes 0=No.

3.1.4 Has any other member of the household attended rice farming training course?

[] 1=Yes 0=No

4. EVALUATION OF RICE PRODUCTIVITY CONSTRAINTS

List the three major constraints that affect your production.

- a)
- b)
- c)

5. Knowledge, Use, Access and Management of rice varieties

Name of variety	Type of variety (Code 1)	Source of knowledge (Code 2)	If variety known, do you have access to seed?	If yes, first year of cropping	Source of seeds (Code 3)

Code 1: Type of variety:

1= local/traditional varieties; 2= improvedAfricaRice NERICA;3= other improved rice varieties

Code 2: Code for knowledge source:

1= farmer from the village; 2=farmer from another village; 3=research institution; 4= extension services; 5=NGO/Projects; 6= other institution (specify); 7= farmers’ organization; 8= local market; 9= other market; 10= seed fair; 11= other (specify)

Code 3: Code for source of seed:

1= From own saved seed; 2= farmer or relative from the village; 3= farmer from another village; 4= research institution; 5= extension services; 6=NGO/Projects), 7=farmers’ organization; 8= local market; 9= other market; 10= seed fair; 11= other (specify).

6. Soil fertility management

- a) Do you often use fertilizer in your fields? /_/1=No fertilizer, 2=Organic, 3=Chemical, 4=others
- b) How many bags of inorganic fertilizer per hectare?.....
- c) What is the costs of a bag (50Kg) of Inorganic fertilizer?

7. General water management methods

- a) Do you have an irrigation system for your rice fields? /_/ 1=Yes, 0=No
- b) What is the costs of irrigation and water management per hectare.....

8. General diseases and pest management methods

Are you encountering pests and disease in your field? /_/ 1=Yes, 2=No

- a) Are you using insecticide/pesticides in your fields? /_/ 1=Yes, 2=No
- b) What amount of pesticides/insecticides are you using per hectare.....
- c) How many times do you apply fertilizer during growth cycle.....
- d) What is the costs of pests management per hectare.....

9. Harvesting

- a) How do you harvest your field? /_/Manual per panicle /_/ , Mechanical/___/, Other /_/
- b) What equipment do you use in harvesting?
1.....2.....3.....
- c) What is the cost (labour) of harvesting per hectare?
- d) In average, what is your output per hectare (Bags).....
- e) What is the cost of empty bag?
- f) Do you dry the rice before threshing?/___/ 1= Yes 0= No
- g) What is the costs of drying per bag?.....
- h) What is the transport costs per bag to storage.....
- i) What is the price of storage per bag ?.....

- j) What is the amount of rice sold (90Kg).....
- k) What is the selling price per bag (90Kg)?.....
10. What is your source of information Information on rice production ?
11. What type of seed are you using? = 1=Kalamata, 2=Mpyakambili, 3=Mabeyenge, 4= others
12. How did you acquire seeds?
1= self production, 2= purchase from another farmer in the village, 3= purchase from the market, 4= purchase from an extension or research facility, 5= received from an extension or research facility, 6= other (specify).
13. What is your selling location ? 1= at home, 2=field, 3= village market, 4=other market, 5= others
14. Farming/marketing contract
- a) Have you heard about contracts withan input dealer, trader or processor in exchange for crop? / __/1= Yes, 0= No
- b) Do such contracts exist in your village? / __/ 1= Yes, 0= No
- c) Have you ever made such contracts for any of your crop? / __/ 1= Yes, 0= No
- d) If no, what are the reasons?
- e) If yes, what was the type of the contract? Fill the table below;
15. What is the costs of labor for agricultural field activities (Tshs)? Clearing, Ploughing....., Sowing....., Weeding....., Fertilizer application....., Pesticides application....., water managements....., harvest....., Others.....

16. TRANSACTIONS

16.1 Access to credit in cash during the last season

Did you request credit in cash? 1=Yes 0=No	Where did you request credit? (source) Code 1		Did you obtain credit in cash? 1=Yes 0=No	Did you obtain the whole amount requested? 1=Yes 0=No	If yes, amount of credit obtained (LC)	Did you take this credit under an agreement to sell your product to the lender? 1=Yes 0=No	Did you pay for credit in kind or cash? 1=Cash 2=In kind	If it is in cash, how much did you pay back in total?	If in kind, quantity given to repay the credit	Unit, 1=kg, 2= liter 3=other	value of this quantity (local currency)	Repayment period (months)	use of the credit (Code 2)	percentage used in rice farming
	Name	Type (code1)												

Code 1= Credit source: 1= MFI, 2= bank, 3= credit program, 4= projects, 5= NGO, 6= traders, 7= inhabitant of the village, 8= inhabitant of another village, 9= farmers' organization 10= other (specify)

Code 2= Use of the credit: 1= rice farming, 2= other agricultural activities, 3= trade, 4= rearing, 5= health care, 6= food, 7= ceremonials, 8= other (specify)

16.2 Provision of credit in cash

Did somebody request credit in cash from you? 1=Yes, 0=No	who requested (Code 2)	Did you lend credit in cash? 1=Yes, 0=No	Did you lend the whole amount requested? 1=Yes, 0=No	Loan (Tshs)	How much does the debtor have to pay back in total (Tshs)?	Repayment period of credit (month)	Mode of repayment 1=in instalments, 2=per term	If yes, why did you give this loan? (Code 3)

Code 1= Code1=Credit source: 1= MFI, 2= bank, 3= credit program, 4= projects, 5= NGO, 6= traders, 7= inhabitant of the village, 8= inhabitant of another village, 9= farmers' organization 10= other (specify)

Code 2= for who you lent to: 1=relative, 2=farmer in the village, 3=farmer in another village, 4=other (specify)

Code 3= loan reason: 1=for interests, 2=social reason, 3=other (specify)

THANK YOU FOR YOUR COOPERATION!

Appendix 3: Milling questionnaire

1. Background Information

- a) Name of the respondents?
- b) What is the sex of the respondents? 1= male, 0= Female
- c) What is the age of the respondents?
- d) What is the marital status? 1= married, 2= single, 3= widower/widow, 4=separated/divorced
- e) What is the educational level of the respondents? 0= No level, 1= Primary, 2= Secondary, 4= College, 5= University, 6=Others
- f) What is the main activity of the respondents? = General commerce, 2= Services/wage-earning, 4= Staple food trading, 5= Miller

2. Mills and Milling Operation

2.1 Mills

- a) What type of mills do you have? /__ / Large mill /__ / Mini-mill /__ / Village mill
- b) Inventory of milling equipment

Please fill in the table below with the milling equipment that you have

Name of equipment	Do you have that equipment?	If yes, unit cost purchase (Tshs)	If yes, year of purchase	Source of funding	Equipment life span
Code1	1=Yes, 0=No			(Code 1)	
Sheller					
Lean mortar					
Others					

Code1: 1= own means, 2= purchase sponsored by an institution, 3= other

3. Location of the mill 1=Yes, 0=No/__/ at market, /__/ at home, /__/other

4. What is the name of the mill?

5. Year of installation of the mill /__ /__ /__ /__ /

6. Have you done any major equipment repair since installation? /__/ 1=Yes, 0=No
7. Which of the following components are present in your mill? 1=Yes, 0=No
 /__/ Paddy cleaner / / destine /__/ Elevators /__/ Rubber rolls /__/ Paddy separator
 /__/ Polisher /__/ Grader /__/ Scales and sealers
8. At what capacity is the mill operating? /__/ %
9. What are the sources of power for your mill? 1=Yes, 0=No /__/ Electricity
 /__/ Diesel /__/ otherpower
10. How much milled rice do you get from 10 kg of paddy? /__/ kg
11. Where is the paddy grown? /__/ /__/ 1= same village as mill,
 2= neighboring village 3= elsewhere
12. What do clients use milled products for? /__/ 1= sale, 2= consumption,
 3= both
13. How do clients get paddy? /__/ 1= they are farmers, 2= they buy from other
 sources, 3= both
14. If you are a buyer of paddy, how reliable are the paddy sources? /__/ 1= very
 reliable, 2= fairly reliable, 3= not reliable
15. How much do you charge for milling per bag of paddy? _____ (Tshs)
16. Does milling go on all year round? /__/ 1=Yes, 0=No
- 16.1. If not, for how many months does milling take place in a year? /__/ /__/ months
- 16.2. Is rice a staple food in this area? /__/ 1= rice is a staple food in the area, 2= the
 market is located outside, 3= both
- 16.3. Besides rice, what other products do you mill? _____
- 16.4. Besides this mill, do you own any other milling unit? /__/ 1=Yes, 0=No
- 16.4.1. If yes, how many other milling units do you own? /__/ c
17. Do you exclusively mill rice for customers or, do you mill so as to sell it out yourself?
 /__/ 1=Customer, 2= sale, 3= both

17.1. If you process rice for your customers, what do you do with the bran? /__/
 1= keep it 2= give it to customer

17.2. If you keep the bran, do you sell it? /__/ 1=Yes, 0=No

17.2.1. At what price per 50kg? (If yes) _____

17.3. If you do not market the rice bran, what do you do with it? /__/ 1=
 burn it, 2= trash it, 3= use for animal feed, 4=others

17.3.1 Is the milling service price different when you keep the rice bran or
 when you surrender it to your customer? /__/ 1=Yes, 0=No

17.3.2 If yes, give the pricesTshs.

In case of retention _____ In case of non retention _____

17.3.3 If No, what is the cost of 1 kg paddy milled? _____(Tshs)

17.4 If you process rice for sale, how do you get the paddy? 1=Yes,
 0=No /__/Primary collector (weekly market) /__/Collector-women
 parboilers /__/Wholesale/__/Collectors /__/Producer /__/Other

18. Do you store paddy at the mill house / warehouse before milling? /__/ 1=Yes, 0=No

19. Do you store milled rice at the mill house/warehouse before sale? /__/ 1=Yes, 0=No

20. Is there incidence of pest/insect attack during storage? /__/ 1=Yes, 0=No

If yes, specify:

Milling conditions

21. What happens to the rice husk? /__/ 1= kept by miller, 2= taken away by
 customers

22. What do you or your customers use the husk for?

23. Does your engine have any problems of a technical nature? /__/ 1=Yes, 0=No

23.1. Are you able to handle these problems yourself? /__/ 1=Yes, 0=No

23.2. If not, what local or external agencies provide technical assistance to your mill? Mention.....

23.3. At what costs often are you incurred per month..... Tshs.

Milling capacity

24. What brand of milling equipment do you own? _____

25. Are there any days of the week during which the equipment does not work? /__/

1=Yes, 0=No

3.1. If Yes, which ones? 1=Yes, 0=No /__/Monday /__/Tuesday

/__/Wednesday /__/Thursday /__/Friday /__/Saturday

/__/Sunday

26. What quantity of paddy do you mill on average per day and the quantity of milled rice obtained?

Name of the rice	Type of product (code)	Number of bags	Unit weight (kg)	Milled rice obtained (kg)

Code:1= *Kalamata*, **2=** *Mpyakambili*, **3=** *Mabeyenge*, **4=** *Bisholi*, **5=** *Kahogo*

27. How many kilograms of broken rice do you get after milling one 50-kgbag? /__/ kg

28. How long does your machine work each day on average? /__/ hours

29. How do your customers find the quality of your milled rice in the following aspects?

Codes: **1=** very good, **2=** good, **3=** average, **4=** bad, **5=**very bad

/__/Cleanliness of the milled rice /__/Grain homogeneity

/__/Milling ratio /__/Percentage of whole grain

30. What regular complaints do your customers have regarding the services you offer?

1.

2.

Milling operational expenses and maintenance

31. Give data concerning costs of operations

Operational expenses	Period (See code)	Price (Ths)	Quantity/ Number
Fuel			
Lubricant			
Electricity			
Labor for operators			
Labor for support staff			
Maintenance charge			
Repair welding			
Repair sieving			
Repair mortar			
Oil change			
Spare sieving			
Spare segments			
Spare belt			
Other			

Code for period: 1= hour, 2= day, 3= weekly, 4= fortnight, 5= month, 6= year

THANK YOU FOR YOUR COOPERATION!

Appendix 4: Traders questionnaire

1: Background Information

- g) Name of the respondents?
- h) What is the sex of the respondents? 1= male, 0= Female
- i) What is the age of the respondents?
- j) What is the marital status ? 1= married, 2= single, 3= widower/widow, 4=separated/divorced
- k) What is the educational level of the respondents? 0= No level, 1= Primary, 2= Secondary, 4= College, 5= University, 6=Others
- l) What is the main activity of the respondents ? = General commerce, 2= Services/wage-earning, 4= Staple food trading, 5= Miller
2. How many numbers of employee's do you have? /__/_/
3. What is the salary per month for your employee? /__/_/ (Tshs/month)
4. Category of your main trading business /__/_/ 1= wholesale, 2= semi-wholesale, 3= retail, 4= collector
5. In which year did you start trading in rice?
6. Who provided the start-up capital? /__/_/ 1= Own capital, 2= Financial aid of relative, 3= Loan, 4= other
7. How many traders on average are in the market during a market day?
8. Among the traders in the market, how many traders on average sell rice during a market day?
9. Is rice the principal food crop that you sell? /__/_/ 1=Yes, 0=No
10. How many days in a week do you usually devote to selling rice? /__/_/
11. What other food crops do you sell? /__/_/ /__/_/ /__/_/ /__/_/ /__/_/
- 1= maize, 2= millet, 3= sorghum, 4= cassava

12. Name of rice known i..... ii iii
 iv
13. Do you own or rent the premises where you carry out rice trade? /__/
1=Owner, 2=Tenant
14. If yes, how much do you pay month? _____
15. If no, what difficulties did you face?
16. Are there permanent warehouses in the market? /__/ 1= Yes, 0= No
17. How many traders on average use the permanent warehouse?
18. Do you use one of these warehouses? /__/ 1= Yes, 0= No
19. If no, what alternative storage facility are you using? /...../ 1= Warehouse
 at home, 2= Store, 3= Others (specify)
20. How far is the storage place from the place of purchase? _____ km
21. Average costs of transport from the place of purchase to the place of storage
 _____ Tshs/50 kg
22. Where is the milled rice stored before selling? /...../ 1= Market warehouse,
 2= Warehouse at home, 3= store, 4= Others (specify)
23. What is the total capacity of the storage house? /___/ (Tonne)
24. Do you rent the storage house? /__/ 1= Yes, 0= No
25. If yes, how much do you pay per month for the rent? _____ (Tsh/month)
26. In what container is rice stored? /__/ 1= Bag, 2= Bowl, 3= Other
27. Are the different type/varieties stored separately? /__/ 1= Yes, 0= No
28. How long is the storage period? Minimum period of storage (in days).....
 Maximum period of storage (in days)....., Average quantity stored
 (kg)....., Estimation of loss during storage (%)....., Average
 cost of storage (Tshs).....

29. What preservation measures are done before rice storage? /__/ 1= Sun Drying, 2= Use of fungicide, 3= others (specify) _____
30. What preservation measure is done during storage? /__/ 1= Sun Drying, 2= Use of fungicide, 3= others (specify) _____
31. How is milled rice sold? /__/ 1= Packaged, 2= Not packaged
- a. If packaged, which kind of packaging material is used? /__/ 1= Polythene, 2= Paper, 3= Jute bag, 4= other
- b. Size..... cost of packaging.....
32. Where are purchasing rice? Farm gate, 2= Own farm, 2= same village 3= other village, 4= Local market, 5= Regional markets (bordering countries), 6= European markets, 7= Asian market, 8= other (Please specify) _____
33. Who is your main supplier? 1= Primary paddy collector, 2= Women collectors – women parboilers, 3= Wholesaler, 4= Collectors, 5= Producer, 6= Family members, 7= other
34. What is the distance from your house to the place of purchase (Km)?
.....
35. What is you mode of payment? /_/ 1= Cash, 2= Credit
36. Average transportation cost of the quantity purchased (Tshs/Km)?
37. What was the buying price of rice (Tshs/kg)? Kalamata....., Mpyakambili....., Mabeyenge....., Bisholi....., Kahogo.....
38. What was the average milling costs of paddy during the last seasons (2012)?.....
39. Who are your main customers? /_/ 1= Retailer, 2= Consumer, 4= Miller, 5= Restaurant owners, 6= Associations/cooperatives, 7= Wholesaler, 8= Semi-wholesaler, 9= other

40. How reliable are the customers? /_/ 1= Very reliable, 2= fairly reliable, 3= Not reliable
41. Main retail Market? /_/ 1. Village market, 2= Weekly market (local/canton/region), 3= Urban market, 4= Sub regional markets (bordering countries), 5= other (specify)
42. Frequency of selling? /_/ 1= Daily, 2= Once in three days, 3= Weekly, 4= every two weeks, 5= Monthly, 6= every two months, 7= others
43. What is the average selling price of rice in this season(Tshs/Kg)? 1.Kalamata..... 2. Mabeyenge, 3. Bisholi
44. Do you own a personal means of transport? /_/ 1=Yes, 0=No
45. Structure of market costs: What is the average cost of these activities per month?

Cost type	Cost per month (Tshs)
Carriage of rice / Transportation	
Carriage of trader	
Handling charges	
Assembling charges	
Electricity and telephone	
Hired labor	
Family labor	
Tips to the police	
Rent for market place	
Market taxes	
All other costs	

46. Marketing constraints: what are the problems you faced in your activities?
- a) Purchase activity:
- b) Storage/Preservation:.....
- c) Transport:.....
47. What is your total revenue for all type of rice sold in the past seasons?

THANK YOU FOR YOUR COOPERATION!