

**RICE (*Oryza sativa*) MARKETING PERFORMANCE AND POVERTY
REDUCTION IN KYELA DISTRICT, TANZANIA**

BY

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**A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY OF SOKOINE UNIVERSITY OF
AGRICULTURE. MOROGORO, TANZANIA.**

ABSTRACT

Although Kyela District has high potential for rice production, which is done by almost every household, poverty is high as evidenced by 66% of households in the district being poor. The specific objectives of the study were to: assess rice marketing channels and the role of different marketing participants; analyze rice market structures; determine the performance of the rice marketing sub-system; compare well-being levels of rice farmers, traders and miller-traders; and find the likelihood of respondent households being grouped into the highest income quintile. A cross-sectional study design was employed, and data were collected between March and July 2010 from 234 households, including 160 rice farmers, 44 rice traders and 30 rice miller-traders. Five well-established informal rice marketing channels in which six marketing groups were participating were observed. Different actors and free entrance of different buyers and sellers to the market were also observed. Moderate levels of the Gini coefficients (0.35 for traders and 0.34 for miller-traders) were obtained. The main sources of marketing information were traders (70.2%), neighbours (15.5%), friends (9.9%), and media (4.4%). Profit margin was higher among traders than among miller-traders and farmers. Market efficiency was highest (20.1%) for traders and lowest (1.6%) for farmers. More than four-fifths (83.8%) of the farmers, 4.5% of the traders and 59.9% of the miller-traders were below the poverty line. The households' income Gini coefficients were 0.468 and 0.425 for poor miller-traders and farmers, respectively. The Pa measure of poverty for traders was 0.016, unlike that for miller-traders, which was 0.188 and that for farmers, which was 0.327. The Pa ratios mean that the traders were the richest of the three groups, since the smaller the Pa ratio the richer the people. In order to reduce poverty more effectively in Kyela District through improved rice marketing performance, it is recommended that road infrastructures should be improved to reduce transport costs for all actors in the rice marketing chain. Further, it is suggested that all problems facing the farmers, traders and miller-traders should be

addressed by the government and other stakeholders to make the rice business a more paying enterprise.

DECLARATION

I, JULIANA ANDAGILE MWAKASENDO, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is my own original work and that it has neither been submitted nor being concurrently submitted for a degree award in any other institution.

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ACKNOWLEDGEMENTS

I acknowledge the Ministry of Agriculture, Food and Co-operatives for financing this research work. I highly appreciate the logistics given by the Zonal Director, Research and Development, Dr. Catherine Madata, the Zonal Research Coordinator, Mr. R Mghogho, and members of the Socio Economic Unit, ARI Uyole. I am most grateful to my supervisors, Dr. Kim A. Kayunze of Development Studies Institute (DSI) and Prof. Aida C. Isinika of Sokoine University of Agriculture (SUA), for their invaluable advice, criticisms, guidance and support during the research work, which made possible the successful completion of the PhD programme of study. I also extend thanks to my colleagues in the Development Studies Institute for their cooperation and encouragement during the entire study period.

Many thanks to the Kyela District, Ward and Village Extension Staff for their cooperation during undertaking the study. Also thanks are due to rice farmers, traders and miller-traders for their hospitality, kindness and time devotion to answering my questions. Finally, I am most grateful and indebted to my family members for their patience, understanding, cooperation, endurance and tireless encouragement. My sincere hope is that this work will be practically connected to the improvement of rice marketing performance and poverty reduction of smallholder rice farmers, rice traders and rice miller-traders in Kyela District and other regions in the country. Despite the importance and generous input of all the people and institutions mentioned above, the final responsibility for this work rests on me.

DEDICATION

This work is dedicated to my late beloved daughter LULU Aloys Malyango, my late father Andagile Mwakasendo who passed away before the dreams of this work could be realised, and to my mother Enea Kalasya, Solile family, and Mwakasendo family for their love and patience.

TABLE OF CONTENTS

ABSTRACT	ii
DECLARATION.....	iv
COPYRIGHT	v
ACKNOWLEDGEMENTS	vi
DEDICATION	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	xv
LIST OF FIGURES	xviii
LIST OF PLATES	xix
LIST OF APPENDICES	xx
LIST OF ABBREVIATIONS AND SYMBOLS	xxi
 CHAPTER ONE	 1
1.0 INTRODUCTION.....	1
1.1 Background Information	1
1.2 Problem Statement	3
1.3 Justification of the Study	4
1.4 Objectives, Research Questions and Hypotheses	6
1.4.1 General objective	6
1.4.2 Specific objectives	6
1.4.3 Research questions.....	6
1.4.4 Study hypotheses	7
1.5 Structure of the Thesis	8

CHAPTER TWO	9
2.0 LITERATURE REVIEW	9
2.1 Rice Production.....	9
2.2 Rice Marketing.....	13
2.2.1 Market and agricultural marketing.....	13
2.2.2. Marketing channels.....	13
2.2.3 Rice marketing in Tanzania	14
2.2.4 Price trends and rice marketing in Kyela district.....	15
2.2.4 Marketing efficiency	16
2.3 Models for evaluating marketing performance.....	17
2.3.1 Internal Productive Efficiency of Marketing Enterprises (IPEME)	18
2.3.2 The Structure-Conduct-Performance model (S-C-P).....	18
2.3.3 Food system framework.....	19
2.4 Features of the S-C-P model.....	19
2.4.1 Market structure	19
2.4.2 Market conduct	20
2.4.3 Market performance.....	20
2.5 Poverty and Poverty Measurements.....	21
2.5.1 The concept of poverty	21
2.5.2 Causes of Poverty	23
2.5.3 Characteristics of poverty	23
2.5.4. Poverty measurement.....	25
2.5.4.1 Poverty lines and poverty measurement using monetary indicators	25
2.5.4.2 Poverty lines in Tanzania	26
2.5.4.3 Measurement of absolute poverty using monetary indicators.....	27

2.5.4.4	Relative poverty measurement using monetary indicators.....	33
2.4	The State and Distribution of Poverty	34
2.4.1	World state and distribution of poverty	34
2.4.2	The state and distribution of poverty in Tanzania	35
2.4.3	Poverty situation in Mbeya Region.....	36
2.7	Conceptual Framework	40
2.7.1	Illustration of the conceptual framework	40
2.8	Research Gap	43
CHAPTER THREE	45
3.0	RESEARCH METHODOLOGY	45
3.1	Description of the Research Area	45
3.1.1	Geographical location	45
3.1.2	Area, administrative units and population	45
3.1.3	Agricultural sector	47
3.2	Research Design and Sampling	47
3.3	Data Collection	49
3.3.1	Secondary data sources	49
3.3.2	Primary data	50
3.4	Preliminary Survey	50
3.5	Operationalization of the Fieldwork	51
3.6	Data Analysis	51
3.6.1	Qualitative analysis	51
3.6.2	Quantitative analysis	53
3.6.2.1	Assessment of rice marketing channels and the role of different participants	53

3.6.2.2	Analysis of market structure.....	54
3.6.2.3	Overall performance of rice marketing sub-system	56
3.6.2.4	Comparing well-being levels among households growing and selling rice	59
3.6.2.5	Likelihood of being grouped into the highest income quintile among respondents selling rice	59
3.7	Data Management	62
3.7.1	Determination of adult equivalent units.....	62
3.7.2	Determination of dietary energy consumed.....	64
3.7.3	Procedures for generating income quintile	65
3.7.4	Limitations of the Study.....	65
CHAPTER FOUR	67
4.0	RESULTS AND DISCUSSION	67
4.1	Socio-Economic Characteristics of Sampled Households	67
4.1.1	Socio-economic characteristics of rice farmers	67
4.1.1.1	Age of sampled household farmers	67
4.1.1.2	Household size	68
4.1.1.3	Education levels, marital status and occupations of sampled household heads	69
4.1.2	Socio-economic characteristics of rice traders and rice miller-traders	70
4.2	Rice Production, Sales and Income	74
4.2.1	Average production, rice allocation for different use and income	74
4.2.2	Rice marketing characteristics at household level	76
4.3	Agricultural Support Services.....	78
4.3.1	Credit facilities.....	78

4.3.2	Access to extension services	80
4.3.3	Rice growers' associations or farmer groups	82
4.4	Rice Marketing Channels and Roles of Different Participants	83
4.5	Marketing Functions or Roles Performed by Rice market Participants in the Study Area	86
4.6	Analysis on efficiency for Rice Marketing System (Market S-C-P Analysis)	94
4.6.1	Market structure	94
4.6.1.1	Barriers to entry in rice marketing system	94
4.6.1.2	Market transparency	101
4.6.1.3	Market/buyer concentration	106
4.6.2	Conduct of market traders	109
4.6.2.1	Purchasing strategy	110
4.6.2.2	Pricing and selling strategy	110
4.7	Performance of Rice Marketing Sub-System	114
4.7.1	Analysis of Marketing Margins	115
4.7.2	Market Power Distribution along the Rice Marketing Chain	119
4.7.3	Degree of interface pricing efficiency in rice marketing	120
4.8	Levels of Wellbeing among Households Selling Rice	122
4.8.1	Role of rice in household income	122
4.8.2	Income levels and composition	122
4.8.3	Mean annual cash income of sample respondents, per adult equivalent units	125
4.8.4	Income poverty, incidence and depth of poverty	126
4.8.5	Degree of poverty in the sampled households	126
4.8.6	Poverty incidence among respondents	128
4.8.7	Depth of poverty among respondents	129

4.9 Food Security	133
4.9.1 Food security based on qualitative assessment	133
4.9.2 Food security based on dietary energy consumed	136
4.9.2.1 Dietary energy consumed per adult equivalent per day from 30 days' data	137
4.9.2.2 Dietary energy consumed per capita per day	138
4.10 The likelihood of households selling rice being in the highest level of income quintile	140
4.10.1 Justification for using ordinal logistic regression	140
4.10.2 Ordinal logistic regression outputs and the likelihood of household being in the highest level of income quintile per adjusted adult equivalent for 28 days	140
4.11 Constraints Related to Rice Production and Marketing	144
4.11.1 Farmers' constraints related to rice production	144
4.11.2 Constraints related to rice marketing by farmers	145
4.11.3 Farmers' suggestions for improvement	146
4.12 Rice marketing constraints according to traders and miller-traders	147
4.12.1 Marketing constraints listed by traders	147
4.12.2 Marketing constraints as listed by miller-traders	148
CHAPTER FIVE	150
5.0 CONCLUSION AND RECOMMENDATIONS	150
5.1 Conclusion	150
5.1.1 Rice market channels	150
5.1.2 Market structure	151
5.1.3 The overall performance of rice marketing sub-system	153

5.2.1	Policy recommendations	155
5.2.2	District level recommendations	158
5.2.5	Household level recommendations	158
5.3	Suggested Areas for Further Research.....	159
REFERENCES.....		160
APPENDICES		178

LIST OF TABLES

Table 1:	Trend of milled rice production in Tanzania	12
Table 2:	Operational definitions of variables of the research	43
Table 3:	Estimated production of major food crops (Tones) in Kyela, 2003/04 -2010/11	47
Table 4:	Sample size of farmers by division in the study area.....	49
Table 5:	Traders and miller-traders sampled on basis of selling point	49
Table 6:	Elements of Structure-Conduct-Performance	52
Table 7:	Computation of adjusted adult equivalent unit	62
Table 8:	Adult equivalent scales for East Africa	63
Table 9:	Household economies of scale constants	64
Table 10:	Ages of household heads of sampled households.....	67
Table 11:	Household size of sampled rice farmers	68
Table 12:	Education level, marital status and main occupation of rice farmers	69
Table 13:	Age of sampled household rice traders and rice miller-traders	71
Table 14:	Household size of sampled rice traders and rice miller-traders	72
Table 15:	Sex, education level, marital status, main occupation of rice traders and miller-traders	73
Table 16:	Mean rice production and allocation for different use in 2008/2009	75
Table 17:	Proportion of farmers indicating rice marketing characteristics at household level	77
Table 18:	Seasonal market prices of rice 2008/2009	78
Table 19:	Proportion of farmers' access, source of credit, terms of payment, uses of credit and reasons for not accessing credit	79
Table 20:	Access to extension services.....	81
Table 21:	Are you a member of any farmer organization?	82

Table 22: Proportion of farmers on method used transporting rice, average storage months, quantity of stored and average price	87
Table 23: Opinions of rice farmers on whether there were entry or exit barriers	96
Table 24: Barriers to entry for farmers	96
Table 25: Opinion of traders on sampled market centres on entry or exit barriers.....	98
Table 26: Barriers to entry for Traders	99
Table 27: Opinions of sampled miller-traders on entry or exit barriers.....	100
Table 28: Barriers to entry for miller-traders	101
Table 29: Access to market information for farmers, traders and miller-traders.....	102
Table 30: Proportions of respondents reporting ease of accessing market information.....	103
Table 31: Proportions of respondents on type of market information collected by farmers, traders and miller-traders	104
Table 32: Proportions of respondents on source and methods of collecting market information by farmers, traders and miller-traders	105
Table 33: Gini Coefficient for the market share of surveyed buyers	108
Table 34: Four-firm concentration ratio of rice traders and miller-traders	109
Table 35: Characteristics of rice commodity transactions	114
Table 36: Rice returns for farmers, traders and miller-traders	116
Table 37: Efficiency measures among marketing agents.....	120
Table 38: Traders, miller-traders: correlation between marketing margin, buying and selling prices.....	121
Table 39: Mean annual cash income of sampled households, Kyela District.....	123
Table 40: Mean annual cash income per adult equivalent units	125
Table 41: Income per adult equivalent for 28 days (Tshs).....	127

Table 42: Categorization of sampled households into ‘non-poor’ and ‘poor’ in 2008/09	128
Table 43: Whether the amounts of rice harvested were enough for households’ food needs	134
Table 44: Coping strategies of households with insufficient rice for consumption.....	135
Table 45: Amount of rice bought and received as remittance and reasons for buying and receiving rice by rice deficient sample households	137
Table 46: DEC per adult equivalent unit per day.....	138
Table 47: Household which were food secure based on DEC per adult equivalent unit per day	138
Table 48: DEC per capita per day	139
Table 49: Household which were food secure based on DEC per capita per day	139
Table 50: Variables entered in the ordinal logistic regression model.....	141
Table 51: Goodness-of-fit	141
Table 52: Pseudo R-square.....	142
Table 53: Parameter estimates for covariates used in ordinal logistic regression.....	142
Table 54: Constraints related to rice production	145
Table 55: Farmers’ suggestions for improvement	147
Table 56: Proportions (%) of traders showing different constraints related to rice marketing activities.....	148
Table 57: Proportions (%) of miller-traders showing different constraints related to rice processing and marketing activities.....	149

LIST OF FIGURES

Figure 1: Graphical representation of the Gini – coefficient.....	30
Figure 2: Different flows within a marketing channel.	38
Figure 3: A dynamic Market Structure-Conduct-Performance Model adapted from DucHai	39
Figure 4: Conceptual framework showing relationship between market efficiency and poverty reduction adapted from DucHai	42
Figure 5: Location of study area.....	46
Figure 7: Lorenz curve of rice traders in Kyela District.	107
Figure 8: Lorenz curve of rice miller-traders in Kyela District.....	107
Figure 9: Depth of poverty for sampled households expressed as a proportion of basic needs poverty line.....	130
Figure 10: Lorenz curve showing distribution of income of poor farmers	132
Figure 11: Lorenz curve showing distribution of income of poor miller-traders.....	132
Figure 12: Marketing Constraints Listed by Farmers.....	146

LIST OF PLATES

Plate 1:	Milled rice displayed in polypropylene bags on the ground at the milling place.....	90
Plate 2:	Type of milling machine commonly found in Kyela District (Sataki model).....	92
Plate 3:	Bags of rice stored at one of the milling centres in Kyela.	92
Plate 4:	Traders at one of the milling machines in Kyela District blending rice	113

LIST OF APPENDICES

Appendix 1:	Operational definitions and levels of measurement of variables of the research.....	178
Appendix 2:	Proportion of miller-traders selling processed rice?.....	179
Appendix 3:	Opinion of traders pertaining to initial capital	179
Appendix 4:	Estimate of Gini Coefficient for rice traders	180
Appendix 5:	Estimate of Gini Coefficient for rice miller-traders	181
Appendix 6:	Return at farm level 2008/2009/hectare	181
Appendix 7:	Profit margin analysis for rice traders	182
Appendix 8:	Profit margin analysis for rice miller-traders	183
Appendix 9:	Data of incomes of the 134 farmer households	184
Appendix 10:	Data of incomes of 13 miller households	188
Appendix 11:	Computing the GINI coefficient of the rice farmers	189
Appendix 11:	Computing the GINI coefficient of the rice farmers	189
Appendix 12:	Computing the GINI coefficient of the rice miller-traders.....	191
Appendix 13:	A copy of the questionnaire used to interview rice farmers	192
Appendix 14:	A copy of the questionnaire used to interview rice traders	200
Appendix 15:	A copy of the questionnaire used to interview rice miller-traders	208
Appendix 16:	A checklist of items used for discussion with the District Agricultural Officer	214
Appendix 17:	Relating specific objectives, operational definitions of variables and data source	215

LIST OF ABBREVIATIONS AND SYMBOLS

\$	United States Dollar sign
%	Percentage
<	Less than
=	Equal to
>	Greater than
ARI	Agricultural Research Institute
AVC	Average Variable Cost
CAN	Calcium Ammonium Nitrate
CI	Concentration Index
CIAT	Centro Internacional de Agricultura Tropical
DALDO	District Agricultural and Livestock Officer
DAP	Diammonium Phosphate
E.g.	For example
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GM	Gross Margin
GMA	Gross Margin Analysis
Ha	Hectare
HIPC	Highly Indebted Poor Countries
HIV	Acquired Immune Deficiency Syndrome
i.e.	That is
IFAD	International Fund for Agricultural Development
IMR	Infant Mortality Rate
IRRI	International Rice Research Institute
Kg	Kilogram

Km	Kilometre
KYERUCU	Kyela-Rungwe Cooperative Union
MAFS	Ministry of Agriculture and Food Security
Masl	Metres above sea level
Max.	Maximum
MDG	Millennium Development Goal(s)
ME	Marketing efficiency
Min.	Minimum
MM	Marketing margin
MMR	Maternal Mortality Rate
NBS	National Bureau of Statistics
NGO	Non-Governmental Organization(s)
NMC	National Milling Corporation
NPK	Nitrogen Phosphorus Potassium
NSGRP	National Strategy for Growth and Reduction of Poverty
oC	Celsius Degrees
Pa	Parametric poverty
PH	Hydrogen ion concentration
PM	Profit Margin
PRIDE	Promotion of Rural Initiatives and Development Enterprises
PRS	Poverty Reduction Strategy
PRSP	Poverty Reduction Strategy Paper
PSP	Poverty Strategy Paper
S –C – P	Structure – Conduct and Performance
SACCOS	Savings and Credit Cooperative Society
SNAL	Sokoine National Agricultural Library

SPSS	Statistical Package for Social Sciences
Sq	Square
SSR	Self Sufficient ratio
Stdev	Standard deviation
SUA	Sokoine University of Agriculture
t/ha	tones per hectare
TARP II	Tanzania Agricultural Research Project Phase Two
TR	Total Revenue
TSP	Triple Super Phosphate
TV	Television
TZS	Tanzania shilling
URT	United Republic of Tanzania
USDA	United States Department of Agriculture
VICOBA	Village Community Bank
Yrs	Years

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Agriculture is by far the most important sector in Tanzania in terms of employment, contribution to Gross Domestic Product (GDP) and foreign exchange earnings (URT, 2009). Available statistics indicate that about 85% of the population live and earn a living in rural areas with agriculture being their mainstay (URT, 2009). In 2008, agriculture accounted for about 22% of foreign earnings and about 25.7% of GDP (URT, 2009). Investments in agriculture are likely to yield improvement in farm, food, and income hence reduced poverty (Mnenwa and Maliti, 2010).

Despite the vital role played by the sector in the economy, the level of agricultural growth is not satisfactory, and it has not been able to liberate the majority of rural population from poverty (URT, 2006). According to Jehovaness (2010), the majority of Tanzanians living in rural areas are very poor in terms of low income, thus unable to acquire basic needs. The NBS (2009) indicates that per capita rural income is estimated at TZS 14 134 compared to an average of 17 928 for Mainland Tanzania, 40 767 for Dar es Salaam and 30 426 for other Urban areas. Households depending on agriculture showed higher levels of poverty compared to households with at least one member who was employed or self-employed in non-agricultural activities.

In Tanzania, inefficient agricultural marketing system has been observed to have major drawbacks in developing of the agricultural sector (Mdoe *et al.*, 2001). The inefficiency of agricultural marketing adversely affects the living standards of rural farmers and consumers (Mudinanamani and Mahayanashetti, 2001, cited by Massawe, 2007). The

agricultural sector can play a major role in improving the living standards of people who reside in rural areas by combating poverty through provision of secure markets. Such markets encourage farmers to increase marketed surplus and diversify production which integrates the farming community into market economy through communication and exchange (Massawe, 2007).

If markets are working well, and trade and exchange are flourishing, they should increase the amount of cash in circulation in rural areas and give individual households broader opportunities to move out of poverty (URT, 2008). Market related factors that hinder the growth of the agricultural sector include: lack of competitive markets, poor road networks (high transport and transaction costs), unavailability of market information, low farmer prices and credit for agricultural marketing (Likwelile, 1999).

Kyela District is for many years popular for producing rice (*Oryza sativa* spp) of good milling quality, flavour and aroma. Before independence, Indians who settled at Ipinda in Kyela were purchasing rice from farmers and marketing it outside the district. They continued purchasing rice until the National Milling Corporation (NMC) took over the business in the early 1970s. The NMC was also assisted in purchasing rice from farmers by Kyela Rungwe Cooperative Union (KYERUCU). In 1985 the NMC handed over this business of purchasing, processing and marketing rice to KYERUCU. During this period, local traders were also involved in buying rice from farmers and selling it elsewhere, but this was done illegally (Mussei and Mbogollo, 2001). Following the introduction of a free market economy¹ in the year 1995, restrictions on rice purchases and marketing in the district were relaxed. Following the liberty of marketing rice and other crops, the

¹ A market economy based on supply and demand with little or no government control. Buyers and sellers are allowed to transact freely i.e buy/trade based on a mutual agreement on price without government intervention.

monopoly of KYERUCU in purchasing, processing and marketing rice was removed. In 1996 private traders, took over the full responsibility of purchasing, processing and marketing the rice. Over time, more processed and unprocessed rice was bought by traders from Kyela for marketing in large towns such as Mbeya, Dar es Salaam and Zanzibar. Since then, there has been an increasing number of people from within and outside Kyela District who are participating in rice marketing (Mghogho *et al.*, 2005). However, no information exists on the structure of rice marketing in the district, its conduct and performance, the extent of income increase and the level of poverty reduction in the study area. This study was, therefore, designed to investigate rice marketing performance and poverty reduction in Kyela District after market liberalization in 1995.

1.2 Problem Statement

Smallholder rice farmers in Kyela District recognise poverty as a problem affecting them in many ways such as failure to provide education requirements to their children, living in poor houses and frequent food shortages (URT, 2008). Farmers in the study area still believe that these problems can be solved through proper rice production and marketing in their localities. Rice is a crop of first choice by most farmers in Kyela District to improve food security and reduce poverty due to its compatibility with the agronomical factors (good climate which favours production of the crop), presence of labour, land suitable for irrigation, and excellent local, regional, national and cross border market demands for a wide range of agricultural products (Mghogho *et al.*, 2005). The presence of a free market economy policy in the area also favours the farmers to attain better price of their produce.

Although rice is grown by 100% of households (Kisandu, 2010) in Kyela District, its high marketability and the presence of competing buyers in a liberalised economy, most (68%) of the rice farmers in the area are still poor and food insecure (URT, 2008) partly because

productivity is generally low; it ranges between 1.5 ton/ha and 3 ton/ha with an average of 1.6 ton/ha while the national average is 1.8 ton/ha (Kisandu, 2010). Providing more conducive conditions for rice crop production and marketing in Kyela District is expected to increase rice production, marketed volume, income and eventually reduce poverty. There is, however, low farm gate price despite high demand for rice from Kyela District (Mghogho *et al.*, 2005). Consequently, farmers' incomes obtained from rice sales are low compared to production costs (Mghogho *et al.*, 2005) thereby affecting their standard of living. This poses a question; what is wrong with the whole marketing system, leading to low farm gate prices for rice? Is it due to a poor market structure and conduct that lead to poor rice market performance or are there other factors? Indeed, an efficient agricultural market is essential for poverty reduction.

Another related question is what factors perpetuate poverty despite the prevailing free market for rice? Is it due to inefficient production or marketing systems or both? As we ponder on these questions little is known regarding the role of rice marketing towards poverty reduction. Information is lacking on the link between income obtained from rice sales and poverty in the study area. This study aimed at bridging this information gap.

1.3 Justification of the Study

Different studies have been conducted on rice production and marketing, including studies on production and marketing of paddy in Ulanga District (Gabagambi, 1998), and development of a major rice cultivation area in the Kilombero Valley (Kato, 2007), adoption constraints of improved rice varieties in Kyela District (Mussei and Mbogollo, 2001), on-farm development and promotion of integrated disease management option for the rice yellow mottle virus diseases in Kyela District (Mwalyego *et al.*, 2001), Evaluation of rice husks as organic mulch on management of Nitrogen, phosphorous and rice yield in

Kyela District (Hallinga, 2003), and baseline study on rice marketing in Kyela District (Mghogho *et al.*, 2005). However, no one had researched on the effects of rice marketing performance on poverty reduction in Kyela District. This study intended to determine the effects of rice marketing performance on poverty reduction in Kyela District.

Apart from marketing performances, the study meant to generate information which would contribute to the body of knowledge on issues related to rice marketing in Kyela District such as key constraints affecting rice marketing, the association between income from rice marketing and poverty reduction, and related policy issues. Information generated from this study can be used by different stakeholders including policy makers, development partners, academics and the government as a reference and in decision making to inform market development strategies for improving performance, hence more effective reduction of poverty.

Basing on Tanzania development Vision 2025 and Millennium Development Goal (MDG) number one (which requires countries to reduce by half both the proportion of people living below the poverty line and that of food insecure people by 2015 (MDGs, 2007), the study for this thesis was about determining effects of rice marketing performance on poverty reduction in Kyela District, Tanzania. The study particularly focused on the effects of rice marketing efficiency and its implication for poverty reduction in the district. As such study is useful for informing evaluating the Tanzania National Strategy for Growth and Reduction of Poverty (NSGRP) currently being implemented under cluster number one, which covers economic growth and reduction of income poverty (URT, 2005). Findings from this study will therefore widen the understanding of the contribution of rice marketing to poverty reduction.

1.4 Objectives, Research Questions and Hypotheses

1.4.1 General objective

The main objective of the study was to determine the effects of rice marketing performance on poverty reduction in Kyela District, Tanzania. The study particularly focused on the effects of rice marketing efficiency and its implication for poverty reduction in the district.

1.4.2 Specific objectives

The study had five specific objectives as listed below.

- i. To assess rice marketing channels and the roles of different marketing participants.
- ii. To analyze the rice market structure in terms of barriers to entry, buyer concentration and market transparency.
- iii. To determine the performance of the rice marketing sub-system in the study area.
- iv. To compare the well-being levels of rice farmers, rice traders, and rice miller-traders in terms of income and food security.
- v. To find the likelihood of being grouped into the highest income quintile among households selling rice (farmers, traders and miller-traders).

1.4.3 Research questions

The first specific objective (i) sought to describe rice marketing channels and the roles of different marketing participants, while specific objective two analyzed the structure of rice marketing in Kyela District. These two objectives were addressed through the following research questions:

- (i) What are the existing rice marketing channels and what are the roles played by different marketing participants in the study area?

- (ii) How is the rice market structure in terms of barriers to entry, buyer concentration and market transparency?

1.4.4 Study hypotheses

The study was also guided by research hypotheses for specific objectives three, four and five. The first hypothesis aimed at determining the performance of the rice marketing sub-system in terms of return per bag of rice and return per Tanzanian shilling invested. Gross margin analysis was used to measure such market performance. The null and alternative hypotheses for this objective are presented below.

Ho: The gross margins of rice farmers, rice traders and rice miller-traders are equal

Hi: The gross margin of rice farmers is not equal to that of rice traders or rice miller-traders.

The second hypothesis compared the well-being levels among rice farmers, traders and miller-traders. Income as a proxy for wellbeing was measured in terms of mean income per adult equivalent for 28 days, while food security was measured using Dietary Energy Consumed (DEC) per adult equivalent per day. The null and alternative hypotheses of this objective are presented below

Ho: Mean income per adult equivalent for 28 days of rice farmers, rice traders and rice miller-traders are similar.

Hi: Mean income per adult equivalent for 28 days of rice farmers are not similar to those of rice traders or rice miller-traders.

H_0 : Dietary energy intake of rice farmers is equal to that of rice traders or rice miller-traders.

H_1 : Dietary energy intake of rice farmers is not equal to that of rice traders or rice miller-traders.

The third hypothesis aimed to find the likelihood of households that produce, process and sells rice (farmers, traders and miller-traders) being grouped into the highest income quintile. The null and alternative hypotheses for this objective are presented below.

H_0 : The odds ratios of being in the highest income quintile are the same for rice farmers, rice traders and rice miller-traders

H_1 : The odds ratios of being in the highest income quintile are different for rice farmers, rice traders and rice miller-traders

1.5 Structure of the Thesis

The thesis is organized in five chapters. The first chapter presents the background to the study covering the problem statement and justification, objectives of the study, and hypotheses. The second chapter provides a review of literature on rice production, rice marketing, models for evaluating marketing performance and methods used in measuring poverty. The third chapter presents the methodology, including the description of the study area, sampling design, data collection tools, data analysis techniques used, and efficiency measures of marketing and market performance. The fourth chapter presents the results and discussion, followed by chapter five which presents the conclusion and recommendations.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Rice Production

The rice (*Oryza sativa* spp) crop is grown in more than one hundred countries worldwide, with a total harvested area of approximately 158 million hectares during 2009, producing more than 700 million tons annually in which 470 tons milled rice (IRRI, 2009). Rice is the world's most important food product (Bruntrup, 2006), about three billion people worldwide eat rice every day (Subair, 2008). On production, about 670 million tons of rice is grown annually worldwide, and by geographical location, about 90% is grown in Asia. China and India remained the world's biggest rice farmers during 2002/03, followed by Indonesia, Bangladesh, Vietnam and Thailand. The United States produces about six million tons (about one percent of the world's rice supply) (FAO, 2008). Latin America produces about 25 million tons and Sub-Saharan Africa produces some of 19 million tons. In Asia and Sub-Saharan Africa, almost all rice is grown on small farms of 0.5 to 3 hectares. This indicates that rice production efficiency is low and an income country is relatively low.

Rice is an old crop in Africa where about 70% of African farmers still grow rain-fed rice (upland rice). Rice has since become the fourth most important cereal in Sub-Saharan Africa in terms of production, behind sorghum (*Sorghum bicolor*), maize (*Zea mays*) and millet (*Eleusine coracana*) respectively. Approximately 20 million farmers in Sub-Saharan Africa grow rice while about 100 million people depend on it for their livelihood (FAO, 2008).

According to the Consultative Group on International Agricultural Research (CGIAR), rice consumption in Sub-Saharan Africa is growing at about 4 to 5% per year. This is due

to rapid urbanization and demographic trends, strong preferences for rice across all income groups, increased participation of women in the labour force, and lifestyle changes (CGIAR, 2009). Rice production is currently increasing with at approximately 5% annual growth rate over the last 5 years in West Africa, 7% in East Africa and 16% in Southern Africa (CGIAR, 2009). However, these growth rates are not sufficient to cope with the rising demand for rice. In West and Central Africa where rice is a staple food, import volumes averaged between 40% to 50% of consumption needs. Close to 10 million tons of milled rice are being imported to Sub-Saharan Africa every year (CGIAR, 2009).

Rice is also a very important cereal crops in Tanzania, consumed by about 60% of the population (WARDA, 2007). Tanzania ranks second, after Madagascar, as a major rice farmer in Eastern, Central and Southern Africa (WARDA, 2007; Kafiriti *et al.*, 2003). Since the late 1990s, the Tanzanian government has recommended rice cultivation for cash income generation and has accelerated activities of private traders in rural areas to facilitate marketing. Consequently, after economic liberalization in the mid 1980s, production rapidly increased as rice became an important cash crop in Tanzania, especially in regions with large marshlands or swamps (Isinika *et al.*, 2003).

According to the National Sample Census of Agricultural of 2007/08, the bulk of national paddy supply (about 70 to 80%) in Tanzania is produced from five regions, namely: Shinyanga (170 482 ha, 25.1%), Tabora (99 268 ha, 14.6%), Morogoro (81 997 ha, 12.1%), Mbeya (80 006 ha, 11.78%) and Mwanza (48 814 ha, 7.2%) (NBS, 2012). Mbeya region has the fourth largest area under paddy production; however, it is the second highest producer of the crop in Tanzania. High rice production in Mbeya region can be attributed to various government initiatives to promote rice production that took place during the early 1990s, particularly in Usangu plains. Of these developments, the most

important initiative is the establishment of a large irrigation scheme at Kapunga farm and smallholder schemes at Majengo, Kimani and Motombaya. These developments have contributed to rising of rice production in the region (Kadigi, 2003).

It is estimated that about 60% of paddy produced in Mbeya Region is from Mbarali district. The rest is produced in Kyela (about 20%), Ileje and Mbozi (about 15%) and other areas in the region (5%). In Kyela District about of 16 715 ha of rice are cultivated and 35 037 tones are produced annually (URT, 2008). Rice is the most important cash and food crop to both farmers and the district as a whole (URT, 2008). According to URT (2008), the crop accounts for almost 100% of some people's staple food. More than 30% of rural households produce sufficient rice for their domestic needs and for sale. Statistics show that rice contributes more than TZS 43 million (30%) to the district's revenue through tax collection from crop trading companies (URT, 2008).

In Tanzania rice is grown under three major agro-ecosystems namely rain-fed lowland, upland rice and irrigated rice (MAFS, 2009). The trends in acreage, milled rice production in Tanzania for the past ten years are summarized in Table 1.

Table 1: Trend of milled rice production in Tanzania

Year	Area (1000 ha)	Yield (t/ha)	Production (1000 t)	SSR (%)
1998	490.0	1.08	530.0	82.3
1999	475.0	1.08	511.0	67.1
2000	500.0	1.02	511.0	67.1
2001	530.0	1.07	569.0	76.5
2002	500.0	1.29	645.0	76.3
2003	570.0	1.26	720.0	78.3
2004	650.0	0.86	556.0	69.0
2005	688.0	0.83	573.0	76.6
2006	650.0	1.21	785.0	81.8
2007	665.0	1.23	818.0	84.5

Source: MAFS (2009)

The area under rice production increased from 490 000 hectares in 1998 to 665 000 hectares in 2007 representing an increase of 36%, which is equal to 3.6% annually. Likewise, rice production increased by 52% from 530 000 tons (about 803 030 tons of paddy rice) to 818 000 tons (1 258 462 tons of paddy rice) during the same period, which is equal to 5.2% annually. The productivity of milled rice for the same period did not change much but varied from 1.0 to 1.2 tons of milled rice per ha (equivalent to 1.6 to 1.8 of paddy per ha). Low yield is mainly attributed to persistent use of genetically low yielding varieties, drought, low soil fertility, weed infestations, prevalence of insect pests, rice diseases and birds.

Low production of rice has contributed to failure to attain food self sufficiency at the national level. Currently, the average Self Sufficiency Ratio (SSR) for rice in the country is about 84.5% (MAFS, 2009). However, a recommended level of SSR that ensures a country's sustainable food supply is supposed to be above 120%.

2.2 Rice Marketing

2.2.1 Market and agricultural marketing

According to Abbott and Markham (1986), the term market refers to an area where exchange can take place. It also means the people living in a particular area or country who have the means and the desire to buy products and services. Thus a market can have local, domestic (national) or a world (global) coverage. Mendoza (1995) also defines marketing as a system which comprises of several interrelated structures along the production, distribution and consumption units. Furthermore, marketing encompasses all business activities performed in directing the flow of goods and services from the farmer to the consumer or final user (Tekele 2010; Abbot 1993). The Market of a particular commodity exists when farmers and consumers exchange commodities at mutually agreed prices. Market participants may also engage in moving, storing, grading and processing the commodity in expectation of enhancing its value to consumers.

2.2.2. Marketing channels

According to Kotler (2003), the term marketing channels refers to a set of independent organizations involved in the process of making a product or services available for use or consumption. He further argues that most farmers do not sell their goods directly to the final users. Between them stands a set of intermediaries performing a variety of functions. These intermediaries constitute a marketing channel also called a trader channel or distribution channel. According to Giles (1973, cited by Tekele, 2010), ‘channels of distribution’ refers to the system of marketing institutions through which goods or services are transferred from the original farmers to ultimate users or consumers. Most frequently, a physical product transfer is involved, but sometimes an intermediate marketing institution may take title to goods without actually handling them.

Furthermore, Kohls and Uhl (1990), cited by Kabungo, (2008) define marketing channels as “alternative routes of product flows from farmers to consumers. They focus on the marketing of agricultural products, as does this study. Their marketing channel starts at the farm gate, ending at the consumer. The marketing channel approach focuses on firm’s selling strategies to satisfy consumer preferences. In this study, the term “marketing channel” will be used as an explanation of the set of activities that add place, time, form or control utility to a product as it is transformed from raw material into one that is purchased by another firm or consumers. In this approach, there are two important functions carried out between farmers and consumers. One is the exchange function (buying and selling), as well as physical functions (transportation, storage and processing). Another is the facilitating function which includes standardization, finance, information and risk bearing. Through such marketing channel concepts it is possible to identify how rice moves from farmers to consumers as well as the functions performed by each participant.

2.2.3 Rice marketing in Tanzania

Between the 1970s and 1980s, the rice marketing system in Tanzania was characterized by a single marketing channel. During this period, the government created institutions and agencies for procurement, importation, storage and distribution of food grains. These institutions and agencies included the National Milling Corporation and Regional Cooperative Unions. However, there was poor performance of these institutions on grain marketing and high running costs by the government which spurred discussions on policy reforms in order to improve the performance of grain markets in the country. The market liberalisation policy was therefore instituted during the mid 1980s as an outcome of these debates. The decision to liberalise marketing of food and other crop products in the mid-1980s thus ceased the monopoly of government agencies. Since then, the marketing system for rice and other crops in Tanzania falls under a free market system (Senda, 1999).

The rice commodity market chain has, therefore, changed from a single marketing channel to a two-channel marketing system with the dominant channel being characterized by a large number of small traders operating between rice farmers and the rice miller. The local traders buy small quantities of rice directly from farmers and transport it to mills where rice is milled and sold to inter- regional traders, local retailers or directly to consumers. The inter-regional traders ferry the rice to large consumer markets, particularly in Dar es Salaam and Zanzibar. Another channel involves inter-regional traders buying paddy directly from farmers, bringing the paddy to mills and sending the milled rice to the main consumption centre (Dar es Salaam). The interaction of actors in all these channels impacts upon the price for farmers in the producing areas.

2.2.4 Price trends and rice marketing in Kyela district

Price trends and marketing in Kyela District show that farmers are subject to considerable price fluctuations over the years and within a year. A plastic bucket approximately weighing 18 kg when full of rice is the most common unit of measurement in rice trade. The average annual prices for four seasons 2002/03 to 2005/06 remained nearly constant at Tshs 7500 (about Tshs 420/kg) per plastic bucket (Mghogho *et al.*, 2005). Low prices were evident during the harvest time from June to September Tshs 6575 (about Tshs 365/kg), reaching a peak during the lean months of January to May Tshs 10 250 (about Tshs 570/kg) (URT, 2008). In Kyela paddy is purchased by local and distant traders. The local traders operate in five market centres (Central Kyela, Mbugani, Ipinda, Busale and Lema STAMICO). They also move around in eight market places (Kasumulu, Ngonga, Makwale, Kajunjumele, Ngyeke, Katumbasongwe, Mwaya and Itunge) where rice selling and buying activities are held on specific days. Distant traders use itinerant commission agents to buy paddy in the villages on their behalf. The activities performed by different market participants to transfer goods and services from farmers to consumers determine

how the marketing system operates (Mendoza, 1995). The efficiency with which a marketing system in an area operates can influence the living standard of people and the overall development of the nation and thus it is vital to improve the marketing efficiency to achieve economic development (Zeberga, 2010).

2.2.4 Marketing efficiency

According to Tekele (2010), market efficiency is defined as the movement of goods from farmers to consumers at the lowest cost, consistent with the provision of the service that consumers desire and are able to pay for. The efficiency of a market can be evaluated (one approach) through analyzing the existing channels according to price and services provided. The prevailing price should reflect the cost plus profit margins, and the profit must be sufficient to reward investment at the prevailing interest rate. The quality of services should be neither too high nor too low in relation to the cost and consumers' desire.

The marketing efficiency model is stated from Shepherd's formula (equation 1) where a score of 100% indicates perfect efficiency; above 100% it indicates excess profit while below 100% it indicates that marketing is inefficient). Shepherd's formula is given by Oscar and Chukwuma (2008 cited by Tekele, 2010), as follows:

$$E = \frac{V}{I} - 1 \dots \dots \dots (1)$$

Where, **E** = market efficiency

V = Value of rice marketed

I = Total marketing cost.

In this study, marketing efficiency was computed using the formula given by Olukosi and Isitor (1990), which is given in equation (2).

$$\% M.E = \frac{\text{Net marketing margin}}{\text{Total marketing cost}} \times 100 \dots \dots \dots (2)$$

Where:

$\% M.E$ = Percentage marketing efficiency

Note: If $M.E. = 1$, marketing is efficient

If $M.E < 1$, *marketing is inefficient*

If $M.E > 1$, *marketing is highly efficient.*

It is postulated that attaining improved marketing efficiency is a common goal of all farmers, market organizations, consumers and society (Kohls and Uhl, 1990). Higher marketing efficiency means better performance, while lower efficiency denotes poor performance.

Based on this argument, different marketing performance models have been used as reviewed in the next sub-section

2.3 Models for evaluating marketing performance

The need to analyse the performance of agricultural market stems from their fundamental role in the development process. Scarborough and Kydd (1992) report that markets can potentially contribute to the development process in two ways. First, they can provide a way to allocate resources ensuring the highest value of production and maximum consumer satisfaction. Second, they may stimulate growth by promoting technological innovation and increased supply and demand. Basically, there are three main models for evaluating the performance of agricultural marketing systems; (i) Internal productive efficiency of the market, (ii) The Structure- Conduct-Performance model, and (iii) Food

system framework (Scarborough and Kydd, 1992). The explanation of each model is given below.

2.3.1 Internal Productive Efficiency of Marketing Enterprises (IPEME)

The Internal Productive Efficiency of Marketing Enterprise (IPEME) is a measure of the level of economic efficiency which is a combination of technical and operational efficiency. Scarborough and Kydd (1992) report that between the 1940s and 1950s the main emphasis in marketing economics was on the internal technical and operational efficiency of marketing firms. In this intra – firm organization, management structure, motivation and incentive arrangements as well as decision – making rules and processes were seen as important determinants of efficiency of operations. Technical efficiency refers to the effectiveness with which resources are used in marketing in terms of physical inputs and outputs ratios.

2.3.2 The Structure-Conduct-Performance model (S-C-P)

The S-C-P approach was developed in the United States of America (USA) as a tool to analyse market organization of the industrial sector. The tool was later applied to assess the agricultural marketing system (Amha, 1994). Scarborough and Kydd (1992) point out that the analytical core of this model is the assessment of markets on the assumption of a two-way casual and feedback relationship between its three major components: structure, conduct and performance. Specifically, the model assumes that given certain basic conditions the performance of particular industries depends on the conduct of its sellers and buyers which in turn is strongly influenced by the structure of the relevant market (Scarborough and Kydd, 1992).

2.3.3 Food system framework

The food system framework combines element of the internal productive efficiency and S-C-P model. Shaffer (1983 cited by Ashimogo, 2005) stresses that this approach emerged because the previous two approaches could not jointly examine the nature of the vertical as well as the horizontal relationship between firms in assessing marketing performance. As a result, the food system framework combines elements of both models, and recognizes the importance of farm resources in both production and consumption. It goes beyond industry boundaries and assesses structure and conduct vertically and horizontally over the entire commodity flow from the input supplier to the ultimate consumer.

2.4 Features of the S-C-P model

2.4.1 Market structure

According to Scarborough and Kydd (1992), the structure of a market entails the organizational characteristics of a market that appears to influence strategically the nature of competition and pricing behaviour within the market. Structural characteristics may be used as a basis for classifying markets. Markets may be perfectly competitive, monopolistic, or oligopolistic. The common measures of efficiency of the component are the degree of concentration (number and size of market participants), market transparency (information), and market entry. According to this concept, performance is expected to be satisfactory under the following conditions: if sufficient numbers of buyers and/or sellers exist to provide alternative outlets without one of them having the market power to dominate the others. If market transparency with regard to product quality, varieties, grades and prices is given; and if there are no serious barriers to market entry or exist (Gabagambi, 1998).

2.4.2 Market conduct

Market conduct refers to the patterns of behaviour that firms follow in adapting or adjusting to the markets in which they sell or buy (Pameroy and Trinidad, 1995). Such a definition implies the analysis of human behavioural patterns that are not readily identifiable, obtainable, or quantifiable. Market conduct defines the conditions which make possible exploitative relationships between sellers and buyers. Analysis of market conduct entails: an examination of: (i) buying and selling behaviour of various market participants, (ii) forms of competition amongst them (pricing, terms of payment and credit, (iii) level of activity, and (iv) actions to avoid collusion (Scarborough and Kydd, 1992).

2.4.3 Market performance

Market performance refers to the impact of the market structure and conduct measured by variables such as prices, cost, and volume of output (Pomeroy and Trinidad, 1995). The market structure such as market concentration (number and size of traders), barriers to entry (economies of scale, capital), vertical integration, market infrastructure and market transparency influence price formation of produce in the markets. By analysing the level of marketing margin and their cost components, it is possible to evaluate the impact of the structure and conduct characteristics on market performance (Anderson *et al.*, 2004). Common indicators of performance in the food industry are: trends in retail prices and consumer food cost, level and stability of farm prices and income, marginal propensity to consume, spread of marketing margin and farmer's share of the consumer's money spent on agricultural products, middlemen profit, and parity farm prices (Kohls and Uhl, 1990). Two common indicators of market performance are net returns and marketing margins. Analysis of this concept normally includes evaluation of operational, technical and pricing efficiency (Ashimogo, 1995). According to Kizito (2008), market performance is defined as the extent to which markets result into outcomes that are deemed good or preferred by

society. Market performance refers to how well the market fulfils certain social and private objectives. These include price levels and price stability in the long and short term, profit levels, cost efficiency as well as qualities and quantities of food commodities. Since the study aims at determining the effects of rice marketing performance on poverty in Kyela District, the following sub-section presents the definition of poverty, causes of poverty, characteristics of poverty in society and different approaches used in measuring poverty.

2.5 Poverty and Poverty Measurements

2.5.1 The concept of poverty

Poverty is conceptualised by scholars and researchers in many ways. A portion of the population which lacks income that is required to meet basic needs and social services in life (such as food, housing, clothing, education, health, water, sanitation, etc.) is said to be poor. People are said to be poor if they are underemployed, and they are powerless in decision making on matters concerning their day to day lives (Lowassa, 1999; World Bank, 2000). Also, poverty is manifested in other areas of human life such as living in squalid surroundings; lack of transport and communication facilities; lack of credit and markets; low utilization of technology; high incidences of diseases such as malaria, HIV/AIDS and diarrhoea; high infant mortality rate (IMR); high maternal mortality rate (MMR); low literacy rate; lack or shortage of physical assets and livestock such as land, cattle, goats, stored crop products, farm implements, furniture and other household assets such as radio, TV set, refrigerator and others (World Bank, 2000).

Different criteria have been used to define poverty. It is not easy to have one single definition of poverty since poverty is multidimensional and location specific. Thus, poverty has various indicators some of which can be measured and quantified and some are not easily quantified. Poverty affects many aspects of human condition, including

physical, moral and psychological. A concise and universally accepted definition of poverty is therefore elusive (Blackwood and Lynch, 1994). For example, many researchers have defined the poor as that portion of the population that is unable to meet basic nutritional needs (Reutlinger and Selowsky, 1976, cited by Blackwood and Lynch, 1994). Others view poverty, in part, as a function of education and/or health measured by life expectancy, child mortality and other indicators (Singer, 1975, cited by Blackwood and Lynch, 1994). Streeten (1979 cited by Blackwood and Lynch, 1994) defines poverty as a condition of being unable to meet “basic needs”, which refer to physical (food, healthcare, education, shelter, etc.) and non-physical (participation, identity, etc.) requirements for a “meaningful life”. Other authors relate the concept of poverty to “entitlements”, which refer to various bundles of goods and services over which one has command, taking into consideration the means by which such goods are acquired (e.g. money, coupons, etc) and the availability of the needed goods. This means, poverty is a shortage or lack of “entitlements” (Sen, 1983, cited by Blackwood and Lynch, 1994). Also, poverty can be defined as a state of deprivation and prohibition of a decent life that results from many mutually reinforcing factors including lack of productive resources to generate material wealth; illiteracy; prevalence of diseases; discriminative socio-economic and political systems and natural calamities such as drought, floods, HIV/AIDS and wars (URT, 2000).

Likewise, the World Bank (2001) indicates that the poor are people who lack adequate food and shelter, education and health, and have deprivations that keep them from leading the kind of life that every one values. Moreover, they are often exposed to ill treatment by institutions of the state and society, and they are powerless to influence key decisions affecting their lives.

2.5.2 Causes of Poverty

It is equally important to analyse the causes of poverty. Cooksey (1994) argues that the causes of poverty are multiple and highly complex in their interrelationships. According to URT (1998), the major causes of poverty in Tanzania have included internal and external ones. The internal causes include; (a) inefficient fiscal and monetary policies, which do not promote economic growth; (b) insufficient support to the leading economic sectors, i.e. the agricultural sector; (c) inadequate support to rural industries and disruption of local institutional structures; (d) low level of technology; (e) gender imbalance in the division of labour at the household level, especially in rural areas where women do most of the activities while men rest more time, resulting in low production; (f) laziness and irresponsibility; (g) diseases, including HIV/AIDS and others; and (h) big families hence more dependants than other family members who can work.

External causes of poverty have been identified to include; (a) existence of national debt, which causes some proportions of recurrent budget to be paid to rich countries in lieu of being spent on social services and economic development; (b) unequal exchange in international trade thereby limiting the ability of developing countries to overcome poverty (URT, 1998) and closure of refugees camps in Tanzania during 2012 which caused changes in the dynamics of the area, especially on infrastructure and markets (Ongpin, 2013).

2.5.3 Characteristics of poverty

There are two characteristics of poverty as described by researchers. These is absolute (abject or hard – core) poverty and relative (soft–core) poverty. A practical and commonly used definition of absolute poverty is inability to attain a specified minimum standard of living (Word Bank, 1990, Atkinson, 1991). The definition focuses on the absolute

economic wellbeing of the poor in isolation from the welfare distribution of the entire society. It implies knowledge of the minimum standard of living, commonly referred to as the poverty line. A Poverty line, commonly expressed in real terms, is normally held constant in the short run, but is adjusted in the medium and long terms to reflect changes in a country's priorities and level of development (Atkinson, 1991). A Poverty line can be specified following the basic needs approach in which a minimum standard of nutrition and other non - food basic necessities are used (JASPA, 1982). The advantage of using the absolute approach is that changes in the welfare position of the poor can be traced and the extent of poverty reduction can be measured.

Relative poverty can be defined as the condition of one person or a portion of a population living in a lower standard of living in comparison to the other. Relative poverty measures define the segment of the population that is poor in relation to the income of the general population (Blackwood and Lynch, 1994). Relative poverty is a comparative term of living standards among the people of the same population. This implies that every society, except those where everyone has the same standard of living, has relative poverty. Hence, a society may have relative poverty, where some members may receive income levels less than others by some degree and at the same time have no absolute poverty, if all members receive income levels greater than the designated poverty line. Thus, there may be an improvement in relative poverty while there is an increase in absolute poverty (Blackwood and Lynch, 1994).

This approach is appealing both socially and politically because individuals relate to one another at all levels of economic wellbeing, implying that poverty is a dynamic concept which changes with time and space as well as the level of education and communication. As such, improved education and communication can indeed expand the poor reference

group by raising awareness, sharing knowledge and information for supporting poverty reduction initiatives. In this way, promoting changes in people's attitude and behaviour and thus increasing their participation in development or poverty reduction processes can help improve standards of living in the society. However, the concept of relative poverty suffers from two obvious weaknesses: it determines "*a priori*" the extent of poverty and makes its elimination impossible, and it ignores mobility into or out of poverty.

2.5.4. Poverty measurement

Poverty measurement uses various concepts of both primary and secondary incomes, broadly defined. Primary income accrues in the form of primary claims of resources, which arise directly out of productive processes of work and accumulation. This includes the earnings of labour from employment (self or hired), returns on rental property and from investments or productive assets (Jazairy *et al.*, 1992). Secondary income sources result from interventions, which empower the recipients to actively engage in productive work such as investments in education, health, food security, sanitary facilities and environmental protection (Jazairy *et al.*, 1992).

2.5.4.1 Poverty lines and poverty measurement using monetary indicators

Using monetary indicators of poverty, poverty can be determined in absolute or relative terms. In the former case poverty lines are used whereas under relative poverty measurement poverty lines are not used (Kayunze, 2008).

The measurement of poverty (magnitude, prevalence, intensity and persistence) is the starting points to any logical step to intervene for the purpose of poverty eradication. This starts off with defining a poverty line which divides the poor and the non-poor. The concept of "poverty line" is elusive, and there still exists a significant debate on what this

measure should be ‘starting’ for operational and policy purposes. However, in spite of the rich literature on poverty indices, empirical work has generally used indices, which at most give the aggregate indices and aggregate intensity of poverty (Kigoda and Mwisoba, 1995). According to PSP (2003), a poverty line is determined in one of the following ways.

Firstly by using cost-of basic needs method, a poverty line calculation is based on the cost required to obtain a basic diet for the main age, sex and activity groups and multiplying that cost by a factor to provide for other necessities. For Tanzania, where the poor spend about 64% of their income on food (NBS, 2009), a factor of $100/64$ (1.56) is multiplied by the income required for food among the poor to get a poverty line. This is in line with the methodology documented by (Semboja, 1994) when the poor in Tanzania spent about 71% of their income on food during the early 1990s.

Secondly by using a food energy method, when this method is used, the poverty line is set at the consumption expenditure level at which an adult person’s average dietary intake is exactly sufficient to meet dietary food energy requirement. Thirdly by using food share method, here the poverty line is derived from the cost of a consumption plan necessary to acquire just sufficient nutrients. If this happens to be one third of total consumption, the poverty line is set at three times the cost of the consumption plan.

2.5.4.2 Poverty lines in Tanzania

In Tanzania, two poverty lines have been used in most studies; one is Tshs. 73 877 (Upper poverty line) and Tshs 49 600 (Lower poverty line) per adult equivalent per year in 1995 prices (PSP, 2003). Based on these two lines, households with expenditure less than the lower poverty line have been referred to as absolutely (hard-core) poor while those with

expenditure equal to and more than the lower poverty line but less than the upper poverty line have been called the less poor. Those whose expenditures are equal to and more than the upper poverty line have been referred to as non-poor. It is recommended that poverty lines have to be adjusted from time to time using official inflation rates in order to express the poverty lines in real terms rather than nominal terms.

According to National Bureau of Statistics (NBS) (2009), two poverty lines that are currently commonly used in Tanzania are the food poverty line and the basic needs poverty line which were calculated during the Household Budget Survey of 2007. The food poverty line is of two types: the caloric food poverty line and the monetary food poverty line. The former is 2 200 kCal per adult equivalent; the latter is the monetary value basic foodstuffs that can supply 2 200 kCal per adult equivalent for 28 days. The food poverty line was estimated to be Tshs 10 219 per adult equivalent for 28 days in 2007 prices (NBS, 2009). While the basic needs poverty line for Tanzania is Tshs 13 998 per adult equivalent for 28 days in 2007 prices.

2.5.4.3 Measurement of absolute poverty using monetary indicators

Blackwood and Lynch (1994) explain that absolute poverty measures consider exclusively the well-being of those who are defined as poor, thereby suggesting that the condition of the poor only, and not of all the society, is important. There are four kinds of absolute poverty measures. The headcount measure is concerned with the number of people who are poor: The income shortfall or the poverty gap measures the amount of income required to raise the poor out of poverty: The third class of poverty measures is concerned with the distribution of income among the poor, while the fourth category comprises of composite poverty measures such as the Sen Index and the Pa Index.

(a) The ‘head count ratio’ index

According to Blackwood and Lynch (1994), the poverty headcount measures the number (or percentage) of the population that falls below the poverty line. This measure makes no distinction between the poor who are close to the poverty line and those who have no income at all, which implies that the income distribution of the poor population is homogenous. In other words, the head count ratio does not indicate the income distribution among the poor and thus fails to distinguish between a person who earns one dollar less than the poverty line and a poor person who earns 100 dollars below the poverty line. This index is very insensitive to a decrease in income of the poor, income transfer among the poor, transfer from the poor to the rich, and also to the degree of poverty. The headcount ratio is suitable especially when an analyst is interested in the number of poor people only and not in discriminating between the average degrees of poverty among different populations or across different points in time. The poverty headcount, (H) can be defined as follows:

$$H = \frac{q}{(n \times 100)} \dots \dots \dots 3$$

Where:

H = proportion of people below the poverty line (Proportion or percentage of a population getting income which is lower than the poverty line);

q = number of people or households below the poverty line; and

n = total number of people in a population or sample (Blackwood and Lynch, 1994).

(b) The income shortfall or the poverty gap

The poverty gap measures the amount of income by which the poor fall short of the poverty line and thus indicates their degree of immiseration. The average income shortfall

measures the amount of money it would take to raise the income of the average poor person up to the poverty line. The income shortfall is limited in that it does not reflect the severity of the poverty problem in terms of the number of people who suffer, and it is not indicative of the income distribution among the poor. The income shortfall or the poverty gap is defined as:

$$I = \frac{(z - \mu)}{(z \times 100)} \dots\dots\dots 4$$

Where:

I = Income shortfall

Z = Poverty line

μ = average income of the poor (Blackwood and Lynch, 1994).

(c) The income distribution among the poor

The most widely used measures in this area are the Lorenz curves and the Gini coefficients. These measurements are concerned specifically with the distribution of income within a poor. The Lorenz curve is a graphical representation of the relationship between the cumulative percentage of income for the poor (on the horizontal axis) and the cumulative percentage of the poor population (on the vertical axis). The Gini coefficient is a measure of income inequality that is based on the Lorenz curve. It is the ratio of the area bounded by the Lorenz curve and the 45-degree line to the total area between the 45-degree reference line and the horizontal axis:

$$G = \frac{\text{area between the Lorenz curve and the diagonal line}}{\text{total area between the diagonal line and the horizontal axis}} \dots\dots\dots (5)$$

$$0 \leq G \leq 1$$

Where: G = Gini coefficient (Blackwood and Lynch, 1994). An example of Lorenz curve is shown in Fig. 1.

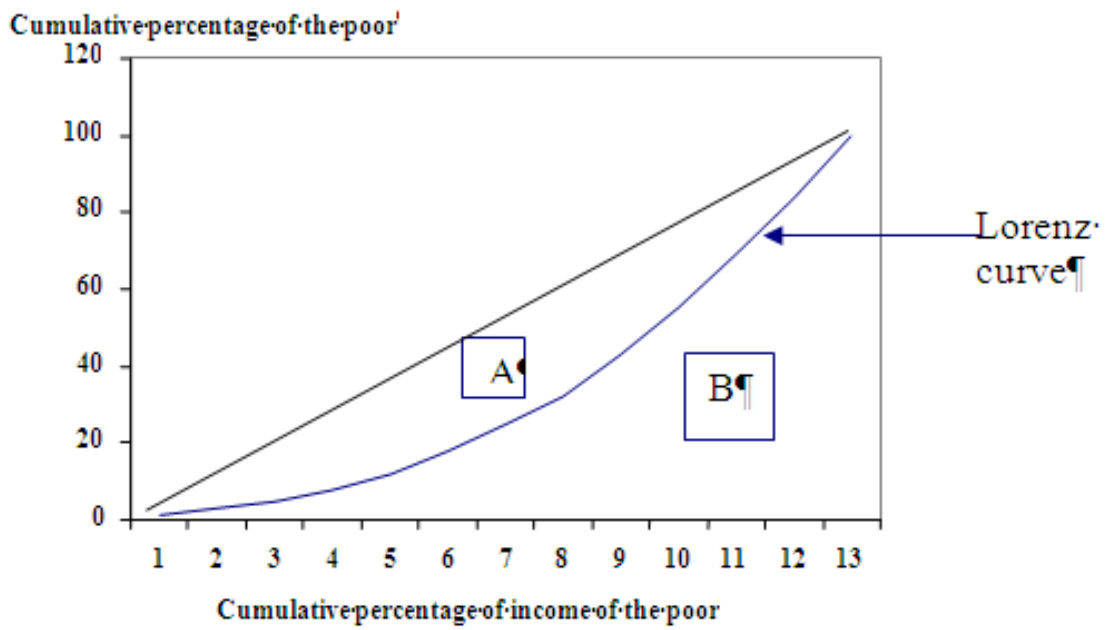


Figure 1: Graphical representation of the Gini – coefficient

Source: Kayunze and Twamala (2000)

The Gini coefficient is equal to the area marked 'A' divided by the sum of the areas marked 'A' and 'B' (that is, $Gini = A / (A+B)$). The coefficient is also equal to $2 \cdot A$, since $A + B = 0.5$, the Gini coefficient, $G = 2A = 1 - 2B$. The extreme values of the Gini coefficient are 0 and 1. These are often presented as percentages; hence the corresponding extreme values are 0% and 100%. The former implies perfect equality where everyone in the society has the same amount of wealth. The latter implies total inequality such that one person has all the wealth and everyone else has nothing. The lower the value of the Gini coefficient the greater the degree of prevailing equality.

(d) Composite poverty and The Sen Index measures

The composite poverty measures were introduced to overcome the shortcomings that were associated with the earlier measures, as pointed out above. There are two methods used:

the Sen Index and the Pa measure of poverty. The Sen Index is one of the best known absolute poverty measures. It reflects the number of the poor, the extent of their immiseration, and the distribution of income among the poor. The Sen Index does this by incorporating the headcount, the income gap, and the Gini coefficient. The Sen Index of poverty is somewhat biased toward policies that reduce the number of poor people. Specifically, the Sen Index is more responsive to improvements in the headcount than it is to reductions in the income gap or to improvements in the distribution of income among the poor. The most efficient way to reduce poverty as measured by the Sen Index is, typically, to help the least needy first and to help the neediest last (Blackwood and Lynch, 1994).

(i) The Sen Index is written as follows:

$$S = H [I + (1 - i) Gp] \dots \dots \dots (6)$$

$$I = \sum (z - y/qz)$$

Where:

S = Sen Poverty index

i = the average income shortfall as a percentage of poverty line

y_i = income of the i^{th} poor household

z = poverty line

q^z = number of households with incomes $< z$

H = q/n ; headcount ratio

Gp = Gini coefficient among the poor

n = total number of households

$$0 < Gp < 1$$

The Index of poverty is an increasing function of headcount and an increasing function of the income shortfall. Since the value of the Gini coefficient among the poor ranges from zero to one, the Sen Index is also an increasing function of the Gini coefficient such that $\Delta S / \Delta H > 0, \Delta S / \Delta I > 0$ and $\Delta S / \Delta G_p > 0$

(ii) The Pa measure of poverty

The Pa class of poverty measures was introduced by Foster, Greer, and Thorbecke (FGT) in 1981. This is a class of parametric poverty measures that satisfy the Sen's index three axioms, which include; factors that are sensitive to changes in inequality, changes in the income shortfall, and changes in the number of the poor (Blackwood and Lynch, 1994).

$$Pa = (1/n) [\sum (g_i/Z)^a] \dots \dots \dots (7)$$

Where:

$a > 0$; a is a measure of sensitivity of the index

n = total number of households

g_i = poverty gap of the i^{th} household

q = number of households below the poverty line

z = poverty line

If " a " is given a value of zero, then Pa is equal to the headcount ratio. The implication is that the number of the poor is the only relevant aspect of poverty:

$$P0 = 1/n \sum (g_i/Z)^0 \dots \dots \dots (8)$$

$$P0 = q/n = H \dots \dots \dots (9)$$

When " a " = 1, Pa is equal to the headcount times the average income shortfall. This suggests that while the number of poor and the extent of their immiseration are relevant to

measuring poverty, the distribution of income among the poor is not. That is why “a” has to be greater than 1.

$$P_1 = \frac{1}{n} \sum (g_i/z / Z) L \dots \dots \dots (10)$$

$$P_1 = HI$$

Where:

P_1 = Poverty Gap Index

G_i = Poverty gap and all other variables are as previously defined

As “a” is assigned values greater than one (the index puts more weight on the position of the poorest), income distribution becomes more important in measuring P_a . The P_a is the weighted sum of individual income shortfalls where the income gaps themselves are the weights. The income gap ratios of poorer households therefore weigh more importantly in the calculation of P_a than the income gap ratios of less poor households. The P_a measure of poverty explicitly incorporates the idea that there should be some consistency between the values that underlie a poverty measure and the values of the policy maker. By selecting the specific value of “a”, the policy maker can influence both the nature of the bias and the degree of bias in the measure. The value of “a” that gives the optimum measure of the P_a ratio has been found to be 2, which is also called the Foster, Greek, and Thorbecke (FGT) squared (Blackwood and Lynch, 1994).

2.5.4.4 Relative poverty measurement using monetary indicators

Another measure of poverty often considered is that of “relative” poverty. According to Blackwood and Lynch (1994), relative poverty measures define the segment of the population that is poor in relation to the income of the general population. Thus, poverty is not determined by a discrete poverty line but rather it is determined relative to the overall income of the population. Two approaches are used in measuring relative poverty. First,

the average income of the poorest X%; say 10%, 20% or 40%; is found. People whose incomes are less than the average are considered to be poor. Once established, the same percentage is used consistently in cross – sectional and in time series studies so that data are comparable.

Second, the mean income of a population is determined. The percentage (say 40%, 50%, or 75%) of the people whose income is less than the percentage of the mean income are considered to be poor. According to Blackwood and Lynch (1994), one problem with relative poverty measures is that they do not reflect the well-being of those who are poor. Hence, relative measures are not appropriate measures of poverty for policy makers who are concerned with alleviating the degree of immiseration and /or reducing the number of people who suffer. Changes in relative poverty do not provide useful information on changes in the degree of inequality. However, one of the advantages of using relative poverty measurement approaches is that they are politically and socially appealing since they consider poverty in the whole society and provide data worth using in promoting community based development. A relative approach to poverty determination is therefore widely used in developed countries where most of the people are above the poverty line and the main issue is equity.

2.4 The State and Distribution of Poverty

2.4.1 World state and distribution of poverty

According to World Development Report (2008), poverty is concentrated in rural areas. With an international poverty line of \$ 1.08 a day. About 75% of the developing world's poor live in rural areas whereas only 58% of its population is rural areas. Poverty levels in rural areas declined between 1990 and 2005, but they have remained extremely high (World Bank, 2010). Based on World Bank (2010) figures which are used for official

global poverty statistics, the number of people in developing countries living below the international poverty line of \$ 1.25 per day fell from 1.82 billion to 1.37 billion between 1990 and 2005. For subsequent three years to 2008, the Bank has offered a preliminary estimate that global poverty fell by a further 200 million to 1.2 billion. However, rural poverty levels remained stubbornly high in India (in 2005) (World, Bank 2010). One third of the global poverty was located in India and just a quarter in Sub-Saharan Africa. Nonetheless the number of poor people in Sub-Saharan Africa increased by 21 million between 1990 and 2005, but the percentage of poverty fell from 58% to 51% in that period (World Bank, 2010).

2.4.2 The state and distribution of poverty in Tanzania

Poverty is not uniformly distributed geographically or within the population. Distinctions can be noted between rural and urban poverty situations as well as across gender and agro-ecological zones. There is sufficient evidence to indicate that poverty is more prevalent in rural areas relative to urban areas. About 83% of individuals below the basic needs poverty line reside in rural areas (NBS, 2009). According to the 2007 Household Budget Survey (NBS, 2009), the proportion of the population below the basic needs poverty line is 33.6%, and that below the food poverty line is 16.6%. This represents a small decline of only 2 percentage points in both measures since 2000/01, which is not large enough to be statistically significant at 5 percent level. However, the proportion of the population below the food poverty line were 21.6% (1991/92), and 18.7% (2000/01) while the proportion of the population below the basic needs poverty line are 38.6% (1991/92) and 35.7% (2000/2001). The decline between 1991/92 and 2007 is large and significant at the 1 percent level. Poverty remains overwhelmingly rural, with some 38% of individuals below the basic needs poverty line being resident in rural areas.

2.4.3 Poverty situation in Mbeya Region

URT (2010) reports that good agricultural potential has given Mbeya Region good economic growth such that it has the third largest regional GDP in 2010, being exceeded by Dar es Salaam and Mwanza. The region performs well particularly in income poverty cluster with the second lowest basic needs and food poverty head count ratio in the country. High primary school enrolment ratios and good access to safe water (66%) for the rural areas also contribute to the overall performance of the region (URT 2002). However, the performance on a few indicators gives reasons for concern, which are; high dropout rate for primary schools (27.3%), high incidence of diarrhoea cases and high prevalence of HIV infections among blood donors (17%). Likewise, it is estimated that the percentage of households having only 32% of houses with burnt bricks walls (NBS, 2002). There are many causes and indicators of poverty in Kyela District including high maternal mortality rate (1.6%), high malaria incidence (49.7%), high childhood malnutrition rates manifested by stunting and wasting, high school dropouts rates (13%) and high orphaned children (19%) (KDC, 2004).

2.5 Rice Marketing Performance and Poverty Reduction

There are different theories for analyzing commodity marketing systems. In order to understand the effects of rice marketing performance on poverty reduction, industrial organization and marketing channel theories were reviewed. The theory of industrial organization was developed to explain the conduct of firms in markets for manufactured products, but can also be applied to markets for services as well as agricultural products (DucHai, 2003). Carlton and Perloff (2005), distinguish two approaches to the study of industrial organization.

Under the structure-conduct-performance analysis, an industry's performance (the success of an industry in producing benefits for consumers) depends on the conduct (policies) of the firms which in turn depends on the market structure (factors that determine the competitiveness). The second approach (price theory) uses economic incentives to explain market phenomena. Specific application of price theory such as transaction cost analysis and game theory are helpful in explaining the structure, conduct and performance of the markets.

In this study, the marketing channel theory was used together with the Structure Conduct Performance approach. A marketing channel is defined as a set of interdependent organizations involved in the process of making a product or service available for consumption or use (Stern *et al.*, 1996). The channel follows a vertical structure where products flow from farmer to the ultimate consumer. The actors meet and interact at markets. Actors that stand between farmers and final users are known as intermediaries (Voor den Dag, 2003; Eskola, 2005).

The analysis of marketing channels provides a systematic knowledge of the flow of goods and services from their original farmer to their final destination at the consumers (Mendoza, 1995). This knowledge is acquired by studying participants in the transaction process, those who perform physical marketing functions in order to obtain economic benefits (Mendoza, 1995). In carrying out these functions, marketing agents achieve both personal and social goals. They earn a personal financial reward by performing an activity desired by society. Also, they add value to production and in so doing they satisfy consumers' needs (Kotler, 1997).

The marketing channel starts with the farmer ending with the consumer and their consumption habits. The channel involves a two-way flow on the market signals. The nature and means of farm production influence the organization and operation of the marketing channel. At the same time, the dynamics of the marketing process itself has a direct influence on agricultural production (Fig. 2).

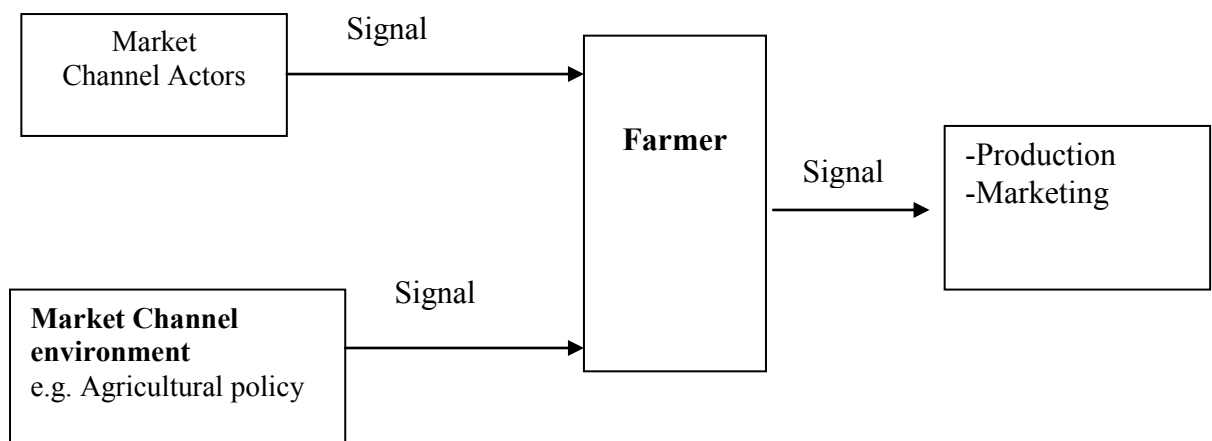


Figure 2: Different flows within a marketing channel.

Source: Castano (2001, cited by Voor den Dag, 2003)

However, many researchers have criticized the SCP approach as being too deterministic to help understand the functioning of imperfect markets, which characterise most agricultural markets. An alternative model, that is dynamic, assumes that there is a simultaneous relationship between market structures, and conduct, which influence performance. In turn, market performance will influence market structure and market conduct in the long run (DucHai, 2003).

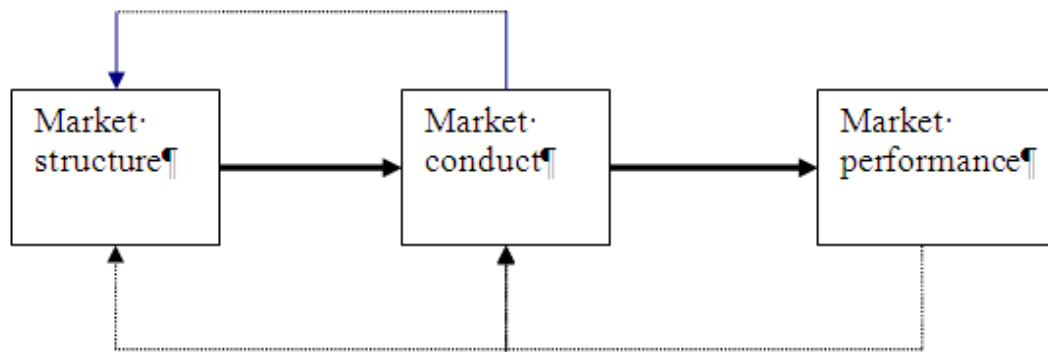


Figure 3: A dynamic Market Structure-Conduct-Performance Model adapted from DucHai (2003).

The relationship in Fig. 3 is indicated as a causal flow from market structure to its conduct and performance as indicated by bold arrows. There are also feedback effects (broken lines). For example, the strategies pursued by sellers in coordinating their mutual price interactions may either raise or lower barriers to entry affecting market structure.

That is to say, performance in a particular market depends upon the conduct of sellers and buyers with regard to pricing policies, product line, and investment in production facilities. Market conduct depends in turn upon the structure of the market, embracing such features as the number and size of distribution of the sellers and buyers, the type of marketing channels, the degree of product differentiation, and the presence or absence of barriers to entry.

In summary, the preceding discussion has reviewed the causal relationship between market structure to its conduct and performance. This information is used as necessary background for analysing the rice marketing performance in the area. The rest of this section is organized to explore linkages between rice market performance and poverty (income and food security).

2.6 Rice Marketing and Poverty Reduction

Marketing is a strong instrument where per capita income could be raised leading to higher standard of living. An efficient food marketing system is attained when using efficient marketing channels, which ensures the highest price of the produce; ultimately this is a crucial component in raising income and enhancing food security at the household level and ultimately improves living condition (Saediman *et al.*, 2004).

Agricultural marketing is a very important factor for economic development, and lack of a well –functioning agricultural marketing system hinders increased social welfare and food security of developing countries (Ahma, 1994). Efficient agricultural marketing is needed in rural areas, especially in developing countries in order to combat poverty and improve food security. According to Kriesel *et al.* (1970, cited by Gabagambi, 1998), shortcomings in agricultural marketing can seriously delay development progress and may substantially nullify investment in other sectors of the economy.

2.7 Conceptual Framework

2.7.1 Illustration of the conceptual framework

Based on the literature review, a conceptual framework was constructed for this study as presented in Fig. 4. A detailed explanation of the conceptual Framework is given below. The conceptual framework of this research shows how an improved efficient market system in the rice industry can lead to improved income and poverty reduction. A number of private traders operate in the rice business (village collectors, retailers, brokers, wholesalers and miller), sending some signals to farmers. A farmer will use all the signals to make decisions regarding rice production and marketing (Castano2001, cited by Voor den Dag, 2003). These decisions will result in the choice of actors (market agents) within the channel to engage with. The choice of a farmer to a specific actor will either depend on

price offered by the market agent or terms of payment (cash or on credit basis). The most significant characteristics of a sound marketing system lie in the distribution channel. The marketing channels used by the farmers do not always perform at the same level of efficiency in terms of their returns. Increases in the marketing channels and the number of actors signify market competitiveness (DucHai, 2003). In this study, the dependent variable was measured using the poverty lines defined according to NBS (2009): The national basic needs poverty line of TZS 13 998 per adult equivalent for 28 days in 2007 prices adjusted for headline inflation, and the national monetary food poverty line of TZS 10 219 per adult equivalent for 28 days adjusted for headline inflations while the national caloric poverty line is 2200 kCal per adult equivalent per day. This conceptual framework assumes that increased efficiency in marketing rice would lead to higher incomes for farmers and hence a decrease in poverty. Market efficiency was analysed using market structure, conduct and performance, each having corresponding indicators.

Under market structure, the following indicators were considered: intermediaries involved and the roles they played, buyer concentration, and barriers to market entry or exit. Others were the structure of market channel and market transparency. The market conduct was analysed by tracing the trading strategies pursued by rice market participants on pricing (buying and selling), transport, storage, processing and access to market information. It was assumed that poverty is caused by a number of factors including the volume of sale, education levels of participants in rice marketing, barriers to market entry and access to market information (about prices, grades and units of measurement). All these indicators and their interactive effects are summarized in Fig. 4. The operational definitions of the most important variables used in this research are presented in Table 2, while the levels of measurement of each variable are given in Appendix 1.

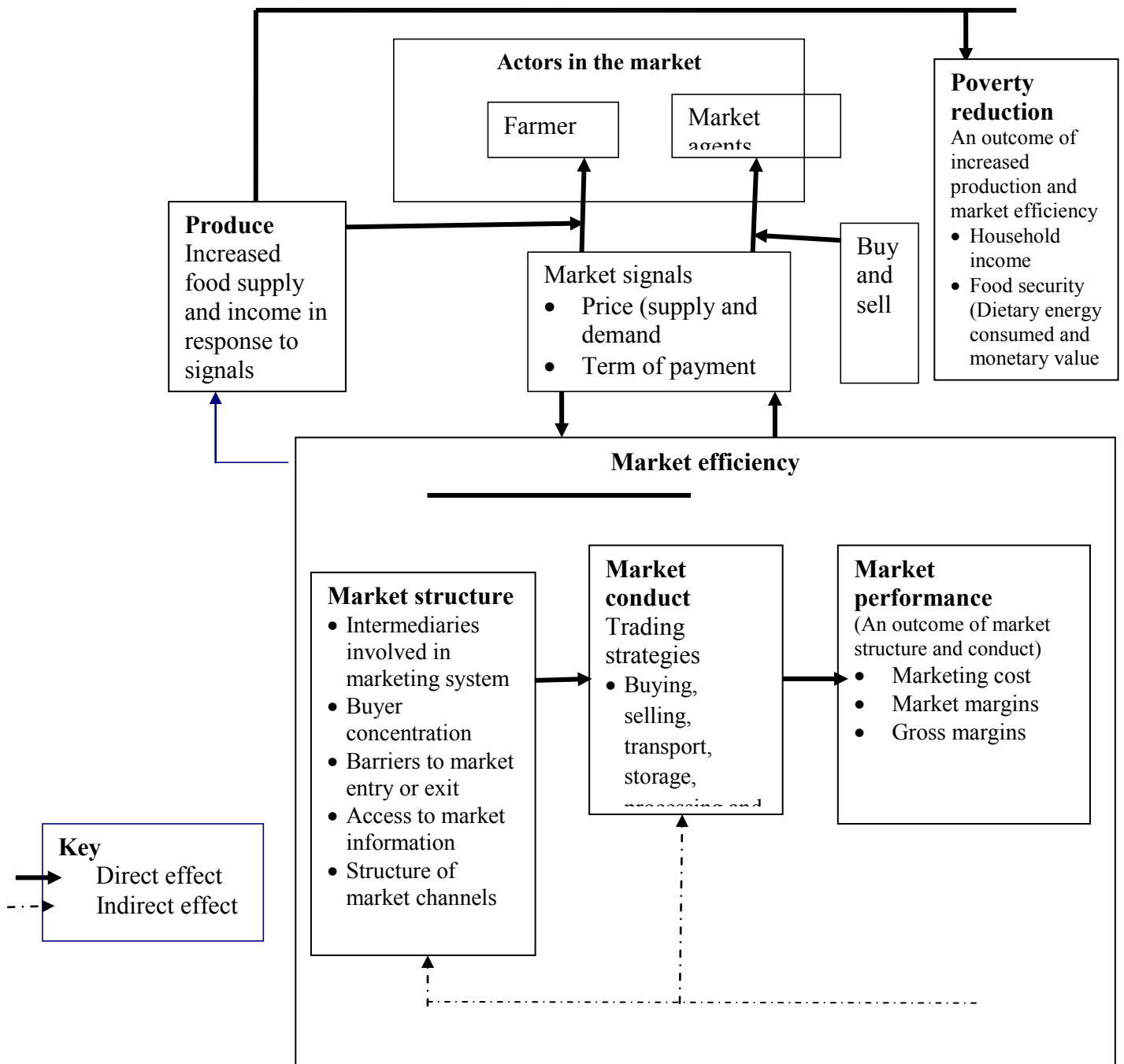


Figure 4: The study's conceptual framework showing relationship between market efficiency and poverty reduction (adapted from DucHai, 2003)

Table 2: Operational definitions of variables of the research

Variable	Operational definition
Farmer	Person who grows rice
Trader	Person dealing with buying and selling rice
Miller-trader	Person who deals with rice husking buying and selling rice
Buyer concentration	Number and size distribution of buyers in the market
Barriers to market entry	Restrictions imposed on entry into the rice marketing system
Marketing margins	Differences between prices at different market levels
Gross margins	Total revenue minus total variable costs
Market efficiency	A level of performance that uses the lowest amount of inputs to create the greatest amount of output.(return per shilling invested)
Poverty	Low income and low dietary energy consumed
Poverty reduction	Increase in income and dietary energy consumed
Income	Net monetary value of products produced and services offered
Change in income	Annual change of household earnings in monetary terms
Income expenditure	Income used to meet household needs
Market transparency	Information transmission in the marketing system, e.g. information about prices, grades and standard

2.8 Research Gap

Previous studies on rice in Kyela District focused on a number of issues, including, adoption constraints of improved varieties (Mussei and Mbogollo, 2001); on-farm development and promotion of integrated disease management option for the rice yellow mottle virus diseases (Mwalyego *et al.*, 2001); on-farm evaluation of tillage and organic mulch practices on yield of rice under rain fed conditions (Hallinga, 2003), and baseline study on rice marketing (Mghogho *et al.*, 2005). Rice marketing performance is an important element for poverty reduction, since the majority of households in the district depend on rice as the main source of food and cash income. However, little, if any, has

been done to assess the performance of rice marketing in relation to poverty reduction, particularly in Kyela District. There was an information gap regarding the linkage between rice marketing performances in relation to poverty reduction. This study attempted to fill this gap by computing the net income and dietary energy consumed (DEC) among households selling rice (farmers, traders and miller-traders) for comparison with minimum requirement to meet poverty line needs. In addition, ordinal logistic regression was performed to find the likelihood of traders, miller-traders and farmers to be grouped into the highest income quintile.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Description of the Research Area

3.1.1 Geographical location

The research was conducted in Kyela District, which is among the leading districts for rice production and marketing in Mbeya region and probably the whole country. Kyela District is one among eight districts of Mbeya Region. The district is located in the southern end of Mbeya Region, on the floor of the Great East African rift valley, at the Northern tip of Lake Nyasa (Fig. 5). Kyela District borders with Makete District to the East, Ileje to the West, Rungwe to the North and the Republic of Malawi to the South. The district lies between longitudes 35° 41" and 30° 00" East and latitudes 9° 25" and 9° 40" South.

3.1.2 Area, administrative units and population

The district covers 1322 km² (2% of Mbeya Region) of which 450 sq. km is occupied by water. The district is administratively divided into two divisions (Ntebela and Unyakyusa), 20 wards and 97 villages. According to the 2012 Tanzania National Population and Housing Census, the population of Kyela District was 221 490 (106 012 males and 115 478 females). The mean average household size of Kyela District is 4.1, and the dominant ethnic group is Nyakyusa who are settled in the lowlands. Immigrant ethnic groups are mainly settled in the Uplands; they include Kinga and Ndali.

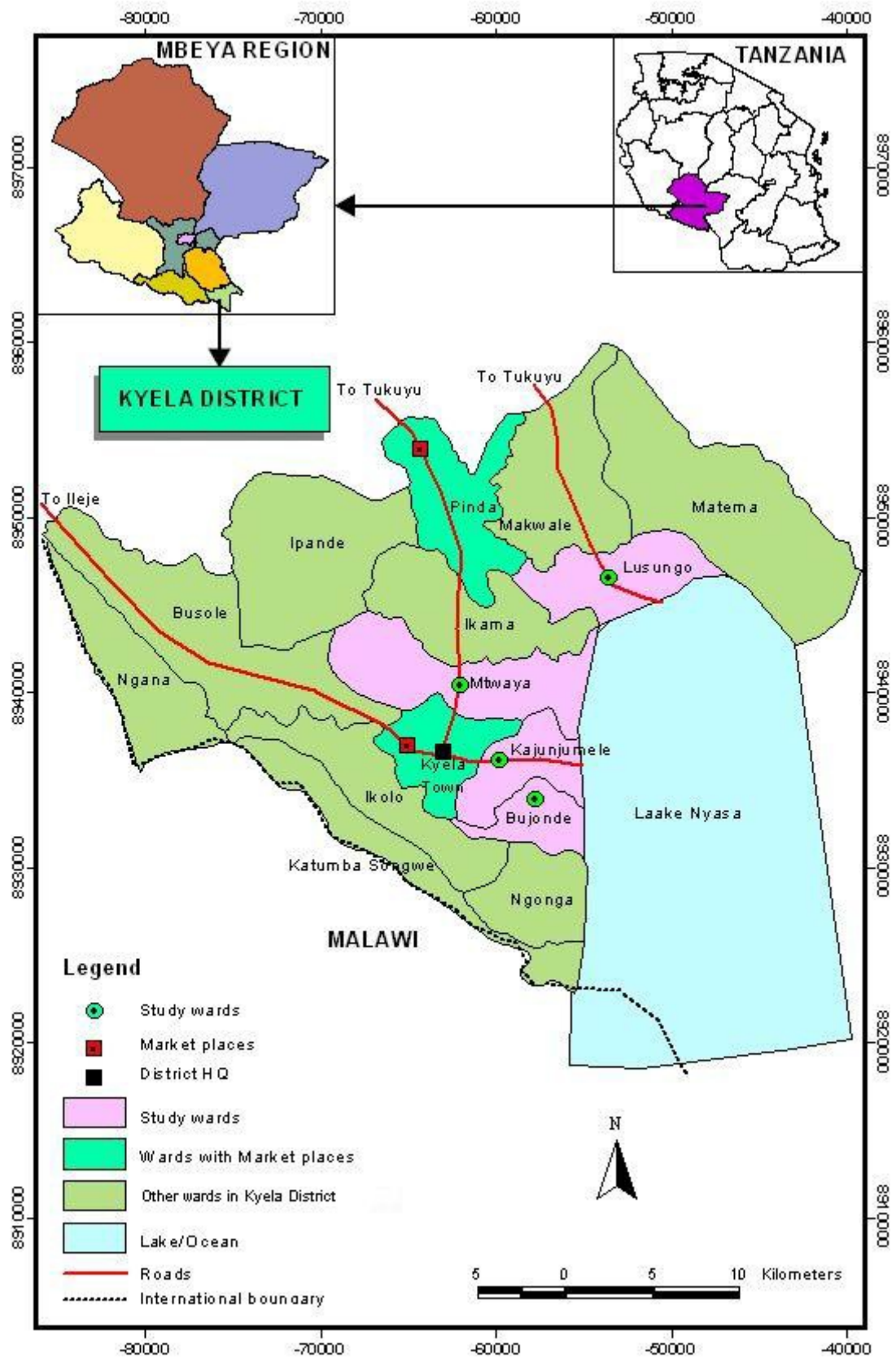


Figure 5: Location of study area.

3.1.3 Agricultural sector

Agriculture is the major source of food contributing three-quarters thus, surpassing the other sources which complement food by only a quarter. The principal crop in Kyela District is rice that is grown under a rain fed production system (Ngailo *et al.*, 2013; Mghogho *et al.*, 2005). Cocoa comes second as a cash crop followed by palm oil, cashew nuts, and citrus fruits. Other crops are maize, banana, beans, cassava and bambara nuts (URT, 2008). Livestock are also raised, dominated by indigenous cattle, poultry and pigs. Table 3 shows estimated production (in tones) of major food and cash crops in the district for the agricultural seasons 2003/04 to 2010/11. Hence in this study it is important to analyze the market for rice since the performance of rice marketing impacts on the income of rice farmers, rice traders and rice miller-traders.

Table 3: Estimated production of major food crops (Tones) in Kyela, 2003/04-2010/11

Type	Crop	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Food	Paddy	34 688	36 250	43 345	22 050	40 150	42 500	54 552	54 900
	Banana	75 330	81 000	72 900	73 953	79 380	81 000	65 817	66 452
	Maize	7307	6180	5881	5 687	7 350	7 200	6 750	9 780
Cash	Cocoa	4830	4896	4830	4 335	5 080	5 150	5 062	5 400
	Palm oil	621	750	1280	1 910	1 920	1 975	2 000	2 250
	Cashewnuts	333	280	458	496	495	496	505	620

Source: DALDO's Office Kyela, 2011

3.2 Research Design and Sampling

This study used cross-sectional design whereby data were collected at a single point in time. The design provides a snapshot of ideas, opinions and information (Bryman, 2004). This design is most preferred because of its broad scope and can incorporate many variables of interest to the study. The design is useful for descriptive as well as for determination of relationships among variables at the time of the study (Walliman, 2006). The target population (N) included all rice growers, miller-traders and traders in the district. Since both Ntebela and Unyakyusa divisions grow rice both were included in the

study. The selection of six wards, two market places and four villages was done in consultation with relevant officials of the Kyela district agricultural officials. Multistage sampling was used to select wards and villages from among those listed to accommodate rice growers, miller-traders, and traders. At some stages purposive sampling was used to select wards and villages based on the availability of growers, miller-traders, and traders of rice.

By simple random sampling, Mwaya and Lusungu wards were selected from Ntebela Division while Kajunjumele and Bujonde wards were picked from Unyakyusa Division. The third stage involved random selection of one village from each of the four wards making a total of the four villages, which were Lukwego, Kasala, Isanga and Kapwili. Marketing places were identified by purposive sampling, two were selected. These were Ipinda from Ntebela Division, Ipinda ward while Kalumbulu (Kyela town market) was selected from Unyakyusa Division and Kyela *Mjini* (town) ward.

Different categories of respondents were selected from each sampling frame. The study involved three types of respondents - growers/farmers, traders and miller-traders. For each village a list of households which grew rice during 2008/09 season constituted a sampling frame. Forty households were randomly selected from each village making a total of 160 respondents. According to Bailey (1994), regardless of the population size, a sample or sub-sample of 30 cases is the bare minimum for meaningful statistical inference.

Simple random sampling using generated random numbers was used to select thirty rice miller-traders from the list of miller-traders, which was obtained from the district market authorities. Simple random sampling was also used to select 22 traders from each of the selected marketing places. The overall sample, therefore, consisted of 234 as seen in

Tables 4 and 5. The sample size of 234 was selected and is much higher than the recommended minimum sample size to minimize sampling errors.

Table 4: Sample size of farmers by division in the study area

Division	Ward	Village	Number of farmers
Ntebela	Mwaya	Kasala	40
	Lusungu	Lukwego	40
Unyakyusa	Kajunjumele	Kapwili	40
	Bujonde	Isanga	40
Total	4	4	160

Table 5: Traders and miller-traders sampled on basis of selling point

Selling point	Division	Ward	Traders	Miller-traders	Total
Kalumbulu	Unyakyusa	Kyela 'Mjini'	22	15	37
Ipinda	Ntebela	Ipinda	22	15	37
Total			44	30	74

3.3 Data Collection

3.3.1 Secondary data sources

Secondary information from published and unpublished sources was obtained from different institutions at the district, regional and national levels. These included; The Ministry of Agriculture, Food and Cooperatives, Mbeya Regional Agricultural Office and District Agricultural and Livestock Development Office in Kyela and Uyole Agricultural Research Institute. This information was useful in establishing the background of the study. Such secondary information also assisted in filling gaps related to understanding the role of rice marketing for poverty reduction.

3.3.2 Primary data

Primary data were collected by interviewing rice growers, traders, and miller-traders. With the household as the unit of investigation, information was obtained mainly from the household heads. When a household head was absent at the time of the interview, other senior members of the household were interviewed. Structured questionnaire consisting opened and closed ended questions were used as tools to collect data from farmers, traders and miller-traders (Appendices 13, 14 and 15).

Besides the questionnaires, direct observations, and informal discussions were guided by a checklists of items for discussion with key informants, including market officials, village leaders, extension agents and the DALDO. Direct observation was used to evaluate the conditions of processing premises as well as the type and condition of processing technology used as a way to counter-check information provided by respondents. The issues pursued during such discussion related to; rice markets and marketing, particularly rice marketing channels, costs of production, barriers to entry, access to marketing information and marketing problems. This was done to countercheck information provided by interviewed respondents

3.4 Preliminary Survey

Prior to operationalizing the main fieldwork, a preliminary survey was conducted in one village, one processing unit and one market place that was not in the selected sample. This was done during January, 2010, in order to: (i) solicit background information about the study area, (ii) familiarize with the areas where the main survey was to be conducted, (iii) establish the sampling frames and units, (iv) find out the most efficient way of carrying out the main survey and (v) pre-test the research instruments. The researcher was able to identify problems associated with the tools. The questionnaires were amended accordingly.

Some questions had to be rephrased, others deleted, and new ones were added. The next step was to select and train enumerators who were familiar with the study area. Six enumerators were selected from Uyo Agricultural Research Institute.

3.5 Operationalization of the Fieldwork

Fieldwork was conducted from March and July 2010. Appointments were made at least one day before the interview date, explaining the purpose of the study to relevant authorities. The objectives of the study were explained to each respondent prior to interviews in order to create a common understanding between the interviewer and the interviewee. Individual household heads, traders or miller-traders were interviewed in their homes, business premise, or selected places after an initial appointment and their responses were recorded immediately. To overcome language barrier, the interviews were conducted in both Kiswahili and Kinyakusa. Responses were recorded in English or Kiswahili.

3.6 Data Analysis

Primary data were coded and entered into SPSS computer programme version 16.0 after cleaning and compiling them. Qualitative and quantitative data analysis methods were employed as described below.

3.6.1 Qualitative analysis

Qualitative data from key informants, documents and reports were analyzed using content analysis, which entails examining data items, themes or discourses (Wilkinson, 2004). In analyzing this information, emerging themes and sub-themes were developed in relation to the main variables they addressed. Content analysis was done basically by analyzing verbal texts and written information from secondary sources, comparing them with other related sources of knowledge.

Qualitative data from individuals (farmers, traders and miller-traders) were also analyzed to establish the relationship between the rice market structure, conduct and performance in Kyela District using the SCP model described earlier (section 2.4). This approach helps to consider in-depth how the market processes direct the activities of farmers from producing raw products to delivery of the final products to consumers. In general, there are three levels that should be taken into consideration while applying the SCP analysis: (a) the structure of the market, (b) the conduct of the market, and (c) the performance of the market (DucHai, 2003). Table 6 presents the principal aspects that were collected.

Table 6: Elements of Structure-Conduct-Performance

Elements of structure	Elements of conduct	Elements of performance
Intermediaries involved in marketing system	Conduct with respect to Buying	Rate of profit in relation to marketing costs and price
Barriers to entry and exit	Selling	
Buyer concentration	Transport	
Distribution of market information	Storage	
Structure of market channels	Negotiation	
Price formation process	Processing	
	Information	

Source: Adapted from DucHai (2003)

With respect to structure, the first consideration was to identify intermediaries and actors that are involved in the rice market. This information defines the general picture of the market channel system. Secondly, the analysis on the competitiveness of the market was done using three criteria: barriers to entry and exit, buyer concentration, and distribution of market information. The barriers to entry and exit reflect the competitive relationship between firms and potential entrants. If the barriers to entry and exit are minimal, new firms can easily enter into the rice markets and compete with established firms. They can also exit easily to pursue alternative investments. Having high barriers to entry and exit means that established firms become well protected from potential rivals.

Under market conduct; the elements described involve trading strategies (i.e. buying, selling, transport, storage, and market information) of different participants in the channel of distribution. Assessing buying and selling practices aimed at getting information on whether there was any formal or informal marketing or farmer groups that affected bargaining power. Also, the type of buying and selling practices followed; auction sale, contract sale, first-come first-served, and type of market channels used. Information was also sought on any observed unethical trading practices such as deceitful weights and misleading prices quotations. Frequency and terms of payments for market transactions and furthermore, pricing behaviour was explored to determine who sets the price, whether it is one buyer or many buyers, factors considered in price-setting basic supply and demand conditions or artificial price restraints, basis for price differentiation, how price adjust to prevailing market conditions and constraints in the use of specific market channels. All these criteria were used to detect indications of unfair price-setting practices and the conditions under which such practices were likely to prevail.

Regarding market performance, the focus was on the rate of profit in relation to marketing costs and price margins (net returns, marketing margins and farmer's share). The analysis as described above is presented in section 3.6.2.3.1 to 3.6.2.3.3

3.6.2 Quantitative analysis

3.6.2.1 Assessment of rice marketing channels and the role of different participants

Descriptive statistics were used to describe rice distribution channels defining the role performed by various intermediaries along the marketing chain. The participants involved in the rice marketing system interacted with each other and were responsible for buying, transporting, storage, processing, selling and distribution of rice. A flow chart was used to trace the market channels from farmers to the final consumer, determining the

relationships among different actors in the market. In addition, the percentage of rice harvested and sold by farmers to different market participants in the channel was computed.

3.6.2.2 Analysis of market structure

The market structure was analysed to examine the competitive process that existed for rice marketing in Kyela District. DucHai (2003) used four criteria in analysing competitiveness in the organization of the liberalized rice market in Vietnam: (i) entry barriers, (ii) distribution of market information, (iii) buyer and seller concentration, and (iv) assortment of the product. In this study only the first three criteria were used (entry barriers, distribution of market information (transparency) and buyer or seller concentration. The assortment of the product was excluded because it was assumed that actors in the study area sold a homogeneous product in terms of variety, colour and quality of rice, such that buyers were indifferent between rice offered by sellers from different places within the district. In this regard, the market was assumed to be competitive pertaining to product assortment hence product assortment was not expected to be a barrier to entry for rice farmers, miller-traders and traders.

(a) Barriers to entry

The perception of respondents regarding the type of barriers to market entry was analysed using an index scale. Average grading was calculated based on the number of responses regarding the level of importance of that variable as a barrier to entry. A barrier was weighted as being not important (= 0), less important (= 1), important (= 2) or very important (= 3). Barriers to entry and exit reflect competitive relationships among firms and potential entrants.

(b) Market transparency

The most important aspect of market transparency is information transmission in the marketing system. This includes information about prices, grades, and standard weights of the product in question. Market transparency was expressed by assessing the farmers' awareness of the market price and the manner in which price information is disseminated among actors. The distribution of market information shows how such information is disseminated to farmers and traders. Other relevant questions are: what/who are the sources of market information, and what is the adequacy of this information and in terms of reducing risks. Descriptive statistics were used to analyze all this information. The results are presented using frequency distribution tables in section 4.5.1.2 of this thesis.

(c) Buyer concentration

The degree of buyer concentration is an indicator of competitiveness which depends on the number of buyers operating in a particular market. Lorenz curves have been used for comparing income distribution. They are drawn with cumulative income of the poor as a percent of total income on the horizontal axis and cumulative percent of the population, showing the income on the vertical axis. In this study, the Lorenz curve shows the quantitative relationship between the cumulative percentages of rice traders and miller-traders against the cumulative percentage of the volume of rice sold in the markets. It varies from zero where every person within society has the same income indicating absence of inequality among market actors, to unity; where one person gets all the income and the rest receive nothing, indicating the presence of complete inequality. This means, as the Gini coefficient increases, the degree of market concentration is higher.

In order to compute the Gini coefficients, the volume of rice sold by each farmer and the volume sold by traders were ranked from the highest to the lowest, while their respective

market shares were computed by getting the percentage of the total sales or purchases handled by each trader group. Graphically, the Gini coefficient is the ratio of the area between the diagonal of the Lorenz curve compared to the area of the half-square in which the curve lies.

The Gini coefficient was computed using the following formula presented in equation 1.

$$Gr = 1 - \sum_{i=1}^{n-1} [(Pi + 1 - Pi)(Si + Si + 1)] \dots \dots \dots (1)$$

Where: P_i : Cumulative percentage of rice traders in the i^{th} class (X).

S_i : Cumulative percentage of the volume of rice sold in the i^{th} class (Y).

Gr: Concentration ratio of rice traders in the market.

This ratio ranges from zero to one such that

If $Gr = 0$, there exists perfect equality, and if $Gr = 1$ there is perfect inequality. Simply equation 3.1 can then be expressed as:

$$GC = 1 - \sum XY$$

Where GC = Gini Coefficient.

X = Cumulative percentage of sellers.

Y = Cumulative percentage of total sales.

3.6.2.3 Overall performance of rice marketing sub-system

Rice marketing performance was examined by analyzing marketing costs, price margins and profitability among different rice marketing participants in order to measure the degree of market efficiency. Returns per bag of rice sold and return per shilling invested were used as indicators for market efficiency. Based on primary and secondary data, the average price at different market participants was estimated. Then the average price margins for different types of market participants were computed. The percent share of each cost item

for each type of market participant was calculated. Pricing efficiency was assessed using correlation analysis to test the extent to which marketing margins were statistically associated with buying and selling prices of traders and miller-traders.

(i) Gross margin analysis (GMA)

Gross margin analysis (GMA) is defined as the difference between total revenue and total variable costs (Kohls *et al.*, 1990). Analysis of gross margin (GM) was useful to measure enterprise profitability. The size of gross margin depends on the services provided, market structure, perishability of the product as well as the distance between farmers and consumers. It may be influenced by market information, especially for short-run margins. In this study, market margin was calculated to establish the relative returns of the crop among the key market categories (farmers, traders and miller-traders). For each level the gross margin was expressed as:

$$GM = TR - TVC \dots\dots\dots (2)$$

Where: GM = Gross margin for paddy (TZS/kg)

TR = Total revenue from sale of produce (TZS/kg) obtained by multiplying quantity produced by unit price

TVC = total variable cost spent on production of produce (labour, chemicals and seeds) (TZS/kg) obtained by multiplying quantity of resources by their corresponding unit prices. For traders and miller-traders variable cost was cost of marketing services or cost of marketing. Another component analysed under this section is marketing margin as described under the following subsection.

(ii) Marketing margin analysis

According to Scarborough and Kydd (1992), gross marketing margin is the difference between prices at two market levels. It represents the price change for one or a collection

of marketing services such as buying, bulking, transporting, storage, processing and other marketing services. In this study marketing margin was employed to compare prices at different levels of the marketing chain. Mathematically, the marketing margin is presented as follows:

$$MM = P_i - P_{i-1} \dots \dots \dots (3)$$

Where: MM = Marketing margin between market level 1 and market level i - 1 in TZS/kg,

P_i = Price of rice at market level i in TZS/kg,

P_{i-1} = Price at market level i - 1 in TZS/kg)

(iii) Analysis of pricing efficiency

In this study, the degree of interface pricing efficiency was assessed using correlation analysis to test the extent to which marketing margins were statistically associated with buying and selling prices. This type of analysis examines the extent to which market participants passed on price changes to subsequent marketing channel levels. If marketing margins are independent of buying or selling prices, and thus are constants in absolute terms, price changes are being passed on to the next market level within the channel and vice versa. Independent margins are statistically indicated by a low correlation coefficient between margins and buying as well as selling prices. This corresponds to a situation in which selling and buying prices are highly correlated. The model employed for this analysis was:

$$MM = f(P_i - \mu) \dots \dots \dots (4)$$

Where: MM = Market margin

P_i = Buying price at a specified market place

μ = Error term

3.6.2.4 Comparing well-being levels among households growing and selling rice

One-way ANOVA was used to compare well-being levels among three groups of rice sellers (farmers, traders, and miller-traders). If significant differences were found, this implied that various channels of rice selling had substantial effects on the well-being or poverty level of households. The one way ANOVA was used to test the second hypothesis of the research, which was about whether mean income per adult equivalent for 28 days are similar for rice farmers, rice traders and rice miller-traders and also if dietary energy intake per adult equivalent per day of rice farmers is equal to that of rice traders and rice miller-traders.

3.6.2.5 Likelihood of being grouped into the highest income quintile among respondents selling rice

Ordinal logistic regression was used to test the third hypothesis whose null hypothesis states that all the three categories of respondents had the same likelihood of being in the highest income quintile. The empirical model for this analysis was specified according to Marija (2010) as given in equation (5)

$$P(y) = 1) = \frac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_h X_h \dots}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_h X_h}}, \dots\dots\dots(5)$$

Where:

$P(y)$ = the probability of the success alternative occurring

e = the natural log

α = the intercept of the equation

β_1 to β_h = coefficients of the predictor variables

x_1 to x_h = predictor variables entered in the regression model

In this study:

$P(y) = 1)$ = the probability of a household being grouped into the highest income quintile

x_1 = Household category

x_2 = Sex of household head

x_3 = Years of schooling of household head

x_4 = Age of household head

x_5 = Access to market information

x_6 = Amount of rice sold

x_7 = Selling price of rice

x_8 = Barriers to market entry or exit

The variables entered in the ordinal logistic regression model are defined below:

The dependent variable was income per adult equivalent for 28 days for five income quintiles: from the lowest, second, third, fourth and fifth (highest) quintiles. Eight independent variables were included in the ordinal logistic regression model to explain the probability of a household being grouped into the highest income quintile. The first variable was years of schooling of household head (EDU). This was recorded as a continuous variable, assumed to affect marketable amount of produce positively. Education builds the capacity of people to understand, manage and harness the environment through increased knowledge and adoption of science and technology in the process of production and marketing. Education is also a tool for achieving social change and modernization was expected to have a positive sign.

The second variable was age of household head (AGE): This was recorded as a continuous variable, assumed to affect marketable amount of produce positively. Wealth is highly dependent on the age of the household head. A direct relationship is expected, at least among adults aged 15 to 64 years. The third variable was the amount of rice sold (SOLD): It was a continuous variable which showed the amount of rice sold by the household. A

marginal increase in the amount of rice sold was expected to have a positive effect on the level of income received by the household.

The fourth variable was selling price (SEPRICE), it was measured as a continuous variable in Tanzanian shillings. It was expected to affect the marketing of rice positively. Lagged prices can stimulate production and thus marketable supply of rice for the next year. If prices in one year are bad, farmers will often respond by planting less in the following year (Myint, 2003). This will lead to low production and higher prices, so encouraging more planting in the following year. According to Boughton *et al.* (2007), prices have a strong positive and highly significant effect on the probability of a household selling produce.

The fifth variable was access to market information (INFO) this was a dummy variable taking a value of 1 if the farmer had access to market information and 0 otherwise. Household marketing decisions are based on market price, supply and demand information. Poorly integrated markets may convey inaccurate and inadequate information on price, demand and supply, leading to inefficient production and marketing decisions (Zeberga, 2010). This study assumed that access to market information affects positively the household's probability to be grouped in a higher income group (quintile). It is therefore expected that households that have access to market information are likely to sell more rice. A study in Ethiopia has demonstrated that obtaining information through extension services increases chances of a household selling rice and has a considerable effect on increasing the profitability of selling horticultural crops (Makhura, 2001 cited by Takele, 2010).

The sixth variable was barriers to entry or exit in the rice market: Barrier was used as a dummy variable taking a value of 1 if no barrier to entry and 0 if barriers existed. The seventh variable was sex of household head (SEX), this was a dummy variable; no sign

could be expected prior to the analysis for this variable. It could take a positive or negative signs. Another variable was household category, whether the household was a farmer, trader or miller-trader. The variable was divided into 3 variables: (i) farmer = variable taking a value of 1 when household is a farmer and 0 otherwise. (ii) trader = variable taking value of 1 when household is a trader and 0 otherwise and (iii) miller-trader = variable taking value of 1 when household is a miller-trader and 0 otherwise.

3.7 Data Management

3.7.1 Determination of adult equivalent units

Variables like income and dietary energy consumed, if expressed per capita, do not reflect good comparable figures for households with different sizes comprising of different age groups as well as composition by age and sex. Dietary energy consumed was therefore expressed per adult equivalent following a procedure used by Collier *et al.* (1990) in their study in Tanzania in 1986. In order to calculate adult equivalent units, the sex and age of every household member must be known. Then a two-step procedure is followed. In the first step, the adult equivalent scales for East Africa by age and sex are added up for all household members to get adult equivalent units for the households. An example of such computation considering a household with seven members (Table 7) is given below. The numbers in the last column in Table 7 are the ones marked with asterisks in Table 8.

Table 7: Computation of adjusted adult equivalent unit

Household members	Sex	Age	Unadjusted adult equivalent units
1	Male	47	1.00
2	Female	35	0.88
3	Male	16	1.20
4	Female	9	0.76
5	Male	7	0.64
6	Male	5	0.56
7	Male	3	0.48
Total adult equivalent	-		5.52
Adjusted adult equivalent	5.52 *0.778		4.29

However, the figure 5.52 representing adult is not used directly as a denominator for computing values per adult equivalent because of economies of scale. The second step involves adjusting the computed adult equivalents for economies of scale due to the fact that large households need fewer resources per person on average due to sharing some facilities. In the example (Table 7), economies of scale are taken into account by multiplying the adult equivalent units obtained above (5.52) by the average cost corresponding to six people (i.e. 0.778). The adjusted adult equivalent units are 4.29456, i.e. 5.52×0.778 . This (4.29456) would be the denominator for calculating values per adult equivalent in that household. Such a procedure is followed for every household in a sample. If the seven-person household income expenditure on food was Tshs 153 850 per month, their income per adult equivalent per month would be 35 824, unlike expenditure on food per capita which would be Tshs $153\,850/7$ (Tshs 21 979 per month).

Table 8: Adult equivalent scales for East Africa

Age group	Sex	
	Male	Female
0 – 2	0.40	0.40
3 – 4	0.48*	0.48
5 – 6	0.56*	0.56
7 – 8	0.64*	0.64
9 – 10	0.76	0.76*
11 – 12	0.80	0.88
13 – 14	1.00	1.00
15 – 18	1.20*	1.00
19 – 59	1.00*	0.88*
Above 60+	0.88	0.72

Source: Latham (1965), cited by Collier *et al.* (1990)

*The figures are the values corresponding to the seven hypothetical household members.

Table 9: Household economies of scale constants

Household size (Number of adults)	Marginal cost	Average cost
1	1.000	1.000
2	0.892	0.946
3	0.798	0.897
4	0.713	0.851
5	0.632	0.807
6	0.632	0.778
7	0.632	0.757
8	0.632	0.741
9	0.632	0.729
Above 10+	0.632	0.719

Source: Deaton (1980), cited by Collier *et al.* (1990)

3.7.2 Determination of dietary energy consumed

Sources and the monetary values of various foodstuffs consumed by all members of the households were determined using a household questionnaire. The respondents were asked to recall both the quantity and monetary values of food (purchased and from own production or gifts) eaten for 30 days. Food that had not been purchased was valued at local market prices. Since all food that was consumed was valued, a single monetary measure of food consumed was calculated and compared to the adjusted monetary food poverty line.

The dietary energy consumed was calculated using Tanzania Food Composition Tables (Lukmanji *et al.*, 2008). The amounts of food consumed by different households were compared with the food items selected from the Tanzania Food Composition Tables. In the absence of a food item in the tables, a suitable alternative was selected by considering the type of food, general characteristics of the food, and likely nutrition profile. The nutrient intake for the selected food items was calculated by multiplying the nutrient figure that is shown in the tables by the weight of the food consumed (nutrients are expressed per 100g or 100 ml in case of beverages). The resultant data from these calculations were added up

to obtain kCal consumed per household, which were subsequently divided by the household size and household adult equivalent units to obtain kcal consumed per capita and per adult equivalent, respectively. Then, the values were compared with the Tanzanian caloric poverty line of 2200 kCal per adult equivalent per day (NBS, 2009) to determine the incidence of food insecurity in the sample.

3.7.3 Procedures for generating income quintile

Starting from the lowest to the highest income, household income per adult equivalent for 28 days was grouped into five income groups 20%, 40%, 60%, 80% and 100%, i.e. income among 20% of the sampled households as the first quintile (1), income among 21 to 40% of the sampled households as the second income quintile (2), income among 41% to 60% of the sampled households as the third income quintile (3), income among 61% to 80% of the sampled households as the fourth income quintile (4) and fifth quintile (5) representing income among 81 to 100% of the sampled households.

3.7.4 Limitations of the Study

In business, information is highly guarded as such collecting data from traders was very difficult. In most cases traders were reluctant and cautious to disclose appropriate information. They were suspicious about an outsider questioning them about their business such as the amounts of rice sold, sold, buying prices and types of measurement used, because such information is linked to tax and fees levied by the government. Besides, the traders were busy and time conscious during interviews. Some traders also needed more days to fill in the questionnaire. The investigation was easier when the research was introduced by someone the traders trusted (a market official). To address these deficiencies, direct observation and discussion with key informants (market officials) was done to countercheck information provided by the traders. Another shortcoming relates to

the fact that the majority of households in the study area do not keep records. Most of the respondents had to depend on memory recall. Probing was therefore employed to get more accurate information.

Data collection was conducted between March and July, 2010, when households were preparing for the national general elections which were held in October 2010. Hence, the researcher faced some difficulty because some respondents associated the data collection process with the elections, and therefore they anticipated some gifts from the researcher. They also expected the research to solve some of their problems such as inputs, especially subsidized fertilizers, seeds and pesticides. The objectives of the study were explained to each respondent prior to interviewing them, in order to create a common understanding between the interviewer and the interviewee.

To address all these limitations, utmost care was made to ensure that shortfalls were minimized. The data collected and used in this study are valid and adequate to address the objectives of the study.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-Economic Characteristics of Sampled Households

4.1.1 Socio-economic characteristics of rice farmers

Socio-economic characteristics of the rice farmers interviewed in the study area are presented in Tables 10, 11 and 12.

4.1.1.1 Age of sampled household farmers

Table 10 shows the distribution of age among rice farmers, the majority (56.9%) being aged from 36 to 60 years, while 3.1% of the household farmers were below 25 years. The mean age of rice farmers was 41.5 years though there was no significant different ($p > 0.05$) in age among the study villages. The majority of rice farmers were in the active and productive age group, they could afford to carry out various productive and marketing activities, since the activities are labour intensive. Young farmers are expected to be more aggressive in searching for useful information on recommended innovations. Maselle (2009) noted that accumulation of wealth is highly dependent on the age of the household head, whereby a direct relationship is experienced.

Table 10: Ages of household heads of sampled households

Age	Villages percentages				Overall (n = 160)
	Lukwego (n = 40)	Kasala (n = 40)	Isanga (n = 40)	Kapwili (n = 40)	
Age group					
<25	5.0	-	5.0	2.5	3.1
25 – 35	45.0	25.0	32.5	25.0	31.9
36 – 60	42.5	65.0	57.5	62.5	56.9
>60	7.5	10.0	5.0	10.0	8.1
Mean age	39.8	42.5	39.4	44.1	41.5
χ^2 -value for age group = 8.542, F value for mean age = 1.408 and $p = 0.243$					

4.1.1.2 Household size

The results in Table 11 show that the mean household size was 6 with a minimum of two and a maximum of 10 people per household. In terms of adult equivalent units which represent the composition of household adjusted for age and sex so that all household members are equivalent to adults for food requirements, the average household size was 3.6 adult equivalent units. However, among the four visited villages, Lukwego had a smaller average household size at 5 people per household compared to 6 for the other three villages. In terms of adult equivalent units, Isanga had the highest (3.8). However, there was no significant difference ($p > 0.05$) in household sizes in terms of adjusted adult equivalent units (AAEU) among the four villages, as seen in Table 11. According to URT (2002) having a large household size is a typical characteristic of households in rural areas. However, Mwamkinga (2006) pointed out that having a big household size, especially in rural areas, exacerbates poverty, although Kamuzora and Mkanta (2000) observed the opposite, that the higher the size of the household, the less poor it is. In this study it was assumed that households with more sizes require more income for food security. This may also induce such households to engage in rice production and marketing.

Table 11: Household size of sampled rice farmers (n = 160)

Characteristics	Measure	Villages				Overall
		Lukwego (n = 40)	Kasala (n = 40)	Isanga (n = 40)	Kapwili (n = 40)	
Household size	Mean					
	Minimum	4.9	5.7	5.8	5.8	5.5
	Maximum	2.0	3.0	3.0	2.0	2.0
	Std Error of the mean	9.0	10.0	10.0	10.0	10.0
		0.29	0.29	0.314	0.325	0.154
Household size	Mean	3.31	3.66	3.80	3.69	3.62
Per adjusted adult equivalent units (AAEU)	Minimum	1.44	2.05	0.88	2.12	0.88
	Maximum	6.42	5.92	6.96	6.50	6.96
	Std Error of the mean	0.199	0.152	0.204	0.176	0.922

F value of mean household size = 2.191 and $p = 0.091$

F value of mean household size per adjusted adults equivalent units = 1.334 and $p = 0.263$

4.1.1.3 Education levels, marital status and occupations of sampled household heads

The results presented in Table 12 indicate that the majority (87.5%) of the rice farmers had primary school education. About one-tenth (10.6%) of farmers had secondary school education, and the remaining 1.9% had no formal education. This observation was also consistent with a study by Ngailo *et al.* (2013). The implication of this is that the majority of rice farmers in the study area have basic education enough for them to seek or receive better agricultural production and marketing technologies available from different sources such as extension agent, publications and mass media. According to Ngailo *et al.* (2013), formal education enhances the farmers' ability to perceive, interpret, and respond to new events in the context of risk. Also, formal education can be capitalized on for rational decision-making regarding rice production and marketing. According to Ferris *et.al* (2006), farmers today need to learn not only how to produce but also how to identify profitable market opportunities, adapt and improve their produce to meet the increasing demands of consumers in the market chain. However, there was no significant association ($p > 0.05$) between education levels and the study villages.

Table 12: Education level, marital status and main occupation of rice farmers (n = 160)

Characteristics	Response	Villages percentages				Overall
		Lukwego (n = 40)	Kasala (n = 40)	Isanga (n = 40)	Kapwili (n = 40)	
Education level	None	-	-	2.5	5.0	1.9
	Primary	95.0	80.0	95.0	80.0	87.5
	Secondary	5.0	20.0	2.5	15.0	10.6
Marital status	Married	87.5	85.0	97.5	97.5	91.9
	Single	2.5	-	2.5	-	1.3
	Widow	7.5	10.0	-	2.5	5.0
	Divorced	2.5	5.0	-	-	1.9
Occupation	Farming	72.5	65.0	67.5	75.0	70.0
	Employment	-	7.5	2.5	5.0	3.8
	Off-farm activities	27.5	27.5	30.0	20.0	26.3

χ^2 value for level of education of rice farmers = 12.401 and $p = 0.054$

χ^2 value of marital status of rice farmers = 11.231 and $p = 0.260$

χ^2 value for rice farmers occupation of = 4.548 and $p = 0.603$

Table 12 also shows the marital status of respondent farmers. The vast majority (91.9%) of the respondents were married. Isanga and Kapwili villages had more (97.5%) married household heads than the other villages. There was significant ($p < 0.05$) association between marital status of the respondents and study villages. The married respondents were likely to have more household members, hence more labour force, which would be employed for rice production and marketing. Since most of smallholder agricultural production systems in most developing countries and Tanzania in particular depend mainly on household labour, therefore, bigger household size provides opportunity for labour supply (URT, 2005). Katunzi (1999, cited by Maselle, 2009) argues that single parents, particularly those living in female headed households, are at a greater risk of being poor due to labour constraints during critical farm operations such as timely planting and weeding.

More than two-thirds (70%) of the households depended on farming activities as their main occupation. Other sources of income were listed as off-farm activities (26.2%) and formal employment (3.8%). Off-farm income generating activities which contributed to the farmers' income included petty trade, livestock keeping, fishing, and casual labour. According to Nzunuri (2011), off-farm income is an important strategy for meeting subsistence needs as well as absorbing shocks due to agricultural failure.

4.1.2 Socio-economic characteristics of rice traders and rice miller-traders

Tables 13, 14 and 15 show socio-economic characteristics of rice traders and miller-traders in Kyela town (Kalumbulu) and Ipinda markets. The mean ages of rice traders and miller-traders were 32.7 and 29.5 years, respectively. The miller-traders seemed to be relatively younger than the traders, but the difference between the two groups was statistically insignificant ($p > 0.05$). In comparison with the average age of the rice farmers, which was

41.5 years, the traders and miller-traders were significantly younger. The results also showed that the sampled traders (52.3%) and miller-traders (43.3%) were aged between 25 and 35 years. These results imply that rice trade was labour intensive and mostly performed by potential active labour. This result is in agreement with that of a study by Tekele (2010) and DucHai (2003). However, there was no significant difference in ages of traders and miller-traders in the two market places ($p > 0.05$).

Table 13: Age of sampled household rice traders and rice miller-traders

	Traders percentages			Miller-traders percentages		
	Kalumbulu (n = 22)	Ipinda (n = 22)	Total (n = 44)	Kalumbulu (n = 15)	Ipinda (n = 15)	Total (n = 30)
Age range						
<25	3 (13.6)	4 (18.2)	7 (15.9)	5 (33.3)	5 (33.3)	10 (33.3)
25 – 35	10 (45.5)	13 (59.1)	23 (52.3)	7 (46.7)	6 (40.0)	13 (43.3)
36 – 60	9 (40.9)	5 (22.7)	14 (31.8)	3 (20.0)	4 (26.7)	7 (23.3)
Mean age	34.1	31.2	32.7	28.5	30.5	29.5

Numbers in brackets are in percentages

F value of mean age of traders and miller-traders = 2.484 and $p = 0.119$

Table 14 shows household sizes of sampled rice traders and miller-traders. The average household sizes for traders and miller-traders were 5 and 4 individuals, respectively, implying relatively larger household size for traders than miller-traders and both were smaller than that of farmers, which was estimated at 6. The household size for traders was similar to the national average (4.8 person) based on the household population census of 2012 (NBS, 2013). The household sizes in terms of adult equivalent units were 3.3 and 2.7 for the rice traders and miller-traders, respectively which were not significantly different from each other ($p > 0.05$).

Table 14: Household size of sampled rice traders and rice miller-traders

Household characteristic	Measures	Traders percentages			Miller-traders percentages		
		Kalumbulu (n = 22)	Ipinda (n = 22)	Total (n = 44)	Kalumbulu (n = 15)	Ipinda (n = 15)	Total (n = 30)
Household size	Mean	4.6	5.1	4.8	4.1	3.8	4.0
	Minimum	2.0	2.0	2.0	1.0	1.0	1.0
	Maximum	8.0	9.0	9.0	7.0	6.0	7.0
	Std Error of the mean	0.347	0.368	0.254	0.412	0.327	0.260
Household size per AAEU	Mean	3.1	3.5	3.3	2.8	2.6	2.7
	Minimum	1.2	1.4	1.2	1.0	1.0	1.0
	Maximum	5.2	6.4	6.4	4.6	3.9	4.6
	Std Error of the mean	0.245	0.262	0.179	0.234	0.177	0.146

t value of mean household size of rice traders and miller = 5.428 and $p = 0.0023$

t value of mean household size per adjusted adults equivalent units = 6.073 and $p = 0.016$

Table 15 depicts sex, education level, marital status and main occupations of rice traders and miller-traders. The majority (88.6%) of the interviewed rice traders were women compared to the proportion (11.4%) of men. There was a higher proportion (18.2%) of males in rice trading activities at Kalumbulu market, unlike at Ipinda market where men represented only 4%. All the miller-traders who were interviewed were male, implying that women were probably not able to enter into capital intensive enterprises that also required more technical and managerial skills, thus they concentrated more on other business activities that were also flexible to accommodate their family roles. Most (83.3%) of the household heads interviewed were married; only 16.7 % were single. More of the traders (90.9%) were married than the miller-traders (83.3%), but there was no significant difference ($p > 0.05$) between married traders and married miller-traders. Since rice trading is a time consuming activity, traders find it suitable to have wives to take care of the household chores while they were away for rice trading activities.

Table 15: Sex, education level, marital status, main occupation of rice traders and miller-traders

Characteristic	Measures	Traders percentages			Miller-traders percentages		
		Kalumbulu (n = 22)	Ipinda (n = 22)	Total (n = 44)	Kalumbulu (n = 15)	Ipinda (n = 15)	Total (n = 30)
Sex	Male	4 (18.2)	1 (4.5)	5 (11.4)	15 (100)	15 (100)	30 (100)
	Female	18 (81.8)	21 (95.5)	39 (88.6)	-	-	-
Marital status	Married	20 (90.9)	20 (90.9)	40 (90.9)	12 (80.0)	13 (86.7)	25 (83.3)
	Single	2 (9.1)	2 (9.1)	4 (9.1)	3 (20.0)	2 (13.3)	5 (16.7)
Education level	Primary	19 (86.4)	22 (100)	41 (93.2)	14 (93.3)	15 (100)	29 (96.7)
	Secondary	3 (13.6)	-	3 (6.8)	1 (6.7)	-	1 (3.3)
Years of experience	Mean years	8.0	5.8	6.9	5.7	6.2	6.0
	Minimum	2.0	1.0	1.0	1.0	1.0	1.0
	Maximum	15.0	11.0	15.0	15.0	16.0	16.0
	Std deviation	4.163	2.671	3.636	4.065	4.799	4.379

χ^2 value of sex of rice traders and miller-traders = 56.221 and $p = 0.000$

χ^2 value of marital status of rice traders and miller-traders = 0.958 and $p = 0.266$

χ^2 value of education level of rice traders and miller-traders = 0.424 and $p = 0.463$

t value of average years of experience of rice traders and miller-traders = 1.001 and $p = 0.320$

Numbers in brackets are in percentages

In the case of education level, most of the rice traders (93.2%) and miller-traders (96.7%) had formal (primary) education. Only a small proportion of traders (6.8%) and miller-traders (3.3%) had secondary education. Although slightly more miller-traders had attained primary education but the association between education level and being a rice trader or miller-traders was not significant ($p > 0.05$). Such low proportion of secondary school leavers among traders and miller-traders might be the reason for failing to exploit existing marketing potentials. Lawal and Idega (2004, cited by Ali *et al.*, 2008) observed that the level of education attained by marketers to a large extent determines the strategies, which they may use to solve their marketing problems. Education also enables them to easily adopt new innovations as soon as they become available as strategies to increase their profit.

The results in Table 15 showed further that, on average, the sampled traders and miller-traders had 6.9 and 6.0 years of experience, in their respective businesses. For miller-traders, experience in rice trading ranged between 1 and 16 years with a mean of 6 years. Traders had about one more year of experience, but the difference was not significant ($p > 0.05$). It should be expected that experience accumulates knowledge and skills regarding the marketing system, market condition, market supply and demand trends as well as prices. This in turn should improve enterprise management, leading to higher profit.

4.2 Rice Production, Sales and Income

4.2.1 Average production, rice allocation for different use and income

Table 16 indicates the average land for rice production, yield per ha, amount of production per household, amount sold, amount consumed, amount reserved as seeds, quantity allocated as gifts, amount used per labourers payment and the price of rice per kilogramme at Lukwego, Kasala, Isanga and Kapwili villages. On average, about 0.9 ha was used for rice production. However, the farmers from Isanga village had significantly ($p < 0.01$) larger areas of rice farms (1.2 ha) than the other villages, especially Lukwego village, which had the lowest mean farm size at 0.7 ha. These findings suggest that most households had on average small land holdings under rice production, which had an implication on the marketed surplus as well as marketing costs. According to Mushongi (2010), large farm sizes provide greater rooms for farmers to shift from subsistence to commercial farming. The average rice yield per Ha was 2 236.6 kg, being relatively higher in Lukwego village (2 549.1 kg/ha) and lower in Kasala village (1 999.2 kg/ha).

Table 16: Mean rice production and allocation for different use in 2008/2009 (n = 160)

Variable	Villages				Overall	P - value
	Lukwego (n =40)	Kasala (n =40)	Isanga (n =40)	Kapwili (n =40)		
Land for rice (ha)	0.7	0.8	1.2	0.7	0.9	0.004
Yield/ha (kg)	2 549.1	1 992.2	2 346.3	2 059.1	2 236.6	0.070
Production (kg)/farmer	1 618.9	1 740.8	2 707.1	1 777.1	1 961.1	0.005
Quantity sold kg/farmer	819.6	807.8	1 646.2	831.1	1 024.9	0.000
Quantity consumed kg	569.6	641.6	798.0	677.1	671.7	0.317
Reserved for seeds kg	186.2	196.2	208.2	202.1	198.2	0.920
Quantity for gift (kg)	154.4	171.2	277.5	224.1	203.9	0.152
Quantity labour payment	350.0	215.0	400.0	225.1	285.0	0.317
Price per kg	422.99	445.0	409.6	388.7	416.77	0.219
Total earning (Tshs)	359 333.3	331 025.0	756 743.6	353 064.1	449 283.4	0.000

The average rice production per household was about 1 961.1kg, being significantly ($p < 0.01$) higher than the mean in Isanga village (2 707.1 kg/season) and lowest at Lukwego village (1 618.9 kg/season). The mean amount of rice produced that was sold per household was about 1 024.9 kg per season again being highest at Isanga (1 646.2 kg/household/season). At Kasala village farmers sold the lowest amount of rice (807.8 kg). Out of the rice which was produced, about 671.7 kg were used for consumption on average being highest at Isanga (798 kg) and lowest at Lukwego (569.6 kg). A small amount of rice produced was reserved for seed (198.2 kg/household/season) while 203 kg was set aside as gifts to friends and other relatives, but a larger amount (285 kg) was allocated for paying labourers. None of these last four quantities (consumed, seed, gifts and labourers) were significantly different between villages. The average price per kilogram of rice produced was Tshs 416.8. The price of rice was relatively higher at Kasala (445 Tshs/kg) and lowest at Kapwili (388.7 Tshs/kg). The average annual earnings from selling rice produce was Tshs 449 283.4, being highest at Isanga (756 743.6) and lowest at Kasala

village (Tshs 331 025) and the mean values for each village were significantly different from each other.

4.2.2 Rice marketing characteristics at household level

Results in Table 17 show rice marketing characteristics at the household level. The majority (73.9%) of the farmers sold rice in order to get cash for household needs, relatively more in Kapwili than in the other study villages. However, some (25.5%) farmers were motivated to sell their rice by the prevailing good price offered by buyers, considerably more in Kasala than in the other study villages. A few (0.6%) farmers were driven by personal ties with the buyers. In addition to that, the data obtained during in-depth interviews market officials show that reasons of selling rice produce soon after harvesting were there because of following explanation, which was said by one of the respondents:

Normally farmers in rural areas need to sell part of their produce to meet households' cash needs to spend on things such as food, school fees, paying back loans, costs of health services, and other needs. Thus, most farmers are likely to sell large quantities of rice soon after harvesting when the price is often low, which lowers farmers' returns despite an implication of most farmers growing rice as a cash crop.

A considerable proportion of farmers sold rice to retailers (46.1%), almost consistently across the study villages. The most common points of sales were at the farm-gate (87.9%). This study is in line with a study by Ngailo *et al.* (2013) and Mghogho *et al.* (2005) who reported that in several parts of the country, including Kyela District, the majority of farmers sold rice at farm-gate. Sales mostly occurred at the farm-gate because there were

no alternative markets (61.1%), considerably more at Kapwili (71.8%) and Kasala (70%) villages than in the other villages.

As regards the type of rice sold, the majority of farmers (96.8%) sold unhusked rice. The results also show that more than three-fifths (63.1%) of the sampled farmers said the price was set by buyers, almost consistently across all the study villages. This implies that farmers had little influence on setting prices for their product. Poor market transparency can be attributed to the fact that farmers lack information on the price for the previous day in their area or local market and those market places.

Table 17: Proportion of farmers indicating rice marketing characteristics at household level (n = 157)

Marketing characteristics	Response	Proportion of Farmer				Overall
		Lukwego (n =39)	Kasala (n =40)	Isanga (n =39)	Kapwili (n =39)	
Determinant of rice quantity to sell	Household cash needs	71.8	67.5	76.9	79.5	73.9
	Good price offered	25.6	32.5	23.1	20.5	25.5
	Personal ties with buyers	2.6	-	-	-	0.6
Type of buyer used by farmer	Retailer	42.2	45.2	42	49	46.1
	Broker	28.1	24.1	24.1	23.2	25.1
	Wholesalers	12.8	14.6	12.3	14.6	14.9
	Village collectors/assemblers	15.4	10.3	13.4	10.1	9.2
	Miller-traders	-	3.3	4.0	3.1	2.6
	Consumer	1.5	2.5	4.2	-	2.1
Kind of rice mostly sold	Unhusked rice	100.0	97.5	94.9	94.9	96.8
	Husked and unhusked rice	-	2.5	5.1	5.1	3.2
Market outlets (point of sale)	At farm gate	89.7	85.0	79.5	97.4	87.9
	In village markets	10.3	-	10.3	-	5.1
	Town market	-	7.5	7.7	2.6	4.5
	at farm gate & town market	-	7.5	2.6	-	2.5
Reason for preference of this outlet	No alternative market	56.4	70.0	46.2	71.8	61.1
	Easy to compromise with buyers	15.4	10.0	23.1	20.5	17.2
	High price offered	17.9	17.5	7.7	5.1	12.1
	To reduce transport cost	10.3	2.5	23.1	2.6	9.6
Who set the price	Buyer	64.1	67.5	56.4	64.1	63.1
	Negotiation (farmer and buyer)	28.2	27.5	38.5	35.9	32.5
	Farmer	7.7	5.0	-	-	3.2
	Take market price	-	-	5.1	-	1.3

Rice market prices were mainly affected by seasonality, as shown in Table 18. Traders buy rice from farmers depending on the availability and season. At harvest (May to June) rice is abundantly available. During that period, traders buy unhusked rice (paddy) from farmers at relatively low prices (344.48 to 633.56 Tshs/kg). After they have collected large volumes they store it to be sold during lean months (October to April) at higher prices (677.84 to 978.98 Tshs/kg). The seasonal price patterns are important in marketing especially in deciding when to sell and store, as well as for government policy implementation to assist farmers.

Table 18: Seasonal market prices of rice 2008/2009

Price	Season	Price (TZS)/bag	Mean (TZS)/bag	Price (TZS)/kg
Buying per 150 kg bag (un husked)	At harvest (May – June)	35 000 – 90 000	51 671.88	344.48
	After harvest (August – September)	38 000 – 100 000	77 065.63	513.77
	Post harvest (October – February)	38 000 – 110 000	90 093.75	600.63
	Pre harvest (March – April)	70 000 – 120 000	95 034.38	633.56
Selling per 100 kg bag (husked)	May – September	50 000 – 92 500	67 784.09	677.84
	Learn months (October – April)	85 000 – 110 000	97 897.73	978.98

4.3 Agricultural Support Services

4.3.1 Credit facilities

A competitive financial market is a fundamental aspect in undertaking every economic activity in order to get the maximum benefit out of the activity undertaken. Formal financial markets in most developing countries are not competitive and even missing in rural areas (Zeberga, 2010). Lack of capital was a main hindrance among the majority of farmers towards strategic rice production and marketing; the majority (52.2%) of farmers needed credit to carry out timely activities on their farms. The results presented in Table 19 show that only 14.4% of the sampled farmers had access to credit. These results are similar to what Kabungo (2008) found that 13.3% of Irish potato farmers in Mbeya rural district had access to credit. In the current study, respondents who secured credit obtained

such credit from informal groups and relatives (52.2%). Other sources included PRIDE (21.7%), SACCOS (13%), VICOBA (8.7%) and Bay Pot Company (4.3%).

The results also show the main reasons which prevented farmers from securing credit. The reasons included restrictive procedures (40.1%), high interest rates (38%), credit not being available (13.1%), and lack of knowledge regarding procedures for obtaining credit (8.8%). According Felber (2003 cited by Mwangi, 2010), credit facilities are limited in Tanzania; the author further argues that even those few which exist rarely extend service to purely agricultural enterprises.

Table 19: Proportion of farmers' access, source of credit, terms of payment, uses of credit and reasons for not accessing credit

Access, source, term of payments, uses and reason	Response	Villages				Overall (n= 160)
		Lukweg o (n = 40)	Kasala (n = 40)	Isanga (n = 40)	Kapwili (n = 40)	
Access to credit	Yes	2(5.0)	5 (12.5)	7 (17.5)	9 (22.5)	23(14.4)
	No	38(95.5)	35 (87.5)	33 (82.5)	31 (77.5)	137(85.6)
Source of credit						
	Informal group, friends and relatives	50.0	20.0	57.1	66.7	52.2
	VICOBA	50.0	20.0	-	-	8.7
	PRIDE	-	60.0	14.3	11.1	21.7
	Bay Pot Company	-	-	-	11.1	4.3
	SACCOS	-	-	28.6	11.1	13.1
Terms of payment	Cash	100.0	80.0	85.7	100.0	91.3
	Inkind	-	20.0	14.3	-	8.7
Use of credit	Invest in business	50.0	40.0	42.9	-	26.1
	Invest in agriculture	50.0	40.0	28.6	77.8	52.2
	Pay children's school fees	-	20.0	-	-	4.3
	Use for home expenditure	-	-	28.6	22.2	17.4
Reasons for not assessing credit	No knowledge on credit	7.9	-	18.2	9.7	8.8
	Credit not available	31.6	14.2	3.0	-	13.1
	Procedures are restrictive	47.4	42.9	36.4	32.3	40.1
	High interest rates	13.2	42.9	26.4	58.0	38.0

χ^2 value of rice farmers on access to credit = 5.433 and p = 0.143

χ^2 value of rice farmers on source of credit = 15.676 and p = 0.207

χ^2 value of rice farmers on terms of payments = 2.128 and p = 0.546

χ^2 value of rice farmers on uses of credit = 11.375 and p = 0.251

χ^2 value of rice farmers on reasons for not assessing credit = 33.992 and p = 0.000

Numbers in brackets are in percentages

It was found that those who had obtained credit had received it in cash. Loans could be repaid in cash or in kind, but the majority of borrowers (91.3%) were required to pay in cash and only 8.7% of credit paid back in kind. The results also revealed that those who had accessed credit used the money for: investing in agriculture (52.2%), investing in trade (26.1%), paying school fees (4.3%), and for domestic expenditure (17.4%). These results are in line with those by Goodland and Gordon (1999), who found that access to financial services, and in particular to funds for crop production, is a limiting factor. Emong'or *et al.* (2009) noted that credit is important in reducing poverty and increasing farm output and livelihood of rice farmers in Kenya.

4.3.2 Access to extension services

Extension services are charged with the responsibility of disseminating information on new technologies. Low frequency of contact between extension officers and farmers would therefore constraint the use of new technologies. Contact with extension officers improves farmers' access to information which increases the likelihood that the farmers will adopt new innovations (Bayene *et al.*, 1998). Farmers require advice on a wide range of issues such as appropriate crop types, agronomic practices, farm management and marketing in order to maximize their returns. Farmers' access to extension services is presented in Table 20.

Table 20: Access to extension services (n = 160)

Question	Response	Villages				Overall
		Lukwego (n = 40)	Kasala (n = 40)	Isanga (n = 40)	Kapwili (n = 40)	
Access to extension	Yes	18 (45.0)	18(45.0)	17(42.5)	12(30.0)	65(40.6)
	No	22 (55.0)	22(55.0)	23(57.5)	28(70.0)	95(59.4)
Extension service provider	Village extension officer	11 (61.1)	12 (66.7)	11 (64.7)	10 (83.3)	44 (67.7)
	Ward extension officer	7 (38.9)	6 (33.3)	6 (35.3)	2 (16.7)	21 (32.3)
Benefit	Good agronomic and increased yield	16 (88.2)	14 (77.8)	17 (100)	12 (100)	59 (90.6)
	Good agronomic and livestock keeping	1 (5.9)	3 (16.7)	-	-	4 (6.2)
	Livestock disease control/prevention	1 (5.9)	1 (5.5)	-	-	2 (3.2)

χ^2 value of rice farmers on access to extension = 2.565 and p = 0.464

χ^2 value of rice farmers on extension service provider = 1.777 and p = 0.620

χ^2 value of rice farmers on benefit of extension service = 7.221 and p = 0.301

Numbers in brackets are in percentages

Slightly more than two-fifths (40.6%) of the sampled farmers had access to extension services while the rest had no access (Table 20). Lukwego and Kasala villages had more farmers who were accessing credit (45.0%), followed by Isanga (42.5%) and Kapwili (30%). However, there was no significant ($p > 0.05$) association between access to credit and the study villages. Since independence in 1961 up to the mid-1980s the central government was the major provider of extension services (MAC, 2000), but from the late 1980s to date, extension services are increasingly being provided by Local Government Authorities (LGAs) working in collaboration with NGOs, Private Agri-business, Community Based Organizations, and Religious Organizations.

In this study, however, 100% of extension service was provided by Local Government Agricultural Officers, of whom 67.7% were village extension officers and 32.3% were ward extension officers. All of the respondents admitted that they had benefited from services provided by extension officers. They added that extension service had enabled them to get more yield through improved agronomic practices disseminated to them.

According to Makhura (2001, cited by Tekele, 2010), obtaining information through extension services increases chances of a household farmer selling rice and has a considerable effect of increasing profitability in Ethiopia.

4.3.3 Rice growers' associations or farmer groups

Farmer groups or associations are important for joint efforts in terms of looking for better markets and strength in bargaining and negotiating for better prices. The results in Table 21 show that only 13.1% of respondents said that there was a farmer association or group which provided services to rice farmers. Two-thirds of the farmers (66.7%) reported also that the groups were not collecting their produce to sell collectively because such association or group was mainly aimed at collaborating to improve rice production as indicated by 90.5% of the respondents. However, one-third (33.3%) of the farmers reported to bulk and sell their rice as a group. Lack of solidarity among farmers provides an opportunity for traders to form marketing mechanisms that enhance unreliable rice prices.

Table 21: Are you a member of any farmer organization?

Response	Villages				Overall
	Lukwego	Kasala	Isanga	Kapwili	
Member of any farmer group					
Yes	8 (38.1)	2 (9.5)	7 (33.3)	4 (19.0)	21 (13.1)
No	32 (23.0)	38 (27.3)	33 (23.7)	36 (25.9)	139 (86.9)
Activity performed					
Rice production	7 (36.8)	2 (10.5)	7 (36.8)	3 (15.8)	19 (90.5)
Provision of credit	1 (50.0)	-	-	1 (50.0)	2 (9.5)
Do you sell collectively?					
Yes	4 (57.1)	-	2 (28.6)	1 (14.3)	7 (33.3)
No	4 (28.6)	2 (14.3)	5 (35.7)	3 (4.8)	14 (66.7)

χ^2 value of rice farmers being a member of any group = 4.988 and $p = 0.173$

χ^2 value of group activity performed by the farmer = 2.141 and $p = 0.544$

χ^2 value if farmers selling collectively = 2.196 and $p = 0.533$

Figure in brackets represent percentages (%)

According to Magreta *et al.* (2010), establishment of strong farmer organizations in the smallholder farming systems can provide a mechanism for which farmers can collectively store their rice and sell it when the prices are higher. The farmers' organizations can provide a commodity warranty; with this, farmers can buy enough fertilizers and other inputs which can be used to increase productivity.

4.4 Rice Marketing Channels and Roles of Different Participants

The analysis of marketing channels is intended to provide systematic knowledge of the flow of rice from farmers to final destination consumers (Mendoza, 1995). Furthermore, the structure of marketing channels helps to determine the relationships between different actors in the market.

Results from this study indicate that a number of well established informal marketing channels exist in Kyela. Five channels existed in the rice markets as presented in Fig. 6. Also the role played by various actors along the marketing chain is presented under this section.

The study identified five channels (See Fig.6) for rice from farmers to consumers in Kyela District. The first channel supplied rice from farmers directly to consumers involving 2.1% of the farmer respondents. The second channel involved 2.6% of farmers who sold directly to miller-traders, who in turn sold to retailers and consumers. This channel was most common during December when farmers needed money for farm operations and preparation for Christmas. The third channel involved 25.1% of the farmers who sold rice through brokers at home who then sold to travelling traders (traders outside the district), wholesalers and retailers who finally sold to consumers.

The fourth channel moved rice from farmers (9.2%) who sold rice at home to village based traders or village collectors or assemblers who sold to wholesalers and retailers who finally sold to consumers. The fifth channel moved rice from farmers directly to travelling traders without involving brokers. The travelling traders then sold to wholesalers and retailers then lastly to consumers. The fifth channel was similar to the fourth channel, but in this case rice moved from farmers directly to travelling traders without involving brokers.

For rice to move from its point of production to the final destination (consumption), there are various participants who provide different services (e.g. transporting, loading, unloading) and others who undertake the activities of selling and buying (chain actors). Apart from the farmers, other participants in the rice marketing activities were village collectors/assemblers (village traders), retailers, wholesalers, miller-traders and travelling traders. According to Fig. 6, rice marketing channels in the study area is as follows:

1. Farmer → Consumer
2. Farmer → Miller → Consumer
3. Farmer → Village collectors/assemblers → Wholesaler → Retailer → Consumer
4. Farmer → Broker → (travelling traders) Wholesalers → Retailer → Consumer
5. Farmer → (travelling traders) Wholesalers → Retailers → Consumer

Results from the survey indicate that most farmers sold their rice through intermediaries, who transported and sold it in urban markets. Fig. 6 shows that a large volume of the traded rice (46.1%) passed through retailers. This is in line with a study by Mghogho *et al.* (2005) and Ngailo *et al.* (2013) who reported that large volume of rice in Kyela District is traded through retailers.

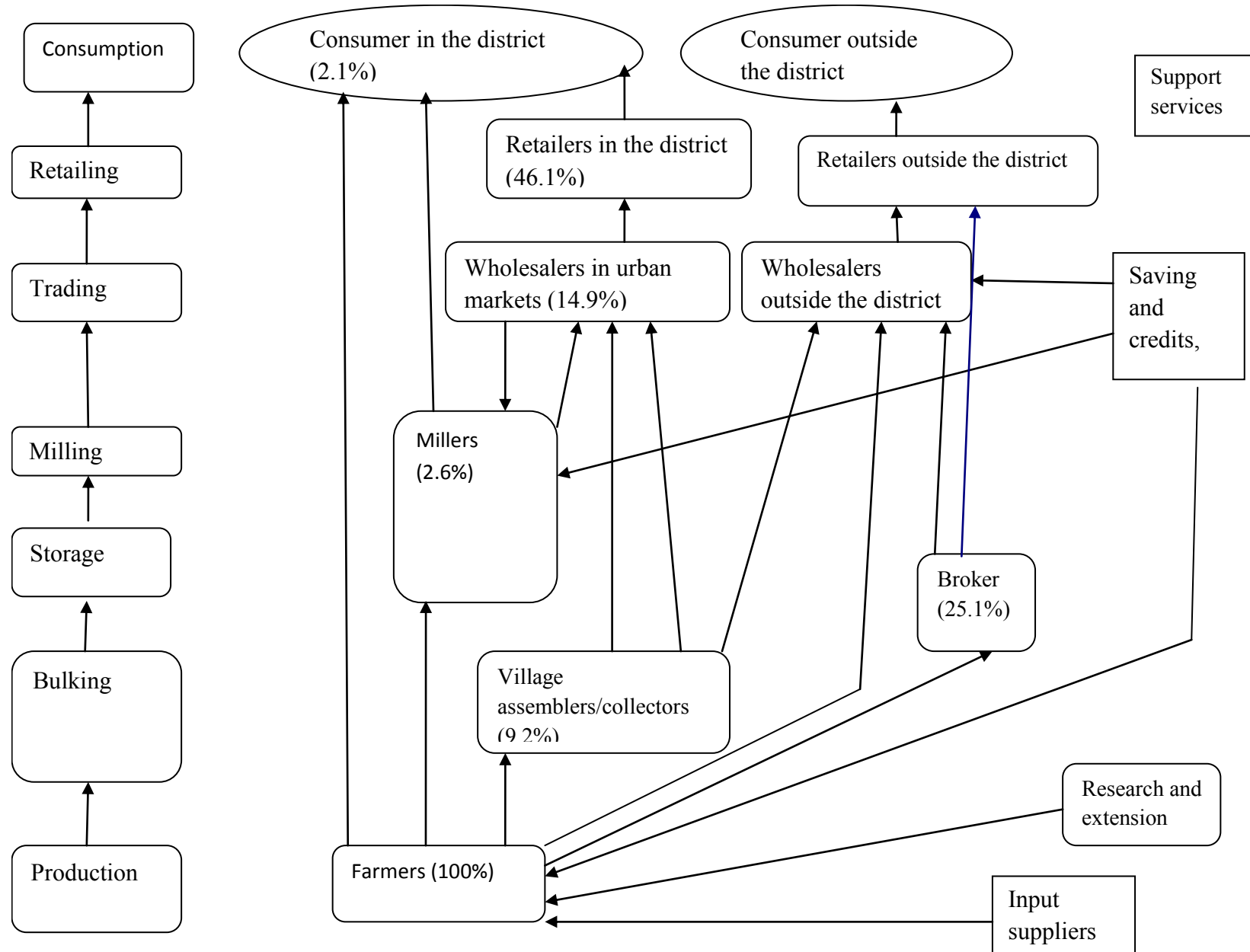


Figure 6: Common rice marketing channels in Kyela

4.5 Marketing Functions or Roles Performed by Rice market Participants in the Study Area

In this study the term rice market participants refers to all individuals or firms that are involved in the marketing process. Six participants were identified along the rice marketing chain in the study area. Among them were farmers, village collector or assemblers, wholesalers, retailers, miller-traders and travelling traders. All participants who were located away from the study area were beyond the scope of this research. The most important market participants and the role they played along the market chain are described here. The activities or roles of actors can be divided into seven main activities: cultivating and harvesting, drying, buying, selling, transporting, storage and milling.

(a) Farmers

The first level was that of rice farmers who grew the crop, harvested it and then sold it to other actors in the chain. The bulk of rice in Kyela comes from a large number of very small and scattered smallholder farmers each operating independently. The majority of farmers harvest rice when it is fully matured. Harvesting was normally done by hand using sickles, and the cut rice was laid in the field for sometime before staking at points where threshing took place. Thick sticks were used to thresh the rice by beating the panicles on canvas or mats which provided a clean environment free from contamination of stones, soil and insects. After threshing and cleaning (winnowing) unhushed rice is then packed in bags ready for transportation home.

Most farmers use bicycles for transporting rice as reported by 90.6% of interviewed farmers (Table 22). Other methods of transporting rice were reported as head load (3.1%) while others used bicycles as well as head load (6.3%). At home, sun drying of the grains is done for one to three days, depending on the amount of sunshine. The dried grain is

stored in polypropylene bags, each capable of holding 120 to 150 kg. About two-thirds (66.3%) of the sampled farmers reported that they were storing their rice for 1 to 12 months before selling it. The majority of farmers (72.4%) stored their rice for 3 to 6 months; others stored their rice for less than three months (13.3%). Others stored their rice for seven to nine months (12.4%), while 1.9% stored their rice for more than nine months (Table 22).

Table 22: Proportion of farmers on method used transporting rice, average storage months, quantity of stored and average price

Question	Response	Proportion of farmers				Overall
		Lukwego (n= 40)	Kasala (n = 40)	Isanga (n =40)	Kapwili (n = 40)	
How rice was transported (%)	As a head load	2.5	5.0	5.0	-	3.1
	By bicycles	85.0	85.0	92.5	100.0	90.6
	By bicycles and as a head load	12.5	10.0	2.5	-	6.3
Do you store rice? (%)	Yes	62.5	77.5	70.0	55.0	66.2
	No	37.5	22.5	30.0	45.0	33.8
Storage (months) (%)	< 3 months	4.0	9.7	18.5	22.7	13.3
	3 to 6 months	76.0	77.4	66.7	68.2	72.4
	7 to 9	16.0	9.7	14.8	9.1	12.4
	> 9 months	4.0	3.2	-	-	1.9
Quantity of stored bags(mean)	Minimum	1.0	0.7	2.0	0.5	0.5
	Maximum	33.0	16.0	40.0	24.0	40.0
	Mean	7.1	4.8	9.8	4.4	6.6
	Std deviation	6.86	3.51	11.15	4.69	7.44
Average price before storage/bag	Minimum	25 000.0	32 500.0	25 000.0	30 000.0	25 000.0
	Maximum	65 000.0	80 000.0	80 000.0	50 000.0	80 000.0
	Mean	47 400.0	49 435.5	49 160.7	46 818.2	48 339.6
	Std deviation	8 674.67	8 259.07	11 966.82	5 243.01	8 957.72
Average price after storage/bag	Minimum	50 000.0	40 000.0	30 000.0	50 000.0	30 000.0
	Maximum	100 000.0	100 000.0	120 000.0	100 000.0	120 000.0
	Mean	78 200.0	8 3225.8	78 125.0	75 909.1	79 174.5
	Std deviation	13 835.34	15 413.65	19 010.53	13 595.89	15 783.96

Some farmers were forced to sell their rice produce at low prices shortly after harvesting in order to fulfil urgent household cash needs. This included paying money that had been borrowed for production, but also to purchase consumer goods. Unfortunately, the same farmers had again to buy rice during off-season for domestic consumption, but at higher prices. Farmers reported to store a minimum of 0.5 bags and a maximum of 40 bags with a mean of 6.6 bags (Table 22). The price of rice before storage ranged from 25 000 Tshs/bag

to 80 000 Tshs/bag with a mean of 48 355.14 Tshs/bag and from 30 000 TZS/bag to 120 000 Tshs/bag with a mean of 79 174.52 Tshs/bag after storage. The prices, however, depended on rice variety and season. In most cases farmers sold unmilled rice as indicated by 96.8%.

(b) Village traders or assemblers

Village traders or assemblers are the first link between farmers and middlemen. The village traders or assemblers are in contact with other buyers such as wholesalers. The village assemblers include better-off local farmers who collect rice from remote villages where transportation conditions are difficult. Other assemblers live in town, but they move to villages during the harvesting season to buy and collect paddy. After identifying farmers who are willing to sell at an agreed price the village traders contact their buyers either by direct visit or mainly by mobile phones, who normally arrange for transport. The village traders or assembler collects several small lots moving from house to house until they assemble the required amount. Buyers include wholesalers from Kyela, Ipinda town and travelling traders from Tukuyu town, Mbeya and other districts, as well as from other regions like Iringa often place orders with trusted village assemblers.

Buyers are willing to pay for this service because they would otherwise have to spend a longer time and more money assembling sufficient quantities of rice to justify the cost of transport to the next stage in the marketing chain. The assemblers often receive cash advance to support their activities, and they normally maintain good relations with farmers, by supplying credit, and collecting rice at harvest, based on oral agreements, or by purchasing for cash payment at harvest. It should be noted that, the key function of an assembler is collecting rice supplies and sometimes providing transport for the supplies collected.

(c) The wholesalers

Wholesaling is concerned with activities of those persons who sell to retailers and other merchants, but they do not sell significant amounts to final consumers (Kotler, 1997). These types of participant normally collect and put the product into large, uniform units. Furthermore, wholesalers provide information to suppliers (farmers, rural assemblers) and other actors in the market. All these activities contribute to price formation. An inherent characteristic of rice production is that it is seasonal whilst demand is there throughout the year, hence the need for storage to allow a smooth and, as far as possible, uninterrupted flow of the produce into the market. This compels wholesalers to organise mass and specialized storage operations, transportation and, in general, the subsequent distribution operations to retailers.

(d) Retailers

There are many rice retailers, especially in urban areas. The main function of a retailer is to buy from wholesale and sell rice to consumers at convenient locations and times in various forms and quantities. In Kyela District, retailers for rice are found at market places of agricultural products and at rice milling centres. Retailers sort and grade rice depending on the quality (especially milling quality and variety type). A plastic bucket which has an average weight of 20 kg sells at 15 000 to 25 000 Tshs depending on variety and season of the year. During harvesting time the price of rice is low compared to the time of planting as shown in Table 19. The price was highest between December and April when farm gate price went up to 25,000/= per 20 kg plastic bucket, equivalent to 1250/= per kilogram.

Some retailers also travel to assemble rice from villages especially during harvesting time. Furthermore, the retailers may have a store or shop. The majority of retailers stored their produce at milling machines where it was easy to get customers.



Plate 1: Milled rice displayed in polypropylene bags on the ground at the milling place Ipinda

The standard plastic bucket is used by traders in Kyela. It is a popular unit of measurement which weighs about 20 kg of rice, though, in efforts to make profit, traders cleverly reduce the size by heating or trimming because of the plastic nature. This malpractice is usually unknown to customers.

(e) Miller-traders

The main objective of milling is to increase the value of rice (Mghogho *et al.*, 2005). For the miller-traders, good quality rice had long grains, a homogenous variety and yields a high percentage of the finished products or high milling recovery. In the rice business, miller-traders have a very important role in the marketing channel; they change the form from paddy rice to milled rice. Several factors affect rice quality right from the field during processing and in the course of marketing. Hence assurance for rice quality begins primarily from the field level and extends to processing and marketing levels. In the study area different types of machines are used for processing rice. One of these is the maize/rice

huller model. This is a diesel or electrical operated small scale machine which can also be found in Kyela remote areas. The machine just pounds, it cannot polish and grade the grain, nor does it separate stones, dust and hulls from rice. For someone to get clean rice he/she has to do winnowing manually. Hence, is not suitable for producing quality rice. The machine has relatively low milling efficiency ranging from 30% to 40%.

Other types of machine are Sataki models (SB -10, SB-50, and SB-100); they are electrical machines that dehull rice and have provisions for separating hulls from grains, and polishing the grains. The machines have relative average milling efficiencies, ranging from 40% to 50%. The miller-traders not only provided the milling services but also they acted as rice traders or wholesalers. In addition the miller-traders also played very important role of storing unprocessed rice (at the mill) for different traders (wholesalers and retailers). The miller-traders usually stored the rice for free up to eight months to ensure that the trader would mill the rice in their mill. The traders then paid for the milling service. However, the majority (73.3%) of miller-traders did not engage in buying and selling rice (Appendix 2), they just provided processing services to traders and farmers about 4 022.73 Tshs/bag of 150kg.



Plate 2: Type of milling machine commonly found in Kyela District (Sataki model)
Kalumbulu

The machines are privately owned, and it was found that 100% of rice miller-traders were men with an average age of 30 years. This indicates that rice miller-traders are of active and virile age, since milling is labour intensive. The majority had primary school education (96.7%) of whom 83.3% were married.



Plate 3: Bags of rice stored at one of the milling centres in Kyela.

Storage is an important activity for miller-traders; they stored in order to guarantee regular supplies to their processing plants for maximizing the utilization of their capital.

(f) Commission agent or broker

Commission agents or brokers, known as “*dalali*” in Kiswahili, operate at all levels of marketing channel. These agents work for a commission on behalf of other participants. In villages, brokers are the contact persons for travelling traders and wholesale buyers to find farmers, who are willing to sell. They act as a key link between farmers and traders; there are also brokers in urban areas who link travelling traders to wholesalers and urban retailers. Brokers bring buyers and sellers together and assist in price negotiations.

(g) Travelling traders

These are traders who either own trucks or hire them for transporting rice bought from farmers, village traders or assemblers and then sell it to wholesalers and urban retailers in other district/region markets such as Rungwe, Mbeya, Iringa, Morogoro, Dar es Salaam and others. These traders usually have substantial financial capital they use to purchase large quantities of unhusked rice during harvesting. However, during shortage (normally during the months of October to April) some rice of inferior quality is brought from Malawi, Usangu (Mbarali) and blended with the preferred varieties produced in Kyela. The blended rice is normally of low quality in terms of cookability, aroma and taste. The high prices for Kyela rice entice traders to blend with other types to make more profit. Kyela rice was classified by traders as having the least content of stones and other foreign matter types due to discipline among farmer during threshing where they use mats and tarpaulins as opposed to milled rice from other areas, which sometimes has contaminants like stones, weed seeds, husks and soil. Generally, blending of rice has no direct effects on farmers’ income. But this affects consumers who are made to believe that they are buying Kyela rice. The traders strive to maximize profit at any cost.

Such blending of good quality rice with poor quality rice after milling is an unethical practice because traders don't declare to have done so. Blending of Kyela rice is nowadays common in many market places even in other districts and regions such as Uyole Mwanjelwa and Chimala markets. The rice is mixed in such a manner that consumers are easily convinced to believe that the rice has not been blended and they are made to believe they are buying Kyela rice which sells at a high price. This is mainly practised due to lack of quality control mechanisms in the marketing system

4.6 Analysis on efficiency for Rice Marketing System (Market S-C-P Analysis)

4.6.1 Market structure

Structural characteristics may be used as a basis for classifying markets According to Scarborough and Kydd (1992), the structure of a market entails the organizational characteristics of a market that appear to influence strategically the nature of competition and pricing behaviour within the markets. Markets may be perfectly competitive, monopolistic, or oligopolistic. The common measures of efficiency of a component are: within the market the degree of seller and buyer concentration (number and size of market participants), the existence of entry and exit barriers, degree of product differentiation (assortment of product quality) and market transparency (distribution of market information). According to Clodius and Mueller (1961), the distribution of market information and its adequacy is important in sharpening the price and quality comparisons and in reducing risk. These factors were used to measure the degree of market concentration among sellers and buyers of rice in Kyela district.

4.6.1.1 Barriers to entry in rice marketing system

The respondents' perceptions regarding the types of barriers to market entry was analyzed using an index scale as described under section 3.6.2.2.1. Barriers to entry and exit reflect

the competitive relationship between firms and potential entrants. If the barriers to entry and exit are minimal, new firms can easily enter into and exit from the rice markets and compete with established firms. However, with the presence of very high barriers to entry and exit, established firms become well protected from potential rivals. Under this section participants were grouped into three main categories of actors: (i) farmers (conducting production functions), (ii) traders (conducting retailer and wholesale functions), and (iii) Miller-traders (conducting processing functions). The results of opinion and type of barriers to entry of farmers, traders and miller-traders are presented in Tables 23, 24, 25, 26, 27 and 28.

(a) Barriers to entry for rice farmers

In Tanzania, although rice is marketed under a liberalised market system with minimum government intervention marketing still faces a number of constraints. Results presented in Table 23 show the opinion of farmers on the entry and exit barriers into and from rice business. It is indicated that about 85% of the sampled farmers in the study area reported to have no restriction to enter or exit into or from the rice production. However, 15% of the farmers faced entry, barriers being highest at Lukwego and Kapwili (17.5%) and lowest at Isanga (10.0%). The results in Table 23 show also that few female farmers (20.8%) faced barrier to entry as compared to male (36%).

Table 23: Opinions of rice farmers on whether there were entry or exit barriers (n = 160)

Village	Male		Female		Overall	
	No	Yes	No	Yes	No	Yes
Lukwego	17 (70.8)	7 (29.2)	16 (100.0)	-	33 (82.5)	7 (17.5)
Kasala	24 (82.8)	5 (17.2)	10 (90.9)	1 (9.1)	34 (85.0)	6 (15.0)
Isanga	23 (92.0)	2 (8.0)	13 (86.7)	2 (13.3)	36 (90.0)	4 (10.0)
Kapwili	23 (82.1)	5 (17.9)	10 (83.3)	2 (16.7)	33 (82.5)	7 (17.5)
Overall	87 (64.0)	19 (36)	49 (79.2)	5 (20.8)	136 (85.0)	24 (15.0)

Numbers in brackets are percentages

The types of barriers as mentioned by farmers were: inadequate capital, low production, few buyers, high taxes (levies) when moving rice outside the village to the point of sale. The levies ranged between 1000 to 2500 TZS per bag of 150 kg), difficulty to get license, severe competition, and inadequate farming and trading experience. These barriers were analysed using weighted average mean to find which one was the most serious barrier (Table 24).

Table 24: Barriers to entry for farmers (n = 24)

Barriers to entry	Number of response on different levels by farmers (n =24)										overall
	No		Less		Important		Very		Average		
	problem		important				important		score		
	M	F	M	F	M	F	M	F	M	F	
Inadequate capital	0	0	0	0	2	0	16	6	2.17	0.75	2.92
Low production	15	5	2	1	1	0	0	0	0.17	0.04	0.21
Few buyers	11	3	2	1	4	1	2	0	0.67	0.12	0.79
High levies	9	1	3	2	1	1	5	2	0.83	0.42	1.25
Severe competition	15	3	1	2	1	1	1	0	0.25	0.17	0.42
Inadequate experience	2	1	5	2	8	3	3	0	1.25	0.33	1.58

M = male, F = female

Average grading was calculated based on the number of responses regarding the level of importance of that variable as a barrier to entry. A barrier was weighted as being not important (= 0), less important (= 1), important (= 2) or very important (= 3). For example in the case of inadequate capital barrier in Table 24, the average grade of 2.92 was estimated as follows:

$$\frac{(0 \times 0) + (0 \times 1) + (2 \times 2) + (22 \times 3)}{0 + 0 + 2 + 22} = 2.92 \dots \dots \dots (1)$$

Results in Table 24 indicate that rice farmers in the study area faced numerous barriers to entry into the rice business. The farmers ranked inadequate capital as the most serious barrier (average score 2.92) followed by lack of farming and trading experience (average score 1.58) and high taxes (average score 1.25). The other less important barriers were few buyers, severe competition, and low production with average scores of 0.79, 0.42, and 0.21 respectively. These results indicate that rice farmers' entry into rice business was blocked by strong barriers of poor access to investment capital and lack of rice farming and marketing experience. Similar observations were also reported by Mghogho *et al.* (2005) and Ngailo *et al.* (2013).

(b) Barriers to entry for rice traders

Results presented in Table 25 show that slightly more than three-fifths (61.4%) of the traders reported having faced barriers to entry into the rice market, while 38.6% faced no barriers. Traders at Kalumbulu market 50% of the respondents said they did not face any barriers compared to 72.7% at Ipinda market. Results in Table 25 show that more female traders (66.7%) reported having faced barrier to entry as compared to male traders (20%).

Table 25: Opinion of traders on sampled market centres on entry or exit barriers**(n = 44)**

Market centre	Opinion	Male	Female	Overall
Kalumbulu	No	4 (100)	7 (38.9)	11 (50.0)
	Yes	-	11 (61.1)	11 (50.0)
Ipinda	No	-	6 (28.6)	6 (27.3)
	Yes	1 (100)	15 (71.4)	16 (72.7)
Overall	No	4 (80.0)	13 (33.3)	17 (38.6)
	Yes	1 (20.0)	26 (66.7)	27 (61.4)

Numbers in brackets are in percentages

Rice traders mentioned numerous barriers to entry into the rice business, which are summarized in Table 26. The traders ranked inadequate capital as the most serious barrier (average score 2.93) followed by high taxes (average score 2.74), low supply of rice supply (average score 2.70), lack of business experience (average score 2.59) and irregular supply of electricity (average score 2.33). Most rice traders indicated that they could expand their business if they were provided with capital in the form of credit. Capital requirement serves as an entry barrier since only those who have such capital can enter the market (as indicated in Appendix 3, the majority of the sampled traders (72.7%) reported that their capital was not enough to run their businesses. Similar results were also reported by Gabagambi (1998) and DucHai (2003), that the most important barrier to entry in rice marketing was lack of investment capital.

Table 26: Barriers to entry for Traders (n = 27)

Barriers to entry	Number of response on different levels by traders (n =27)										Overall
	No problem		Less important		Important		Very important		Average score		
	M	F	M	F	M	F	M	F	M	F	
Inadequate capital	0	0	0	0	0	2	1	24	0.11	2.82	2.93
High taxes/levies	0	0	0	3	1	0	0	23	0.11	2.63	2.74
Difficuly to get license	0	15	1	5	0	4	0	2	0.04	0.70	0.74
Low supply of rice	0	0	0	2	0	4	1	20	0.11	2.59	2.70
Inadequate business experience	0	0	0	2	0	7	1	17	0.11	2.48	2.59
Irregular supply of electricity	0	0	0	3	0	12	1	11	0.11	2.22	2.33
Severe competition	0	16	1	7	0	2	0	1	0.04	0.52	0.56
M = male, F = female											

Average scores of market barriers for traders were calculated as described for rice farmers in the previous section (equation 4.1). The results indicated that 36.4% of traders had never requested for credit from any agency. In general, traders had difficulties in obtaining credit. The main reasons were that the procedures were restrictive and acquisition of credit from formal institutions such as banks and SACCOS follow very long and bureaucratic procedures with high interest rates. This results is in agreement with results of some other studies, for example by Gabagambi (1998), Mghogho *et al.* (2005), Kabungo (2008) and Ngailo *et al.* (2013). Availability of credit is a proper incentive for rice value chain development and upgrading in the district.

(c) Barriers to entry for rice miller-traders

The results presented in Table 27 show that more than three-fifths (63.3%) of the miller-traders reported having faced barriers to entry into the rice market, while 36.7% faced no barriers. Few miller-traders at Kalumbulu market faced market barriers; only 33.3% of them said that they had not faced any barrier compared to (40%) of the miller-traders at Ipinda market.

Table 27: Opinions of sampled miller-traders on entry or exit barriers (n = 30)

Opinion	Market centre				Overall	
	Kalumbulu (n = 15)		Ipinda (n = 15)		n	%
	n	%	n	%		
No	5	33.3	6	40.0	11	36.7
Yes	10	66.7	9	60.0	19	63.3

According to Table 28, the most serious barrier for rice miller-traders was irregular supply of electricity (average score 2.84). This was followed by inadequate capital (2.74), high taxes (2.63), and low supply of rice (2.37). Low supply of rice particularly during lean periods (November to April), reduces utilization capacity of milling machines from 100% during peak period to only 25% (Mghogho *et al.*, 2005). Other barriers listed as: few buyers (1.84), severe competition (1.68) this mainly depends on the quality of processing machines and difficulty to get license (restrictive procedures). Few buyers affect miller-traders indirectly; though during the harvest season a lot of rice is available for milling, demand for rice is usually low; hence the amount to be processed by traders is reduced for that particular case.

Table 28: Barriers to entry for miller-traders

Barriers to entry	Number of response on different levels (n =19)				Average Grading
	No problem	Less important	Important	Very important	
Irregular supply of electricity	1	0	0	18	2.84
Inadequate capital	0	1	3	15	2.74
High taxes	1	1	2	15	2.63
Low rice supply	0	0	12	7	2.37
inadequate experience	2	3	7	7	2.00
Few buyers	1	4	11	3	1.84
Difficulty to get license	3	4	6	6	1.79
Severe competition	4	3	7	5	1.68

4.6.1.2 Market transparency

The most important aspect of market transparency is information transmission in the marketing system. This includes information about prices, grades, and standard weights of the products in question. The distribution of market information refers to the availability of relevant market information to farmers, rice traders and rice miller-traders such that the information enables them to take appropriate decisions in their respective market (Maunyo *et al.*, 2003). Results presented in Table 29 show that above sixty- nine percent (69.7%) of the surveyed households had acquired market information. Results also show that 66.9%, 84.1% and 63.3% of farmers, traders and miller-traders respectively had access to market information. The results indicated no significant ($p > 0.05$) difference in the proportion of respondents who received information among farmers, traders and miller-traders.

Table 29: Access to market information for farmers, traders and miller-traders

Opinion	Percentage of response to different levels (%)			
	Farmer	Trader	Miller	Overall
	(n = 157)	(n = 44)	(n = 30)	(n = 231)
Yes	105 (66.9)	37 (84.1)	19 (63.3)	161 (69.7)
No	52 (33.1)	7 (15.9)	11 (36.7)	70 (30.3)

$\chi^2 = 5.482$, $p = 0.065$ and number in brackets are in percentages

4.6.1.2.1 Ease of accessing market information

Another fact that was considered in relation to market structure apart from market entry barriers was how easy it was for respondents to get information. The results presented in Table 30 show that on average 72% of interviewed farmers said that it was easy, 23%, sometimes difficult, and 5% very difficult to obtain market information. The difference between sampled households on how they obtained information indicated that 72.4%, 78.4% and 57.9% of farmers, traders and miller-traders respectively found it was easy to obtain market information. However, very few farmers, traders and miller-traders complained that they found it very difficult to get market information as reported by 4.7%, 2.7% and 10.5% of farmers, traders and miller-traders respectively. However, no significant ($p > 0.05$) difference was observed among farmers, traders and miller-traders regarding the way they got the information (whether easy, difficult or very difficult). This result are in line with those of a study by DucHai (2003), who reported that, most of the information related to rice trading for farmers, traders and miller-traders are easy to obtain in Vietnam.

Table 30: Proportions of respondents reporting ease of accessing market information

Household categories	Percentage of response to different levels (%)		
	Easy to obtain	Sometimes difficult	Very difficult
Farmers (n = 105)	72.4	22.9	4.7
Traders (n = 37)	78.4	18.9	2.7
Miller-traders (n = 19)	57.9	31.6	10.5
Total	72.0	23.0	5.0

Note: n = number of respondents

4.6.1.2.2 Type of marketing information accessed

Farmers were asked about the type of information they accessed. Their response show that it was mainly on buying and selling prices of rice as indicated by 57.1% of the respondents (Table 31). The results show that 94.6% of traders, 57.9% of miller-traders and 42.9% farmers accessed information on buying and selling prices This is in agreement with studies by Gabagambi (1998), Silomba (2000) and Kabungo (2008) and Ngailo *et al.* (2013) who found that most of marketing information accessed was on buying and selling prices. This result confirms that farmers, traders and miller-traders were aware of the prevailing price in the markets they participated in. The result also indicated a slightly high proportion (15.8%) of miller-traders pertaining to access of information on availability of rice. This is so because miller-traders played a very important role of storing unmilled rice from traders.

According to Poole *et al.* (1999), efficient and equitable performance of markets requires that relevant information be accessible to a wide range of incumbent market participants and new entrants. Where information flows is poor, the cost and risks of marketing activities are high compared to markets where access to information is good, where information flow is poor, a few people are able to garner monopoly profits and to expand market shares at the expense of others who are less well-informed. Thus, access to market

information is a vital component of the competitiveness for participants in strengthening their bargaining power with traders.

Table 31: Proportions of respondents on type of market information collected by farmers, traders and miller-traders

Type of information	Percentage of response on type of information collected			Sample total (n = 161)
	Farmers (n = 105)	Traders (n = 37)	Miller-traders (n = 19)	
Buying price of rice	25.7	-	15.8	18.6
Selling price of rice	15.2	-	5.3	10.6
Buying and selling price	42.9	94.6	63.1	57.1
Availability of rice	16.2	5.4	15.8	13.7

Note: n = number of respondents, number in brackets are overall proportions (%) of respondents

4.6.1.2.3 Main sources of marketing information

The results presented in Table 32 show that traders were the main source of information for all categories of respondents (farmers, traders and miller-traders). Generally, respondents obtained price information from traders (70.2%), from neighbours (15.5%), from friends (9.9%) and few (4.4%) used information that was announced by radio or television. However, a comparison of farmers, traders and miller-traders on the source of market information showed that the majority of farmers were found to obtain information from traders (72.4%), while for traders (67.6%) and for miller-traders (63.2%). This result indicates that farmers and miller-traders rely mostly on traders to access price information. Similar results were reported by Mghogho *et al.* (2005) and Ngailo *et al.* (2013). Findings by Mendoza and Rosegrant (1995) indicated that traders tend to possess better bargaining skills than other actors thus are perceived to be able to manoeuvre prices to the disadvantage of less skilled actors. Dependence on information from traders limits farmers to take full advantage of setting price for their produce and search for market from other places. Sometimes information from some exploitative traders could be misleading, which

would imply that there is insufficient communication between farmers (rural areas) and major urban markets. The situation is quite different from rice marketing in Vietnam where majority of farmer's access market information through relatives and friends (DucHai, 2003).

Table 32: Proportions of respondents on source and methods of collecting market information by farmers, traders and miller-traders

Question	Response	Percentage of response to different sources			Total (n = 161)
		Farmers (n =105)	Traders (n = 37)	Miller-traders (n = 19)	
Source of information	From traders	72.4	67.6	63.2	70.2
	From friends	19.0	2.7	21.1	15.5
	From neighbours	6.7	18.9	10.5	9.9
	From radio or Tv	1.9	10.8	5.3	4.4
Methods of collecting	Direct visit to market	24.8	67.6	63.2	39.1
	Crosscheck with different buyers or sellers	63.8	8.1	21.1	46.0
	Friends	6.7	2.7	10.5	6.2
	Use of mobile phones	4.8	21.6	5.3	8.7

Note: n = number of respondents

Findings from Eskola (2005) indicate that an individual farmer is willing to accept whichever price is offered by the buyer who comes to the village, especially at the time when cash from the previous harvest has been depleted. Furthermore, findings from Mendoza and Rosegrant (1995) indicated that traders tend to possess better bargaining skills than farmers and hence are able to offer low buying (farm-gate) prices to the less skilled farmers. The flow and availability of market information was not transparent between levels that demonstrated or reflected high price difference between selling farmers as well as variability over time.

4.6.1.2.4 Modes of obtaining marketing information

Also the survey results (Table 32) show that the respondents used several modes to obtain market information. The respondents obtained information: by crosschecking the prices with different buyers or sellers (46.0%), direct visit to market (39.1%), farmers, traders and miller-traders received current prices after they arrived at the market place. From this result it is evident that personal contact was the main source of information for 91.3% of the respondents since only 8.7% received information through mobile phones. For rice traders and miller-traders common method used was direct visit to market as indicated by 67.6% and 63.2% of traders and miller-traders respectively. While for farmers common method used was by crosschecking the prices with different buyers or sellers (63.8%). This is in agreement with the findings by Kabungo (2008) and Mghogho *et al.*, (2005). Market information plays an important role for traders because it influences the volume of rice to be purchased, buying and selling prices at the time of selling.

4.6.1.3 Market/buyer concentration

The degree of buyer concentration is an indicator of competitiveness and it depends on the number of buyers in the market. The concentration of sellers and buyers are the most common measures of market structure (Caves, 1992). In this study only the concentration of buyers was examined because the production side of rice was occupied by numerous smallholder farmers. This study uses the Lorenz curve and the Gini coefficient to show the buyers' concentration. A Lorenz curve is a graphical presentation of buyer concentration with regard to market shares of trade volume. It relates the cumulative percentages of market shares (ordered by size) to get the cumulative percentages of traders or miller-traders (order by size) as presented in Fig. 7 and 8.

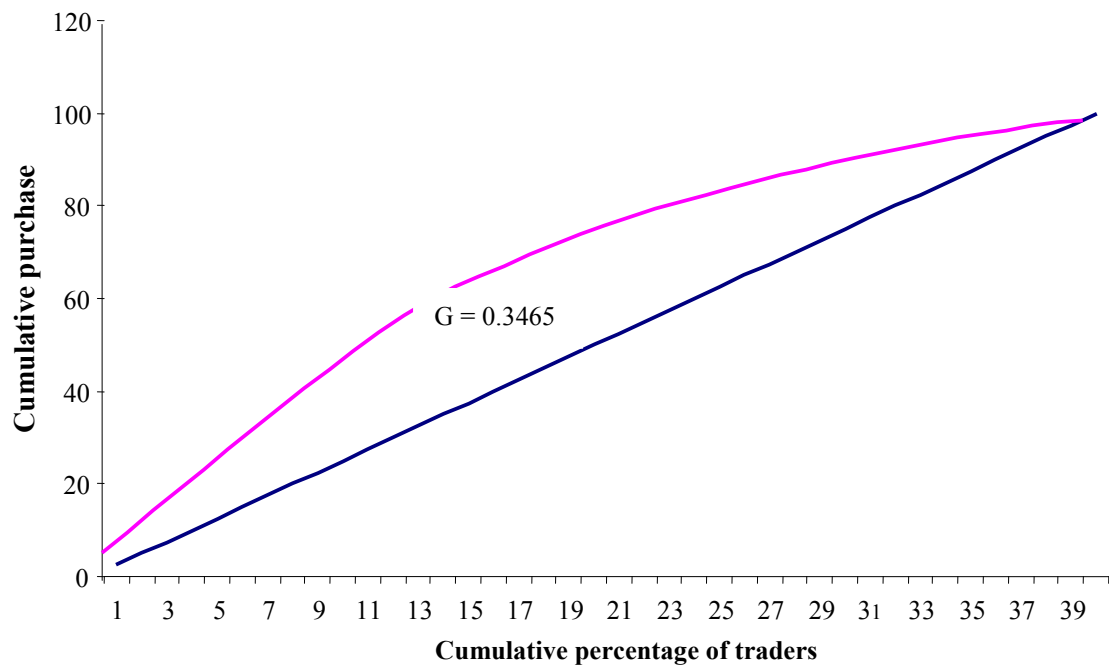


Figure 7: Lorenz curve of rice traders in Kyela District.

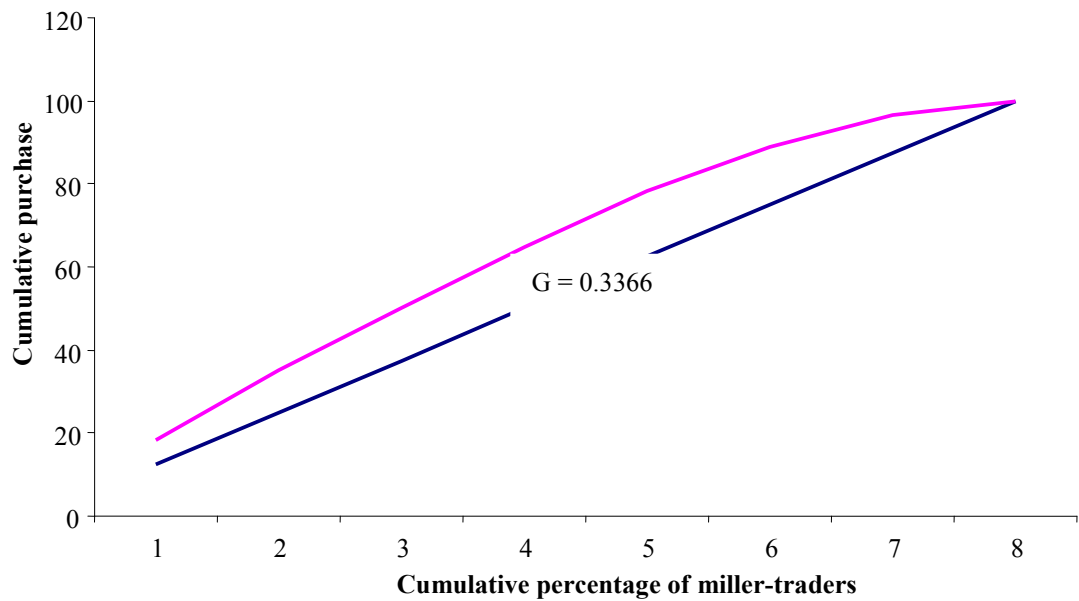


Figure 8: Lorenz curve of rice miller-traders in Kyela District.

The results presented in Appendices 4 and 5 describe in detail the Gini coefficient for rice traders and miller-traders. The results are summarized in Table 33. The figures in this table indicate that the Gini coefficients obtained were higher than 0.33. As the Gini coefficients

for rice traders and miller-traders in this study were 0.35 and 0.34 respectively. According to Dillon and Hardaker (1993), the value of the Gini coefficient if above 0.33 is considered high, indicating inequitable distribution of income or sales. This indicates a slightly high level of concentration and consequently inefficiency in the structure of rice markets. Additionally, results indicated a difference in the Gini coefficient between rice traders and rice miller-traders.

Table 33: Gini Coefficient for the market share of surveyed buyers

Type of buyers	Concentration ratio (GINI)
Traders	0.34650
Miller-traders	0.33662

Note: the figures in this table were computed from Appendix 4 and 5

Moreover, under this section, it was also useful to establish whether traders and miller-traders were able to dominate the market. In order to get information on this, it was useful to compute the “four-firm” concentration ratio (CR₄). This is the market share of the top four traders in the market. Empirical studies in the field of industrial organization suggest certain levels of concentration at which non-competitive behaviour of market participants begin. For example, Kohl and Uhls (1990) suggest that a four-firm concentration ratio (CR₄), representing the market share of the largest four firms, of less than or equal to 33% is generally indicative of a competitive market structure, while a concentration ratio of more than 33% to 50% and above 50% may indicate weak and strongly oligopsonistic market structures respectively. In this study, the market concentration ratio was 35% and 34% for the traders and miller-traders respectively, which implies that the rice market was weakly concentrated representing a weak monopolistic situation which existed in Kyela District. This suggests that the number of buyers (traders and miller-traders) in the rice

marketing system within the study area was high enough to prevent monopolistic tendencies among buyers.

The results presented in Table 34 show that the CR_4 of sampled rice miller-traders was significantly greater than the CR_4 of traders ($64.75 > 20.16$). These results can be interpreted as follows: the 4 largest rice miller-traders had more than five-eighths (64.75%) of the market share. Similarly, the 4 largest rice traders handled about one-fifth (20.16%) of the market share.

Table 34: Four-firm concentration ratio of rice traders and miller-traders

Level	Cumulative percentage (%)	
	Traders	Miller-traders
Largest top	6.51	18.24
Largest 4	20.16	64.75

Note the figures in this table were computed from Appendix 4 and 5.

4.6.2 Conduct of market traders

In general, market conduct refers to the set of competitive practices and tactics that a trader or a group of traders uses to run their business in order to avoid competition. For instance pricing and selling tactics, traders' cooperation or rivalry, and research and development. In this section the conduct of traders was mainly analyzed by focusing on their trading strategies such as buying, selling, transport, storage, and information (Table 35). These constitute the criteria or that define the rules of the game (Tekele, 2010).

In this study, rice traders operated individually without any appreciable cooperation. Little evidence of collusion by the marketing intermediaries was found. The market for rice in the area involved different actors, such as assembler/collectors (59.1%) wholesalers

(54.5%), retailers (47.7%) and few transporters (6.3%). The presence of large number of different actors suggests that the market was competitive since it was not in the hands of a few traders/actors. However, there was completely no formal collusion or cooperation in determining buying and selling prices or the mode of payment to be adopted. Nonetheless, traders passed prices to other traders.

4.6.2.1 Purchasing strategy

The purchasing strategy for traders revealed that 47.7% of sample traders purchased rice personally; 34.1% used family/relatives that purchased rice on their behalf; 11.4% used agents; and only 6.8% did self-purchase and used agents. Traders were asked if they were buying rice based on certain attributes. The results revealed that 63.6% of the sampled traders were buying rice based on specific attributes. The attributes considered mainly were: milling quality as reported by 53.6% of the traders, milling quality and colour (21.4%). The results also indicated that 86.4% of the sampled traders were purchasing rice directly from farmers because of the price advantage they gained. This is in agreement with Mghogho *et al.* (2005) and Ngailo *et al.* (2013). After traders bought rice from different sources they transported it to their stores using, hired trucks (52.3%), bicycles (38.6%), as on-head loads (4.5%), and using a combination of hired trucks and bicycles (4.5%). Rice was transported a distance over 24.4 km on average with a minimum and a maximum of 0.25 and 200 km respectively.

4.6.2.2 Pricing and selling strategy

Regarding the pricing strategy, 59.1% of the sampled traders indicated that price was set by the market. Factors that contributed to price differentiation include transaction costs (59.1%), type of variety (50%), demand and supply/seasonality (45.5%), take prevailing market price (35.1%) and accessibility to market (15.9%). Generally, traders indicated that

the price at which they sold their produce was determined by prevailing conditions in the market at the time of selling. This is in line with the study by Gabagambi (1998). Implication of this is that, selling prices in Kyela are largely determined in relation to other market places in the region/country. However, traders considered the transaction cost involved and incorporated the “risk premium” into their marketing margins, explaining why the margins were higher than those of farmers (Section 4.7.1). It was further noted that, though traders bought rice independently at varied prices and marketing costs, selling prices from one trader to another were almost equal. This led to variation in the gross margins obtained.

Pertaining to sale strategies, the results show that the majority of traders were buying during the harvesting period and storing the produce before selling it as indicated by 61.4% of sampled traders, while 38.6% of the farmers sold immediately after harvest. This is in agreement with the study by Mghogho *et al.* (2005), and Ngailo *et al.* (2013). Moreover, traders were asked whether they were aware of prices prevailing in the nearby market; 75% indicated that they were aware, while 25% said that they were not aware. This was possible because the best way of collecting price information among market participants as described under section 4.5.1.2.4 was through personal communication. This is in line with the study by Gabagambi (1998), who reported that, in Ulanga District the most important price information is personal communication among market participants. The results show also that, traders knew the price in advance before taking their consignments to the market places as indicated by 84.1% of respondents, but a few (15.9%) did not know. Commenting on this situation, traders explained that though the majority knew the price in advance, but the price was not an important factor whether a trader delivered his/her produce to the market place. Traders indicated that there was no formal contractual agreement before selling as indicated by 90.9%, while 9.1% of the

responding farmers agreed that there was contractual agreement with buyers before selling (Table 35). Selling was open to any buyer so long as they offered a good price.

Traders and miller-traders were also required to mention the type of measurement used while selling rice; it was observed that there were no uniform measurements, weight or standard grades used. However, the market traders and miller-traders used many and different measuring devices such as a plastic buckets (“*debe*”) which can hold 15 kg of unhusked rice or 18 to 20 kg of husked rice). Traders did not accept buckets that were offered by farmers because they were small. The baseline study on rice marketing (Mghogho *et al.*, 2005) showed similar results. Furthermore, Masawe (2007) found that marketing food traders in Rufiji mostly used local measurements (*komedi/pishi*, and *kiroba* to obtain more volume and thus increased profit. Silomba (2000) similarly found that traders in Kigoma deliberately used local measurements to buy beans as a strategy to obtain extra volume to increase profit margin in their business.

In the current study it was observed that both traders and farmers cheated each other. Traders maximized the volume of the produce during weighing (using reformatted plastic buckets). Meanwhile farmers cheated traders by mixing different varieties that which affected the quality of the final product. Discussion with traders as well as personal observation revealed this behaviour whereby inferior quality rice was blended with rice of the preferred varieties to get high price. Sometimes traders add cooking oil to make the grain shine and attract buyers as indicated by Plate 4. In addition to that, the data obtained during in-depth interviews with traders and market officials show that problems of standards in grades and weight were there because of following explanation, which was said by one of the respondents:

“Rice marketing was not under the control of the Central Government since market liberalization in the 1980s. The District Council controlled rice traders by imposing fees and through direct ban to control the outflow outside the district. The average market fee per bag per day was TZS 120/=-, while levies per bag ranged between TZS 1500 and 2500. On the other hand the District Council paid little attention to the quality control; this led to problems of standards in grades and weight. Standard metric scales were not common”.



Plate 4: Traders at one of the milling machines in Kyela District blending rice

Table 35: Characteristics of rice commodity transactions

Question	Response	Frequency	Percentage
Procurement of rice	Self purchasing	21	47.7
	Use family or relatives	15	34.1
	Use an agent	5	11.4
	Self purchasing and an agent	3	6.8
Buy basing on attribute that are important	Yes	28	63.6
	No	16	36.4
Attributes considered	Type of variety	5	17.9
	Milling quality	15	53.6
	Pure colour (not mixed)	2	7.1
	Milling quality & pure colour	6	21.4
Who set selling price	Set by the market	26	59.1
	Set by traders themselves	15	34.1
	Through negotiations between buyers and traders	3	6.8
Factors for price differentiation	Transaction costs	26	59.1
	Variety	22	50.0
	Demand and supply/seasonality	20	45.5
	Take market price	15	34.1
	Accessibility to market	7	15.9
Any contractual selling agreements	Yes	4	9.1
	No	40	90.9
Know price in advance	Yes	37	84.1
	No	7	15.9
Aware of prevailing price in nearby market	Yes	33	75
	No	11	25
From whom do you purchase	From farmers	38	86.4
	Middlemen	3	6.8
	Wholesaler	2	4.5
	Miller-traders	1	2.3
Sales strategies	Immediate selling	17	38.6
	Store before selling and buy at harvest	27	61.4
Means of transport used	Hired truck	23	52.3
	Bicycle	17	38.6
	As a head loads	2	4.5
	Hired truck and bicycle	2	4.5

4.7 Performance of Rice Marketing Sub-System

The average net profit margin realized by rice farmers, traders and miller-traders are shown in Table 36. The net profit margin of any specific actor is the net earnings, which is gained after paying all marketing costs. The net profit margin of the rice farmers was calculated on per hectare basis taking the sale price of rice, minus production and marketing costs while net profit margin for traders and miller-traders were calculated as value of sales less purchase prices and other marketing costs.

4.7.1 Analysis of Marketing Margins

(a) At the farm level

The results presented in Table 36 show marketing margin analysis at different levels along the rice channel for major market participants (farmers, traders and miller-traders). Also it includes the practical cost and margins computed for various market participants in the rice market chain, while appendices 6, 7 and 8 show the assumptions used to derive difference cost in rice marketing channels.

The cost and price information used to derive data in Table 36 were part of the field data collected in 2010. The cost and returns on rice traded between farmers, traders and miller-traders were not the only ways rice was traded. The analysis presents what the majority of actors in rice marketing channels tended to follow from rural to urban markets. However, variations in rice marketing chains met similar costs, even though the actors' margins depended very much on the exact trading arrangements they made.

Before calculating the margins, the underlying assumptions must be explicit. In this study the calculation was based on the information on prices and measurement units was obtained from the respondents. For 150 kg of unhusked rice, farmers obtained 100 kg of husked rice. Therefore, by a simple conversion factor of 0.67 (i.e. $100/150$) was used to convert the amount and value of unhusked rice to that of husked rice.

Table 36: Rice returns for farmers, traders and miller-traders

Return per actor		Measures	Value
Farm level	1	Total output (150 kg bag/ hectare)	
		Mean	15.0
		Minimum	2.5
		Maximum	35.0
	2	Average selling price(Tshs/150kg bag)	60 056.0
	3	Gross revenue per hectare	900 840.0
	4	Average variable costs	886 896.5
	5	Gross margin (Tshs/hectare)	13 943.5
Traders level	6	Returns per bag harvested	929.57
	7	Return per shilling of land rented (Tshs)	0.4325
	8	Return per shilling invested (Tshs)	0.016
	1	Quantity of rice bought (150 kg bags)/year	
		Mean	110.60
		Minimum	25.00
		Maximum	288.00
	2	Buying price per 150 kg bag (Tshs)	48 744.39
Miller-traders level	3	Variable costs (Tshs)	6 173 512.00
	4	Average selling price per bag of 100 kg (Tshs) (milled rice)	1 22 120.50
	5	Gross revenue (Tshs) (80bags milled rice)	9 769 640.00
	6	Gross margin (Tshs)	1 240 875.84
	7	Returns per bag of rice (Tshs)	15 510.95
	8	Return per shilling invested (Tshs)	0.201
	1	Quantity of rice bought (150 kg bags)/year	
		Mean	68.28
		Minimum	22.00
		Maximum	120.00
	2	Buying price per 150 kg bag (Tshs)	59 500.00
	3	Variable costs (Tshs)	4 859 410.00
	4	Average selling price per bag of 100kg (Tshs) (milled rice)	111 250.00
	5	Gross revenue (Tshs)	5 806 137.56
	6	Gross margin (Tshs)	946727.5
	7	Returns per bag of rice (Tshs)	14 612.77
	8	Return per shilling invested (Tshs)	0.196

Farmers harvested an average of 15 bags of unhusked rice each weighing 150 kg per hectare (2 250 kgs). At farm-gate, farmers sold unprocessed rice at Tshs 60 056.00/= per 150 kg bag (i.e. 400.37 per kg) on average. However, the farm-gate price ranged between 25 000 and 100 000/= per bag depending on the rice variety and season of the year. The lowest price was experienced during harvesting time. The average profit margin for

farmers per hectare was estimated to be Tshs 13 943.50, whereas returns per bag harvested were Tshs 929.57. The return per hectare rented was Tshs 0.43 and return per shilling invested was Tshs 0.016. The market margins at farm level were smaller compared to that of traders and miller-traders probably due to the nature of the crop, which is labour intensive, especially weeding, which accounts for about 17.97% of the total costs incurred.

Returns to farmers were also reduced due to low use of improved inputs. Only 28.7% of the farmers in the study area applied fertilizers in their fields, and all of the sampled farmers were using local seeds. Differences in the farmers' performance was reflected by a large range of yield amounts per hectare of 2.5 to 35 bags (Table 38), out of expectation of harvesting 125 bags of 70 kg per hectare (8 750 kg) when using improved seeds (Kisandu, 2010). Another factor which could account for low margin at the farm level was the low selling price the farmers realised as compared to the traders and miller-traders. Moreover, traders and miller-traders were using volume as a unit of measure when buying from farmers in order to increase their own profit. Silomba (2000), similarly found that traders in Kigoma deliberately used local measurements to buy beans as a strategy to obtain extra volume to increase profit margin in their business. In addition, there were no uniform measurements, weights or standards, thus making it very difficult to determine rice price.

(b) At the traders' level

On average traders received a total profit of Tshs 1240 875.84season with an average return per bag (of 100 kg) of Tshs 15 511.0. The return per shilling invested (0.201 Tshs) was 90% higher than that recorded at farm level (0.02 Tshs). This could be because of added value to the produce (milled rice) which fetched higher prices compared to unprocessed as the farmers sold rice at Tshs 60 056.00 (Table 36).

Although processing improves the quality of rice with corresponding increase in the market price, farmers could not afford to process their rice because they could not pay for transport cost from the farm to the milling machines at urban centres. Furthermore, the majority of traders were reluctant to buy milled rice using weighing balances. They mainly used local volume measurements which were not standard. According to Mghogho *et al.* (2005), the main reasons for not using standard measurements were unavailability of weighing balances and avoiding losses during rice processing and marketing. Another reason for having high return per bag among traders might be due to the fact that they (traders) controlled the purchasing price from farmers by considering their costs, although in rare cases there were mutual bargaining and agreements.

Purchasing rice from rural areas in Kyela District is competitively done by local and outside traders, though the latter operate with a high degree of solidarity, particularly in price setting. They collude in a certain manner, which is a sort of unofficial price setting mechanism. Thus, farmers find themselves squeezed in a uniform price band that is offered by all traders since farmers mainly rely on buyers (traders) as their main source of price information.

(c) At the miller's level (miller-trader)

At the miller level, profit was found to be Tshs 946 727.5 being 14 612.77 Tshs per 100 kg bag of rice sold and 0.196 Tshs as return per invested shilling. The miller-traders earned more than 93.64% return per bag sold as compared to farmers, but their returns were relatively lower than those of traders. Likewise, the comparison of profit margin obtained between the three groups of participants indicates that traders earned more (Tshs 1 240 875.85 Tshs/ season), followed by miller-traders (946 727.50 Tshs/ season) followed by farmers (13 943.55577.40 Tshs/hectare respectively). These differences in returns are

attributed to the amounts of bags handled, selling price, type of measurements used, and place of sale.

Traders and miller-traders determined the prices taking into account their marketing costs and margins, while farmers did not know their production costs or their profit margins as a basis for setting farm-gate prices, similar results reported by (Mghogho *et al.*, 2005). According to Mendoza and Rosegrant (1995), after the farm-gate the market was not operating efficiently since traders had better bargaining skills than farmers, and were thus perceived to be able to manoeuvre prices to the disadvantage of less skilled farmers.

4.7.2 Market Power Distribution along the Rice Marketing Chain

Table 37 indicates the efficiency measure of return per bag and return per shilling invested –a measure of market power. Traders seemed to have more market power than other participants in rice marketing channels. Returns per bag were highest for traders followed by miller-traders' levels being 15 510.95 and 14 612.77 Tshs per bag respectively compared to the farm-gate price at 929.57 Tshs per 100 kg bag of milled rice. The corresponding market efficiency measured by returns per shilling invested was highest for traders (0.201%) and lowest at the farm gate level (0.016%). The marketing efficiency is similarly reported to be highest for traders (20.1%) followed by miller-traders (19.6%) and lowest for farmers (1.6%) The wide range of market efficiency levels could be interpreted to mean an inefficient marketing system. However, according to Olukosi and Isitor (1990), market efficiency is a function of both pricing and operational efficiency. These results could, therefore, be interpreted to reflect low pricing efficiency in rice marketing in the study area. This means farmers sell at low price and experience minimal operational efficiency.

Table 37: Efficiency measures among marketing agents

Market level	Return per bag	Returns per TZS (M.E)	Market efficiency (%)*
Farm level	929.57	0.016	1.6
Traders' level	15 510.95	0.201	20.1
Miller-traders' level	14 612.77	0.196	19.6

* Was calculated based on TZS per bag of rice by using the following formula

Market efficiency = Net margin/marketing costs*100% (Olukosi and Isitor 1990). Note if

M.E = 1, marketing is efficient

If M.E < 1, marketing is inefficient

If M.E > 1, marketing is highly efficient

4.7.3 Degree of interface pricing efficiency in rice marketing

In this study, the degree of interface pricing efficiency among traders and miller-traders in the marketing channel was determined using correlation analysis. The analysis was used to test the extent to which marketing margins statistically correlated with buying and selling prices in order to examine the extent to which rice market participants passed on price changes to subsequent marketing channels and locations. Table 38 showed the marketing margins of both traders and miller-traders to be insignificantly ($p > 0.05$) correlated with their buying prices whilst they were insignificantly ($p > 0.05$) correlated with their miller-traders' selling prices. However, marketing margins were highly significantly ($p < 0.001$) correlated with traders' selling prices.

Table 38: Traders, miller-traders: correlation between marketing margin, buying and selling prices

Category	Correlation	Buying price	Selling price	Market margin
Traders	Buying price	1.000	0.0491 ^{ns}	-0.2177 ^{ns}
	Selling price		1.000	0.6786***
	Market margin			1.000
Miller-traders	Buying price	1.000	0.2194 ^{ns}	-0.4613 ^{ns}
	Selling price		1.000	0.1325 ^{ns}
	Market margin			1.000

Note: ns = Not significant ($P > 0.05$); *** = Highly significant at $P < 0.001$

Number of cases 40 traders, and 8 miller-traders

A positive correlation between market margin and selling price implies that as selling price increases, market margin also increases and vice versa. However, there was a negative correlation between the buying price and marketing margins for traders and miller-trader, which indicates that as buying price increased, the marketing margin decreased and vice versa. This implies that selling prices were relatively more stable than buying prices (Gabagambi, 1998). It can be deduced that traders or miller-traders maintained constant selling prices even when an increase in buying prices prevailed within the short term.

The insignificant association between marketing margin and miller-traders' selling prices implies that the selling prices were relatively more stable than buying prices. However, the miller-traders' marketing margins were independent of selling prices, which implies that prices paid by rice consumers from the study area reflected the high marketing cost incurred by the miller-traders.

4.8 Levels of Wellbeing among Households Selling Rice

4.8.1 Role of rice in household income

This section presents information about the main income sources, levels and distribution among households involved in selling rice (farmers, traders and miller-traders). Households were asked to estimate the amount of money they had obtained from different sources during the previous twelve months (one year) prior to the survey. The data on household income were therefore for the 2008/09 fiscal year. Complete income data were available for all 160 farmers and 44 household traders. However, income data could only be obtained from 22 out of 30 miller-traders. Household income can affect poverty through its influence on other manifestation on health, nutrition, illiteracy and mortality (World Bank, 2002). According to the 2007 Household Budget Survey (NBS) for 2009 in Tanzania, selling food and cash crops is still the most important source of cash income for rural households, being reported by 50.4% and 15.3% of the farmers and traders- miller-traders respectively. This is in contrast from urban areas where salaries and income from non-farm enterprises predominate.

4.8.2 Income levels and composition

In order to isolate the contribution of rice and other income sources to total household cash income, five sources were distinguished, they were:

- i. Income from rice, including cash income from quantity of rice sold
- ii. Income from other crops, including cash income from sales of beans, maize, cassava, banana, cocoa, cashew nuts, groundnuts and palm oil
- iii. Income from livestock, including returns from traded livestock (pigs, poultry, cattle and goats).
- iv. Non-farm income, including wage earned from non-farm labour and informal sector employment

- v. Remittances in cash or in kind from family members and other relatives living away from the village

Table 39 presents income from these sources among the respondent categories. The annual income of sampled households averaged TZS 3 544 921. The income derived from rice sales had by far the biggest share, accounting for about 80.3% of the total household cash income for the entire sample, including farmers, traders and miller-traders. This was followed by income from off-farm activities (8.1%), livestock sales 4.9%, sales of other crop products (4.8%), and remittances (1.9%). Overall, agricultural activities (farming and livestock keeping) contributed about 90% of the households' mean cash income – reflecting the importance of agricultural activities as a source of livelihood for the sampled households.

Table 39: Mean annual cash income of sampled households, Kyela District

Income Source	Farmers (n = 160)		Traders (n = 44)		Miller-traders (n = 22)		Overall %
	Value (TZS)	%	Value (TZS)	%	Value (TZS)	%	
Rice	488 410.3	44.1	10 638 787.7	92.3	6 001 250.0	87.8	80.3
Other crops	157 983.9	14.3	373 000.0	3.2	241 333.3	3.5	4.8
Livestock	122 465.8	11.1	318 740.7	2.8	162 700.0	2.4	4.9
Off-farm	266 960.8	24.1	150 000.0	1.3	371 062.5	5.4	8.1
Remittances	72 500.0	6.4	50 000.0	0.4	56 666.7	0.8	1.9
Total cash income	1 108 321.0		11 530 528.0		6 833 013.0		
Mean	712 168.8		10 888 128.6		2 56727.3		

NB: All income figures are based on mean annual cash income per expressed in TZS.

P – value for the mean income of sampled households = 0.000 and F = 90.151

The analysis of total cash income by respondent categories indicated a marked difference in both income earnings and main sources of income. The household traders reported the highest average annual total income of TZS 11 530 528 (Table 39). The average total

income reported by trader households was 40.7% higher compared to that of miller-traders -traders and 90.4% higher compared to that of farmers and the respective mean total income levels were significantly ($p < 0.05$) different from each other for all three categories of respondents. The high level of total income for of traders in the study area was explained by their high levels of income from rice which contributed 92.3% of the traders' total income. Likewise, the results indicated that 44.1% of farmers' annual income was derived from rice production. According to these results, none of the farmers interviewed relied on rice production as their only source of income; all the households combined more than two sources of income in order to survive. These results are in line with those of Mwamkinga (2006), who reported that, in order to overcome poverty, people in Kyela District had come up with various income generating activities.

Considering for a farmers' household of six people (average household size as presented under Table 11) each member could probably receive about Tshs 81 401.71/= per annum, equivalent to US\$ 49.3 per annum (income from rice). At the prevailing exchange rate of Tshs 1650 per 1 US\$ (Ministry of Finance, 2013), this translates to less than a dollar a day. This amount is not adequate to pay a minimum wage to each family member for a month, especially for the households that rely on rice production only as their major source of income.

One-way ANOVA was used to test the null hypothesis that there is no significant difference in income level among farmers, traders and miller-traders. The results revealed that there was statistically significant ($F = 54.15$, $p < 0.01$) difference in the households' levels of net income (Table 41), thus rejecting the null hypothesis which stated as previously stated.

4.8.3 Mean annual cash income of sample respondents, per adult equivalent units

For income and expenditure data, the unit for comparison was an adult equivalent unit. Income and expenditure of households were expressed per adult equivalent (AE) as reported in Table 40. The household average income per adult equivalent was Tshs 1 247 034. The income derived from rice sales represented the highest share with an average of 74.3% of the total cash income. This was followed by income from off-farm activities (10.6%), sales of other crops (6.5%), livestock sales (6%), and remittances (2.6%). Overall, agricultural activities (farming and livestock keeping) contributed 86.8% of all the households' cash income.

Table 40: Mean annual cash income per adult equivalent units

Income Source	Farmers		Traders		Miller-traders		Overall %
	Value (TZS)	%	Value (TZS)	%	Value (TZS)	%	
Rice	141 415.16	42.1	3 927 926.37	92.9	2144250.6	87.5	74.3
Other crops	46 011.90	13.7	131 360.36	3.1	65625.0	2.7	6.5
Livestock	45 128.92	13.1	91 893.92	2.2	67503.5	2.8	6.0
Off-farm	82 118.03	24.5	51 507.34	1.2	153140.7	6.2	10.6
Remittances	21 484.33	6.4	23 619.22	0.6	21 093.1	0.9	2.6
Total income	334 786.6		4 226 307.2		2 449 858		

Analysis of annual (gross) cash income by household category indicated a marked difference in both income earnings and the most important sources of income. Traders reported the highest average total income per adult equivalent unit of Tshs 4226 307.2 compared to Tshs 2 449 858 and Tshs 334 786.6 for miller-traders and farmers respectively. The average total income reported by traders was 42% and 92% higher than the total income of miller-traders and farmers respectively. The high total income level of traders in the study area is explained by the high level of income from rice sale, which

contributed 92.9% of the traders' total income. The results indicated that 42.1% of farmers' total income per adult equivalent was derived from rice production, followed by off-farm activities (24.5%).

According to the Tanzania Household Budget Survey of 2007 (NBS, 2009), most (68%) Tanzanians still depend on agriculture, with food crop production dominating as the main source of cash income for some 40% of households in Mainland Tanzania and 50.4% for rural areas. For this reason, the ability of the majority of the households in the study area to escape poverty will depend on their earnings from crop production, mainly rice production in the foreseeable future. This suggests that poverty reduction strategies in the area should go hand in hand with improving rice production and marketing.

4.8.4 Income poverty, incidence and depth of poverty

In this section, consumption expenditure is used to examine income poverty and inequality. The aim here was to establish the level of poverty for households in each category and establish the proportion of households that were either below, at or above the basic needs (monetary) and food poverty lines. Poverty in this study was operationally defined as low expenditure on food and non-food items for 28 days per adult equivalent. Expression of expenditure per adult equivalent for 28 days was aimed at getting results comparable with those of the Tanzania Household Budget Survey of 2007 (NBS, 2009), which determined poverty using a similar method.

4.8.5 Degree of poverty in the sampled households

In this study, income was analysed based on Tanzanian national poverty lines. A poverty line is a monetary expression of what a household requires in order to meet their basic needs (NBS, 2009). Due to the complexity of setting the poverty lines or basic needs, the

national poverty lines for basic needs and for food were used. According to the NBS (2009) the basic needs poverty line for Tanzania for the year 2007 was Tshs 13 998 per adult equivalent for 28 days, while the monetary food poverty line was Tshs 10 219 per adult equivalent for 28 days expressed in constant 2007 prices. However, in order to take into account the time value of money, the poverty lines values were adjusted for inflation in order to express them in 2009 prices, when data for this study were collected. The adjusted poverty lines were obtained by using headline inflation ratios which were 6.9% and 12.7% for 2007 and 2009 respectively (Ministry of Finance, 2013). By cross-multiplication, the adjusted basic needs poverty line became TZS 25 764 (i.e. $13\,998 \times 12.7\% / 6.9\%$), and the monetary food poverty line became TZS 18,809 (i.e. $10\,219 \times 12.7\% / 6.9\%$) per adult equivalent for 28 days.

Table 41: Income per adult equivalent for 28 days (Tshs)

Category	Minimum	Maximum	Mean	Std
Farmers (n = 160)	1294.19	185 030.84	17 694.11	211 163.17
Traders (n = 44)	6853.75	2 361 306.87	333 607.65	395 958.17
Miller-traders (n = 22)	4080.17	402 576.49	77 780.96	114 704.64
Total (n = 226)	1294.19	2361 306.87	85 048.56	216 380.21

F value = 54.151, and p = 0.000

From the results presented in Table 41, a household with an income equal to and more than Tshs 25 764 was considered ‘non-poor’, and a household with an income falling below Tshs 25 764 was considered ‘poor’. Based on this criteria, the majority of the farmers’ households were classified as “poor” while trader households and miller households fell under the group of ‘non-poor’ since their mean income per adult equivalent for 28 days (Tshs 333 607.65 and 77 780.96 respectively) were above the basic needs poverty line. However, farmer households had much less mean income per adjusted

adult equivalent unit for 28 days than trader households and miller-trader households. Moreover, the results indicated very high significant differences in mean income per adult equivalent unit for 28 days at the 0.1% level ($p \leq 0.001$) among the three household categories (Table 41).

4.8.6 Poverty incidence among respondents

The results in Table 42 show the proportions of households that were ‘poor’ and those that were ‘non-poor’ based on the basic needs poverty line of 25 764 Tshs for 28 days, which were obtained using the method described above. For the whole sample, the results show that 34.1% of the sampled households were classified as ‘non-poor’ and 65.9% as ‘poor’. However, poverty incidence was the highest (83.8%) among farmer households, followed by miller–traders among whom 59.1% were poor. However, for trader households only 4.5% were below the poverty line, though, according to Household Budget survey of 2007, poverty remains highest in rural areas. Where about 38% of the population fall below the basic needs poverty line (NBS, 2009). The levels of basic needs poverty line for households of farmer and miller were higher than those reported by the Household Budget Survey of 2007 (NBS, 2009).

Table 42: Categorization of sampled households into ‘non-poor’ and ‘poor’ in 2008/09

Poverty classes	Household category						Total (n = 226)	
	Farmers (n = 160)		Traders (n = 44)		Miller- traders (n = 22)		No.	%
	No.	%	No.	%	No.	%		
Non- poor	26	16.2	42	95.5	9	40.9	77	34.1
Poor	134	83.8	2	4.5	13	59.1	149	65.9
Total	160	100	44	100	22	100	226	100

χ^2 value = 96.886, p-value = 0.000

4.8.7 Depth of poverty among respondents

It is argued that, when assessing poverty, it is important to focus not only on the number and proportion of poor households but also on the depth and severity of poverty (Sen, 1981 cited by Monde, 2003). In this study, the depth of poverty was determined by using the poverty depth (poverty gap) formula as presented earlier in Section 2.5.4.3b. The results given in Fig. 9 show a large poverty gap especially among farmers. The class ' $\leq 20\%$ ' represented the proportion of households which were close to the poverty line, i.e. households which required less than a 20% increase to raise their income levels to the basic needs poverty line. The results show that only 10.7% of farmer households were in this class. The results also indicated that as the sampled households moved further below the basic needs poverty line, the percentage which they needed to increase income increased too. The range from '80% – 99%' represented households which were further from the basic needs poverty line; 20.8% of the farmers' households were found in this group that is they required 80% to 99% increase in income to ascend and attain the basic needs poverty line. Furthermore, the results revealed that the depth of poverty for farmers' households was 60% to 79%. These observed results were higher compared to the national average based on data from the 2007 Tanzania Household Budget survey whereby the depth of poverty in Tanzania, where the national basic needs poverty line was computed as' 37.6% for rural areas and 33.6% for Mainland Tanzania (NBS, 2009). The depth of poverty for farmers and miller-traders were 37.3% to 52.4% higher compared to those of rural areas. From this observation it is evident that not all households classified as poor suffered the same degree of deprivation.

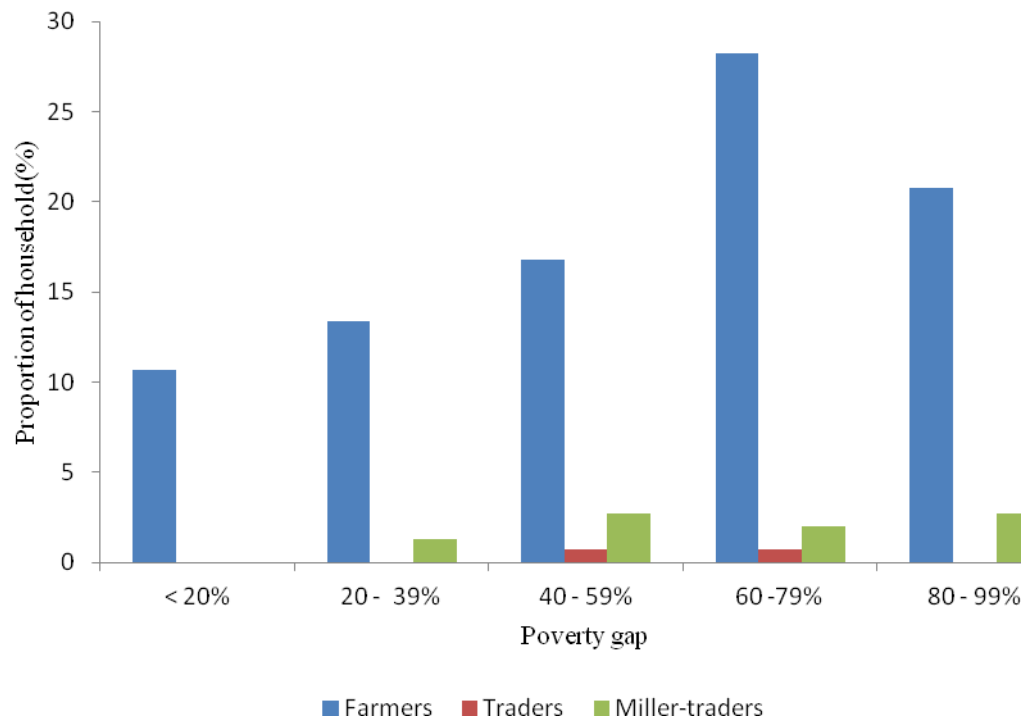


Figure 9: Depth of poverty for sampled households expressed as a proportion of basic needs poverty line (n = 149)

Apart from determining the depth of poverty of the poor households, it was also important to consider the composite measures of absolute poverty which had one thing in common: consideration of the number of the poor, the extent of immiseration, and the distribution of income among the poor in the sample. One of the composite measures of poverty is the Sen Index as described under section 2.5.4.3d (i). Another is the Foster, Greer, and Thorbecke (FGT) measure of poverty, which is also called Parametric measure of poverty (Pa) as described under section 2.5.4.3 d (ii). Under this section, the FGT was used to measure poverty because it includes factors that are sensitive to changes in inequality, changes in poverty incidence and changes in poverty depth. The results obtained using the Pa measure of poverty show that the estimate of Pa for poor households (i.e. farmers, traders and miller-traders) was 0.177. Comparison among the three household categories shows that farmer had a higher Pa value of 0.327 followed by miller 0.188 and trader households 0.016. These Pa values obtained are all greater than zero, thus the Pa value is

not equal to the head count ratio, such as the number of the poor was not the only relevant aspect of poverty measurement. Also, the results indicated that the value of P_a was less than one, thus P_a was not equal to the head count ratio times the income shortfall; this is to say that the distribution of income among the poor households was relevant for measuring poverty. The P_a ratio indicates how rich the people are (the smaller the P_a ratio, the richer the people). Hence in this study trader households were the richest (0.016) compared to miller households (0.188) and farmer households (0.327).

The consumption expenditure measure was also used to examine income inequality, and the results are presented in Fig 10 and 11. The results show the Gini coefficients for farmers and miller-traders, while appendices 11 and 12 show how the Gini coefficients were computed. The Gini coefficients are represented on the graph by the area between the Lorenz curve and the line of equality. This measure shows how equal or unequal the level of income is, providing a visual representation of the information on the inequality of income prevailing in the society or households. As described under section 2.5.4.3 c, a lower Gini coefficient tends to indicate a higher level of income equality. A coefficient that is close to zero (0) implies that the income distribution of the households in the sample are similar or equal. Meanwhile, a score approaching 1 depicts a near total inequality, of the households' income distribution. Conversely, a score of one (1) implies total inequality signifying concentrated income in a few households which rank high in the consumption range. The Gini coefficient for consumption among miller-traders (0.47) was slightly higher than that of farmers (0.43). The result obtained was higher as compared to the national average which is 0.34 for Dar es Salaam, 0.35 for other urban areas and 0.33 for rural areas (NBS, 2009).

The income inequality was more prevalent for miller-traders. The results imply that the richer among the poor miller-traders accounted for 16.2% of the total income share, compared to only 1.7% among farmers. The Gini coefficient of 0.425 obtained under this study is considered to be high, since the national average gini coefficient is only 0.33 for rural areas and 0.35 for Mainland Tanzania.

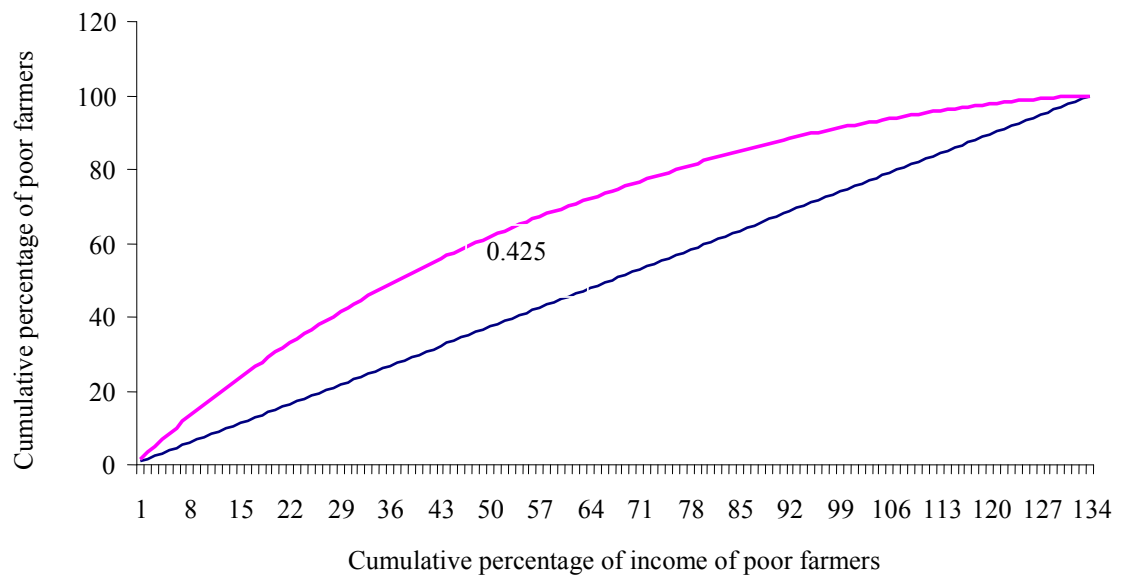


Figure 10: Lorenz curve showing distribution of income of poor farmers

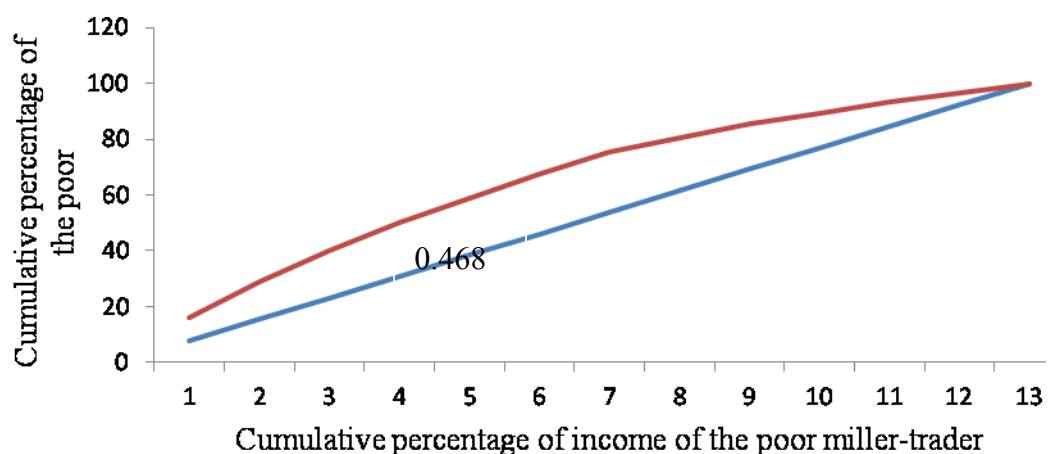


Figure 11: Lorenz curve showing distribution of income of poor miller-traders.

4.9 Food Security

According to FAO (2008), food security exists when all people at all times have access to safe nutritious food to maintain a healthy and active life. The first purpose of food security is for households to be able to obtain adequate food needed at all times, and to be able to utilise the food to meet the body's needs. Thus, this section presents the findings on food security status of the sampled households based on: firstly, self-qualitative appraisal of households themselves on having food shortage or not. Households which said they had food shortage at any time within 12 months during the agricultural season 2008/09 were considered to be food insecure. Secondly, food security is given using the number of meals eaten per day. Households whose adult members had eaten an average of less than three meals per day during seven days prior to the survey were considered to be food insecure. Thirdly, food security is given by using dietary energy consumed per capita and per adult equivalent per day.

4.9.1 Food security based on qualitative assessment

The sampled households were asked whether rice grown was sufficient overall in their households during the period from 1 July 2008 to June 2009. The results indicated that more than a half (54.7%) of the sampled households said that their households had food insufficiency while the remaining households said that they had adequate food for the whole year (Table 43). Based on households' self-appraisal, it was taken that the level of food insecurity was 54.7%. Based on this proxy indicator of self-appraisal on food security, among farmer households the proportion of food insecure households was higher (59.4%) than that between trader and miller households (45.5% and 43.3% respectively). Although the statistical test shows that there was no statistical significance ($p > 0.05$) difference in the proportions of food insecure households among the three household

categories, the proportion of food insecure households was much higher than the average food insecurity for Tanzania, which was 16.6% in 2007 (NBS, 2009).

Table 43: Whether the amounts of rice harvested were enough for households' food needs

Question	Response	Household category			Overall (n = 234)
		Farmer (n = 160)	Traders (n = 44)	Miller-traders (n=30)	
Weather rice harvested were enough	Yes	65 (40.6)	24 (54.5)	17 (56.7)	106 (45.3)
	No	95 (59.4)	20 (45.5)	13 (43.3)	128 (54.7)
Food shortage (month)	Minimum	1	3	1	1
	Maximum	9	6	5	9
	Mean	4.2	3.9	3.7	4.1
	Std deviation	1.91129	1.03999	1.25064	1.74701

Opinion whether rice is enough for household food needs $\chi^2 = 4.493$ and $p = 0.106$

Mean month of food shortage $F = 0.801$ and $p = 0.451$

The results presented in Table 43 show that the households faced food insecurity with an average of 1 month and maximum period of 9 months especially in among farmers' households with a mean of 4.2 months. The traders faced food insecurity for 3 to 6 months, with a mean of 3.9 months, while food insecurity periods in among miller-traders were 1 to 5 months, with an average of 3.7 months. In this regard, farmer households experienced longer periods of food shortage than traders and miller-traders, although the difference was not statistically significant ($p > 0.05$). The results also showed that, on average, the food insecurity period for the sampled households was 4.1 months.

Table 44 presents the main strategies used by respondents under each category to ensure household food security, especially in terms of having enough rice for consumption. The most important strategy was income diversification followed by consumption of other crop products. Generally, it was indicated that more than a half (52.3%) of the sampled

households consumed maize, which is grown in flood plains during the rainy season to provide green cobs during the period when the supply of rice is at the lowest level within most households which occurs shortly before harvest (around March). There is an additional maize crop that is harvested during the dry season in September. By that time much of the harvested rice has already been consumed or sold.

Table 44: Coping strategies of households with insufficient rice for consumption

Coping strategy	Sample households			Total (n = 128)
	Farmers (n = 95)	Traders (n = 20)	Miller- traders (n = 13)	
Consume maize	62 (65.3)	4 (20)	1 (7.7)	67 (52.3)
Use income from crop sale	44 (46.3)	8 (40)	6 (46.2)	58 (45.3)
Petty business	22 (23.2)	16 (80)	5 (38.5)	43 (33.6)
Sell labour	21 (22.1)	5 (25)	3 (23.1)	29 (22.7)
Use income from livestock sale	11 (11.6)	1 (5.0)	2 (15.4)	14 (10.9)
Consume dry season crop products	14 (14.7)	-	-	14 (10.9)
Informal sector	7 (7.4)	1 (5.0)	3 (23.1)	11 (8.6)
Use salary	3 (3.2)	-	4 (30.8)	7 (5.5)
Consume banana	7 (7.4)	-	-	7 (5.5)
Fishing	1 (1.1)	-	1 (7.7)	2 (1.6)

Numbers in brackets are % of households

Another coping strategy as reported by 45.3% of the respondents was to use some of the money from the sale of other crops to buy food products (including rice) for domestic consumption and other necessities. Cash for buying food was also obtained by selling labour as reported by 33.6% of the respondents while 22.7% coped with food insecurity by selling their labour.

In addition, households used gifts or remittances from friends and relatives (Table 47) to cope with food shortages. Using various sources of cash income, households bought (during food shortage) about 96.5 kg of rice on average, being highest for traders (124 kg) followed by miller-traders (88.8 kg) and lowest for farmers (88.8 kg). Inferential analysis

using one-way ANOVA showed that there was significant ($p < 0.05$) difference among the three household categories in mean amount of rice bought. Out of the insecure households 14.1% (8 out of 128) received gifts or remittances. Traders received on average higher amount of rice as remittance (45.1 kg) on average than farmers (19.4 kg) and miller-traders (25.0 kg).

Majority of the respondents (79.2%) bought rice due to inadequate supplies from their own production. However, low rice production might not be the real reason, at least for some households, given the fact that a number of the same farmers also sold rice. Less than one-fifth (16.7%) of the households acknowledged that overselling their own rice produce soon after harvest forced them to buy the produce later in the season. Low own production mentioned by majority of farmers (53.1%), while low production and overselling own produced rice were mentioned by only 4.2% of the farmers. This observation indicates that the farmers in the study area faced problems in dividing rice produced for food and for sale.

4.9.2 Food security based on dietary energy consumed

Determination of dietary energy consumed was done using the procedure described in section 3.10.2. The dietary energy consumed was determined per capita and per adult equivalent. The cut-off points of 2 100 kCal per capita and 2 200 kCal per adult equivalent per day are the minimum values for people to be considered food secure in Tanzania.

Table 45: Amount of rice bought and received as remittance and reasons for buying and receiving rice by rice deficient sample households

Question	Response	Household category			Mean total
		Farmer (n = 65)	Trader (n = 19)	Miller (n = 12)	
Amount of rice	Bought (kg) mean (n = 96)	88.8	124.0	94.9	96.5
	Received as remittance (kg) mean (n = 18)	19.4	45.1	25.0	32.9
Reasons for buying rice (%)	Little own production	46 (70.8)	15 (78.9)	10 (83.3)	76 (79.2)
	Overselling own production	18 (27.7)	4 (21.1)	2 (16.7)	24 (25)
	Little production and overselling	1 (1.5)	-	-	1 (1)
Reasons for receiving rice remittances (%)	Little own production	4 (57.1)	3 (33.3)	2 (100)	9 (50)
	Overselling own production	1 (14.3)	1 (11.1)	-	2 (11.1)
	As gift from relatives or friends	2 (28.6)	5 (55.6)	-	7 (38.9)
From whom rice was received	From farmer	4 (57.1)	-	-	4 (22.2)
	From relatives or friends	3 (42.9)	9 (100)	2 (100)	13 (77.8)

Numbers in brackets are % of households

χ^2 value for average amount of rice bought = 0.037 and F = 3.422

χ^2 value for average amount of rice received as remittance = 0.362 and F = 1.088

χ^2 value for average month of food shortage = 0.451 and F = 0.801

4.9.2.1 Dietary energy consumed per adult equivalent per day from 30 days' data

The results presented in Table 46 indicate that the average DEC per adult equivalent unit per day was 4 384.79 kCal in the whole sample. Even though the mean DEC for farmers, traders and miller-traders were not significantly different ($p > 0.05$) from each other, the miller-traders and traders had relatively higher DEC per adult equivalent than that of the farmers.

Table 46: DEC per adult equivalent unit per day

DEC per adult equivalent unit per day	Respondent category			Whole sample (n = 234)
	Farmers (n = 160)	Traders (n = 44)	Miller-traders (n = 30)	
Mean	4241.26	4686.72	4707.48	4384.79
Std	1508.71	1752.28	2042.22	1638.23

F - value = 1.959, p = 0.143

The results also show that, based on the DEC per adult equivalent per day obtained, 96.2% of the households were food secure while only 3.8% were food insecure in the whole sample (Table 47). Also the households that were food secure among farmers, traders and miller-traders were 95%, 100% and 96.7% respectively.

Table 47: Household which were food secure based on DEC per adult equivalent unit per day

DEC/AEU/day	Respondent category			Whole sample
	Farmer	Trader	Miller	
< 2200 kCal	8 (5.0)	-	1 (3.3)	9 (3.8)
≥ 2200 kCal	152 (95.0)	44 (100)	29 (96.7)	225 (96.2)

Numbers in brackets are percentages

4.9.2.2 Dietary energy consumed per capita per day

The results in Table 48 indicate that, on average, the DEC per capita per day in the whole sample was 3 000.62. The minimum and maximum DEC amounts per capita per day were 87.21 and 11 615.04 kCal, respectively. Despite the mean DEC per capita among farmers, traders and miller-traders being insignificantly different ($p > 0.05$), the miller-traders had relatively higher DEC (3 424.61), followed by traders (3 143.80) and farmers (2 881.75). The results also show that only 19.7% households were food insecure in the whole sample (Table 49).

Table 48: DEC per capita per day

DEC per capita per day	Respondent category			Total (n = 234)
	Farmers (n = 160)	Traders (n = 44)	Miller-traders (n = 30)	
Minimum	87.21	1 698.11	1 094.50	87.21
Maximum	11 615.04	6 150.66	9 219.60	11 615.04
Mean	2 881.75	3 143.80	3 424.61	3 000.62

F-value = 2.278, p = 0.105

Table 49: Household which were food secure based on DEC per capita per day

DEC/AEU/day	Respondent category			Total
	Farmers	Traders	Miller-traders	
< 2100 kCal	34 (21.3)	8 (18.2)	4 (13.3)	46 (19.7)
≥ 2100 kCal	126 (78.8)	36 (81.8)	26 (86.7)	188 (80.3)

Numbers in brackets are percentages

Looking closely at the results presented one realizes that food security was not a problem in the area since more than 70% of the households were food secure. There are a number of plausible explanations for obtaining such results, namely (i) crop diversification due to a favourable environment which is suitable for other food and cash crops to be grown; (ii) engagement of households in petty businesses which increases income for buying food during times of food shortage, and (iii) selling household labour, especially during food shortage.

Based on all these findings, one finds that food security based on self-assessment of being food secure or insecure was extremely different from food security based on other methods. This might have been due to underestimation of their food status by the households with the expectation of getting food aid.

4.10 The likelihood of households selling rice being in the highest level of income quintile

The likelihood means the chance or probability of an event occurring. The chances of the event being grouped into the highest income quintile among the households selling rice, which was the concern of the fifth objective of this research, were determined using ordinal logistic regression.

4.10.1 Justification for using ordinal logistic regression

Income per adult equivalent for 28 days, which was the dependent variable, was presented in five quintiles. Ordinal logistic regression was used because independent variables that which were used in the model comprised a mixture of continuous and categorical variables, as presented in Table 50. The ordinal logistic regression equation is derived in Section 3.9.4.6. Analysis was done using SPSS, and the outputs are presented in following sub section.

4.10.2 Ordinal logistic regression outputs and the likelihood of household being in the highest level of income quintile per adjusted adult equivalent for 28 days

The analysis was based on data from 223 respondents. To test the model's stability for inference analysis, goodness-of-fit was determined using Pearson index and the deviance goodness-of-fit as presented in Table 51 and 52. The model showed that the goodness-of-fit measures have large observed significance levels, so it appears that model fits and could be used for making inference on the population based on the sample.

Table 50: Variables entered in the ordinal logistic regression model

Variable	Description of variables
Dependent variable	
Poverty	Was the dependent variable obtained by grouping the values of household income (i.e. income per adult equivalent for 28 days into five income groups i.e. first quintile (1), second quintile (2), third quintile (3), fourth quintile (4) and fifth quintile (5)
Independent variables	
Age of household head	Years since one was born
Sex of household head	Dummy variable taking the value of 1 where the household was a male and 0 otherwise
Years of schooling	Years
Amount of rice sold	Bags each weighing 100 kg
Selling price of rice	TZS
Access to market information	Dummy variable taking the value of 1 where one had access to market and 0 otherwise
Barriers to market entry or exit	Dummy variable taking a value of 1 where was no barrier to entry and 0 otherwise
Household category	Variable was broken into three variables <ol style="list-style-type: none"> 1. Household farmers - Dummy - variable taking a value of 1 where household is a farmer and 0 otherwise 2. Household traders - Dummy-variable taking a value of 1 where household is a trader and 0 otherwise 3. Household miller-traders – Dummy –variable taking a value of 1 where household is a miller and 0 otherwise

Table 51: Goodness-of-fit

	Chi- Square	df	Sig.
Pearson	598.802	689	0.994
Deviance	446.742	689	1.000

Another important output chosen was the model summary, it is indicated in Table 54 and shows Cox and Snell R square, McFadden R square and Nagelkerke R square. These were used to measure the strength of association between the dependent variables and the predictor variables. The results in Table 54 show that Nagelkerke R^2 was 0.553, implying that the independent variables explained 55.3% of variance of the dependent variable.

Table 52: Pseudo R-square

Pseudo R-square	(Pseudo R-square)
Cox and shell	0.531
Nagelkerke	0.553
McFadden	0.236

The results in Table 53 show that the variable which had the highest impact on the chances of households being grouped in the highest income group was being a trader (Wald statistic = 35.92), followed by the amount of rice sold (Wald statistic = 31.82) and access to market (Wald statistic = 14.64). All the three covariates had significant impact at the highest level of significance, 0.1% ($p < 0.01$).

Table 53: Parameter estimates for covariates used in ordinal logistic regression

Covariates	Coefficient (B)	Std. Error	Wald T	df	Sig	EXP (B)
Threshold						
TIAAEUMM* = 1	-0.408	1.018	0.161	1	0.689	1.5038
TIAAEUMM* = 2	0.785	1.018	0.594	1	0.441	2.1924
TIAAEUMM* = 3	1.978	1.025	3.721	1	0.054	7.2283
TIAAEUMM* = 4	4.283	1.080	15.725	1	0.000	72.458
Location:						
Farmer	-0.503	0.476	1.116	1	0.291	1.6537
Trader	4.201	0.701	35.924	1	0.000	66.753
Miller -traders				0		
Sex	0.142	0.316	0.202	1	0.653	1.1526
Age	-0.038	0.012	9.843	1	0.002	1.0387
Education (yrs)	0.258	0.110	5.481	1	0.019	1.2943
Access to market information	1.090	0.285	14.643	1	0.000	2.9743
Barriers to market	0.221	0.341	0.421	1	0.516	1.2473
Amount of rice sold	0.118	0.021	31.817	1	0.000	1.1252
Selling price	6.745E-06	0.000	1.457	1	0.227	1.00007

*TIAAEUMM 1, 2, 3, and 4 stand for second, third, fourth and fifth income quintile

The results presented in Table 53 show the Exponential (B) which measures the proportional odds ratios (coefficients exponentiated). This is different from the odds which are probabilities of an event occurring; the odds ratio is the natural log base, e , to the

exponent, B , where B is the parameter estimate. For example, in Table 53, the odds ratio ($\text{Exp}(B)$) for the amount of rice sold is 1.1252. The odds ratio is the predicted change in the odds for a unit increase in the corresponding independent variable. Odds ratios that are less than 1 correspond to decreases in the odds; odds ratios that are greater than 1.0 correspond to increases in the odds; an odds ratio equal to 1.0 means that the respective independent variable has no effect on the dependent variable; and an odds ratio close to 1.0 means that the respective independent variable almost has no effect on the dependent (Wuensch, 2008). According to this explanation, the data presented in Table 55 show that, for one unit increase in the years of schooling (going from 0 to 1), we expect a 0.258 increase in the household to be grouped in the highest income group, all other variables in the model remaining constant. According to Tekele (2010) education builds the capacity of people to understand and manage their environment through increased knowledge and adoption of technology in the process of production and marketing.

The odds ratio for a given independent variable denotes the factor by which the odds (income groups) change for a one-unit change in the independent variable. For example, for a unit increase in the amount of rice sold, the odds ratio of a respondent's household being grouped into the highest income quintile versus the first, second, third and fourth income categories was 1.1252 greater, given other variables in the model are held constant. Similarly, a unit increase in access to market information (going from 0 to 1) the odds ratio of the highest income group or category versus the combined middle and lowest income groups or categories was 2.97 greater, given that all of the other variables in the model are held constant. According to Zeberga (2010) and Tekele (2010) access to market information by household selling rice has a considerable effect on increasing the profitability, hence be grouped in the highest income quintile. The results also showed that, for a one unit increase in years of schooling (education), the odds ratio of being

grouped in the highest quintile of income was 1.2943 times. Since the coefficient for age was negative, each additional unit increase in age (years) of the household head reduces the odds of the household being grouped in the highest income group by a factor of about 1.0387. According to Ngailo *et al.* (2007), households headed by younger people are active and could afford to carry out various rice production and marketing activities, since the activities are labour intensive hence grouped in the highest income quintile compared to households headed by older people. For similar reasons, if the respondent was a farmer that reduced the odds ratio of the household being grouped or categorized in the highest income group by a factor of 1.6537. According to NBC (2009), households depending on agriculture showed higher levels of poverty compared to households with at least one member who was employed or self-employed in non-agricultural activities.

4.11 Constraints Related to Rice Production and Marketing

4.11.1 Farmers' constraints related to rice production

Table 54 presents one of the main constraints to production of rice reported by the respondents was rice diseases (77.7%) that caused yield losses and reduced quality of crop products. The same constraint is reported by Fomba (1988, cited by Mghase *et al.*, 2010). This was followed by high cost of inputs (59.2%), high costs of farm operations especially hand weeding (52.2%), and inadequate capital (42%).

Table 54: Constraints related to rice production (n = 157)

Constraints	Response	Percentage
Rice diseases	122	77.7
High costs of inputs	93	59.2
High costs of weeding	82	52.2
Inadequate capital	66	42.0
Floods	36	22.9
Drought	9	5.7
Poor access to extension services	7	4.5
Lack of improved seeds	6	3.8

It was noted that limited cash makes hand weeding the most laborious, time consuming and often expensive. Also weed infestation (such as the witch weed or Striga which is a very serious problem in Kyela) significantly reduces rice yield levels due to ineffective weed management done by hand weeding (Mbwaga, 2002). Other minor constraints were floods (22.9%), drought (5.7%), poor access to extension services in some villages, and lack of improved seeds as indicated. Extension services are required to help farmers enhance their production and address marketing constraints through capacity building or training.

4.11.2 Constraints related to rice marketing by farmers

Marketing rice also faces many challenges, results in Fig. 12 present constraints related to rice marketing as reported by farmers. The main marketing constraints were listed as: low price of produce (85.1%), lack of standard measurements (76%) as traders preferring using deformed and expanded plastic buckets which they provide at the time of buying, moving with them from one place to another. When farmers provide similar buckets of similar volume, they are not accepted by traders.

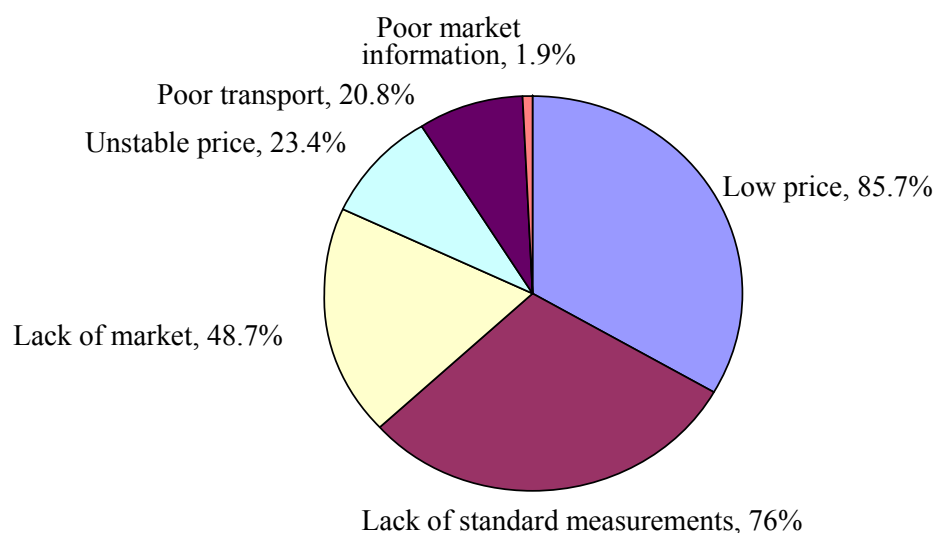


Figure 12: Marketing Constraints Listed by Farmers

Other constraints that were listed included unstable price (26.6%) and poor physical infrastructure (25.3%). Lack of passable roads for rural residents, especially those residing in remote areas was also a constraint to transporting rice produce to market places. Poor roads also increase the marketing cost (UN, 2002; IFAD, 2012). Poor access to marketing information was mentioned by a small proportion of respondents (1.9%).

These results are in line with a report by URT (2010), which indicates that the slow growth of agriculture was a result of a combination of many factors, which include: poor infrastructure, inadequate extension services, poor technology of production, low value addition, lack of financing mechanism for agriculture, unreliable markets, unfair and uncompetitive farm-gate prices, and environmental degradation.

4.11.3 Farmers' suggestions for improvement

Farmers presented a number of suggestions for addressing the listed constraints are presented in Table 55. About 91.6% of the respondents suggested that the government,

through the relevant authorities, should monitor and advocate the use of standard weighing balances to be used by all traders while buying and selling rice. Moreover, about five-eighths (62.3%) of the respondents suggested provision of credits with low interest rates to be availed to farmers so that they may have enough capital for different farm operations, especially for buying inputs. The farmers also suggested improving the availability of markets (46.1%) and infrastructure improvement, especially feeder roads for easy transport throughout the year (23.4%),

Table 55: Farmers' suggestions for improvement (154)

Suggestions	Frequency	%
Use of weighing balances	141	91.6
Provision of credit	96	62.3
Provide market	71	46.1
Government improving infrastructure/roads	36	23.4
Farmers forming groups or organizations	28	18.2
Government providing training on production and marketing	25	16.2
Government removing or educing levies	11	7.1
Provision of improved rice varieties	7	4.5
Marketing information being readily available to small scale farmers	2	1.3

4.12 Rice marketing constraints according to traders and miller-traders

4.12.1 Marketing constraints listed by traders

Table 56 presents the most common constraints perceived traders. The results show that the main constraints were unstable price of produce, high market fee and inadequate capital for investment in marketing. This was mainly due to failure of some traders to get loans from financial institutions due to high interest rates. This led to shortage of rice supply, especially during lean months between January and April. The shortage of rice

supply was attributed to low production of rice, disposal of large amount of rice during harvesting season (May to June), poor infrastructure in the production areas and high local government rice produce fee/levies for farmers and traders.

Table 56: Proportions (%) of traders showing different constraints related to rice marketing activities

Constraints	Market centre		Overall
	Kalumbulu (22)	Ipinda (22)	
Low price	19	36	27.9
Inadequate capital	23.8	45.5	34.9
Unstable price	71.4	50	60.5
Fluctuating rice supply	23.8	18.2	20.9
Poor infrastructure	14.3	18.2	16.3
High market fee	47.3	18.2	41.9

The order in which the traders presented the constraints differed between the two main rice markets. At Ipinda market unstable price (50%) and inadequate capital (45.5%) ranked highest followed by low price of produce (36%). At Kalumbulu market the ranking order was; unstable price (71.4%), high market fee or levies (47.3%). fluctuating rice supply and inadequate capital (23.8%)

4.12.2 Marketing constraints as listed by miller-traders

Table 57 presents the most common constraints perceived rice miller-traders at Ipinda and Kalumbulu rice market centres, in Kyela District. The majority of the respondents at Ipinda centre mentioned inadequate capital, high competition, high market levy, instability of selling price and lack of means of transport in that order of importance to be among the main constraints. Other constraints were, default milling parts, instability of selling price, and fluctuation of rice production. This result is in agreement with the study by Mghogho *et al.* (2005). However, almost similar proportions of the miller-traders across the study areas showed the presence of constraints pertaining to the rice processing and marketing activities.

Table 57: Proportions (%) of miller-traders showing different constraints related to rice processing and marketing activities

	Kalumbulu (n = 15)	Ipinda (n = 15)	Whole Sample (N = 30)	Chi-square
Presence of constraints	12 (80)	9 (60)	21 (70)	1.4229 ^{ns}
Yes				
No	3 (20)	6 (40)	9 (30)	
Constratints				
Inadequate capital	71.4	28.6	33.3	
Unstable prices	60.0	40.0	23.8	
Fluctuating rice supply and demand	50.0	50.0	50	
High market fee	66.7	33.3	23.8	
Lack of transport	60.0	40.0	38.6	
High competition	71.4	28.6	33.3	
Destruction of milling parts	41.7	58.3	57.1	
Poor supply of electricity	55.0	45.0	95.2	

Note: n = number of respondents; ns = not significant ($P > 0.05$).

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study was conducted primarily to analyze rice market performance in relation to poverty reduction in Kyela District. Market channel, structure, conduct and performance of rice marketing system were analyzed to establish the efficiency of the marketing system. Furthermore, the well being levels among households that grew and sold rice were compared. In addition, the likelihood of rice farmers, traders and miller-traders being grouped in the highest income quintile per adjusted adult equivalent for 28 days was determined. In this section, conclusions are made based on the findings and in relation to the specific objectives of the study.

5.1.1 Rice market channels

Before trade liberalization from the mid-1960s to the 1980s, the rice marketing system in Tanzania was characterized by a single market channel. The free market has created a favourable environment for private rice traders to engage openly in rice marketing. This is an opportunity for increasing the efficiency of the marketing system. It is concluded from this finding that five well-established informal marketing channels exist in Kyela District. There are five main rice marketing channels in the area: The first channel was from farmers directly to consumers, the second channel was from farmers sold directly to miller-traders, who sold to consumers. The third channel moved rice from farmers to village based traders or village collectors or assemblers who sold to wholesalers and retailers who finally sold to consumers. The fourth channel moved rice from farmers directly to travelling traders without involving brokers. The travelling traders then sold to wholesalers and retailers then lastly to consumers. The fifth channel was similar to the

fourth channel, but in this case rice moved from farmers directly to travelling traders without involving brokers. The study identified six rice marketing participants, among them were farmers, village collectors or assemblers, wholesalers, retailers, miller-traders, travelling traders. The most important role played along the market chain are: cultivating and harvesting, drying, buying, selling, transporting, storage and milling.

5.1.2 Market structure

Market structure was analysed to examine the competitive process in rice marketing in terms of entry barriers, distribution of market information transparency and buyer concentration. The findings show that market reforms in Tanzania have led to changes in the rice market structure, conduct and performance. Consequently, the rice market can be characterized according to different measures of competition as follows.

(a) Barriers to market entry

It can be generally concluded that market entry was not a serious problem because the barriers did not really prevent rice traders from entering the market. According to the miller-traders, expansion of the rice business was mainly constrained by lack of electricity, investment capital, high taxes and a low supply of rice. However, farmers were of the opinion that lack of capital for investment and credit for operational expenses constituted the main hindrance towards strategic rice production and marketing.

(b) Market transparency

Most of surveyed households acquired market information from traders, which was easy to obtain. Farmers, traders and miller-traders were aware of the prevailing price for the market they participated in. Most of the market participants made marketing decisions on the basis of prevailing or historical prices of the produce. Farmers rely mostly on traders to

access price information, which limits them (farmers) to negotiate for better prices for their produce or search for alternative markets that offer higher prices.

Respondents used various modes to obtain information such as by: cross-checking with different buyers or sellers, direct visit to the market places, receiving information from their friends, and also by using mobile phones. The findings show that personal contacts were the main source of information for the majority of the respondents.

(c) Buyer concentration

From this study there was a slightly high level of buyer concentration and consequently indicating inefficiency in the structure of rice market. This reflects that the distribution of returns from rice sales were not fairly distributed among market actors; rather, the benefits were squeezed in favour of traders and to the disadvantage of farmers. The results indicated that differences existed in the Gini-coefficients of rice traders and rice miller-traders.

The market for rice in this area involved different actors dominated by assemblers, wholesalers and retailers. The presence of a large number of different actors suggests that the market was competitive since it was not in the hands of few traders or actors. It is concluded from this finding that there was completely no formal collusion or cooperation in determining buying and selling prices or mode of payment to be adopted, though prices from one trader passed to others by word of mouth from trader to farmer, farmer to farmer and possibly trader to trader. Most of the traders bought rice from farmers, except for a few who bought from middlemen, wholesalers and from miller-traders.

Factors that accounted for price differences at various nodes in the market channel included were transaction costs, type of variety, demand and supply in relation to seasonality. Most traders indicated that the price at which they sold their produce was determined by prevailing conditions in the market at the time of selling. Though traders bought rice independently at varied prices and marketing costs, the selling prices from one trader to another was almost equal, implying that traders sold their rice at a higher price, other sellers would outcompete them by offering lower prices; and if all traders raised their prices to match, rice would flow in from other districts and regions to exploit the higher prevailing price.

5.1.3 The overall performance of rice marketing sub-system

Market performance refers to economic results that include effectiveness, productivity and profitability. In this study rice marketing performance was examined by analyzing marketing costs, price margins and profitability among the different rice marketing activities in order to measure the degree of market efficiency

Analysis of the market performance revealed that profit margins at the traders' level were higher compared to miller-traders and farmers. That is to say business was more profitable trades relative to the other market actors. On this basis, it is concluded that traders seemed to have more market power than other market participants. However, it is generally concluded that the market system in the area was inefficient owing to relatively low market efficiency, mostly attributed to low pricing efficiency.

For all categories of market actors, it was established that as the price of selling rice increased, market margins also increased and vice versa. However, as the price of buying price increased, the marketing margin decreased and vice versa. These findings imply that

selling prices were relatively more stable than buying prices. Also selling prices at miller-traders' were observed to be more stable than corresponding buying prices. In addition, miller-traders' marketing margins were independent of the selling prices.

5.1.4 Well-being levels among household selling rice

Rice is the most important cash crop in terms of income in Kyela, and it influences the household's income and food security hence poverty reduction in the area. It was noted that rice marketing has a significant contribution to household food security and income improvement. Trader households earned significantly ($p < 0.001$) higher income (Tsh. 4 226 307.21/=) from selling rice than farmer (2 226 307.21 TZS) and miller-traders (336 158.34 TZS) respectively), which implies that was a significant difference in net income levels among rice farmers, traders and miller-traders. However, analysis of dietary energy intake revealed that there was no significant difference ($P > 0.05$) in dietary energy intake among the three studied groups (farmers, traders and miller-traders).

Another measure of poverty based on the Pa ratio revealed a Pa value of (0.016), for traders followed by the Pa ratio of 0.188 for miller-traders and (0.327) for farmers. On the basis of these findings, it is concluded that the well being levels of rice farmers were the lowest while those of the rice traders were the highest.

5.1.5 Likelihood of households involved in selling rice being grouped into higher income quintile

The results of the ordinal logistic regression established that the type of household, i.e. trader, access to market information, age of household, years of schooling of the household head and the amount of rice sold were the main determinants of households being grouped into higher income quintile. Among the three household categories that were involved in

selling rice, traders had the highest likelihood of being grouped into a higher income group or quintile, followed by miller-traders and lowest for farmers. The implication of this result is that trader households were the richest as compared to miller and farmer households.

5.2 Recommendations

Based on the empirical findings and conclusions from this study, a number of recommendations are made in order to improve the well-being levels of households that are involved in producing and selling rice in Kyela District. To facilitate their consideration, the recommendations are presented by category in relation to different organizational levels of the marketing process. Thus, recommendations are given in relation to national (policy), district, research centre and household levels. Improved rice marketing performance can help farmers, traders and miller-traders to get out of low rice productivity, poor access to market information, poor access to credit, low income and food insecurity thereby improving their wellbeing. In order to enhance poverty reduction through rice marketing in the study area, the following recommendations are given.

5.2.1 Policy recommendations

(i) Provision of credit

Credit plays an important role in boosting rice production and marketing. Financing of rice production and marketing enterprise require access to affordable credit facilities for production and marketing activities. Availability of credit would enable farmers to increase the area under rice production and rice productivity. Thus, there is a need for the government to create a more conducive environment for financial institutions to lend to rice farmers, traders and miller-traders at reasonable interest rates.

(ii) Improving road infrastructure

Poor infrastructure increases the cost of production and marketing and other risks of delivering crop products to the market. Poor road infrastructure makes the farmers more vulnerable as traders exploit them; buying their produce at very low prices at the farm gate since farmers are unable to transport their produce to nearby market places (Kalumbulu or Ipinda). It is therefore recommended that development of the road infrastructures; especially rural roads, should be improved including construction of new roads and rehabilitating feeder roads to make all roads passable throughout the year, which will reduce transport costs for all actors in the chain. This will enable farmers to transport their agricultural produce to better market places in Kyela or even in nearby districts and regions thus, increasing profit margins to farmers, traders and miller-traders.

(iii) Promoting education, training in production and marketing through extension services

The government should make policies that will promote awareness among rice farmers to improve the adoption of new technologies such as the use of recommended agronomical packages to improve yield. The quantity of rice produced within the household level affects the level of supply of rice in the market. Rice productivity can be improved by full utilization of improved technologies from agricultural research institutes, particularly Uyole Agricultural Centre that is in Mbeya Region. The research station should establish of demonstration plots within farmers' locations to enable farmers to emulate the improved agricultural practices thereby improving rice production. Also, farmers need to be encouraged to use higher yielding rice varieties to get high yields from their small plots. This calls for the government to allocate adequate funds for agricultural research to develop new rice varieties which will have superior aroma and hence attract farmers to accept the varieties.

(iv) Establishment of rice selling centres

In the district, there is heavy dependency on Kalumbulu and Ipinda market places for rice supply. Rice is mostly purchased from villages, to ensure regularity of supply. The government is urged to establish rice marketing centres (major depots run by wholesalers) in the district where consumers can frequently access the produce at a minimum cost. Also, the Government, through research centres, should promote production of rice by irrigation for regular supply.

Lack of organized selling points at village level gives other actors (traders or miller-traders) an upper negotiating hand. Within the village, price can vary significantly depending on how informed the farmer is. Improving access of farmers, traders and miller-traders to agricultural market through improving rural market facilities is needed. The market problems mentioned under section 4.12.2 adversely affect the production and marketing of rice. The good price of the rice produce in Kyela district could presumably be ensured through promotion of exportation and initiation of contract farming by the district council.

(v) Improvement of accessibility of market information

It was common to find most farmers relying on other farmers as a source of information regarding prices and buyers. If reliable market information was available, farmers would compare prices and decide where and when to sell their produce. Therefore, there is a great need by the government through extension officers, village leaders and district officials to make sure that information is available at the right time and place. This could be done through regular visits by extension officers to farmers, putting on notice boards of village offices, advertisements on radio and TV and news papers. Indeed, the government should assist with compilation, retrieval and dissemination of market information that should trickle down to all relevant stakeholders.

5.2.2 District level recommendations

The District Council should pay attention to quality control and make sure standard metric scales are used during buying and selling rice. Additionally, there should be a way of monitoring fees/levies being collected from rice; some of it should be directed to the improvement of the rice sector.

5.2.5 Household level recommendations

- (i) In view of the fact that local seeds are commonly used in the study area, and that were among the reasons for low yield, the farmers are advised to contact extension workers and researchers for attaining extension services such as husbandry practices in order increase rice yield per unit area.
- (ii) Farmers are advised to organize themselves into farmer groups to facilitate their access to credit from financial institutions. Formation of strong farmers' groups or cooperatives will help to minimize the unfair tendencies of middlemen during marketing of the produce. Farmers are also encouraged to search for market information by using different sources rather than depending mainly on buyers. This will enable them to choose the best channel for getting better prices for their produce, which will lead to raising income and thus improving their living conditions.
- (iii) It was also suggested that rice farmers should think about how to increase their gross margins, the farmers can increase gross margin through value addition. At the farm level farmers are urged to add value to the produce by storage and selling during periods when prices are reasonably higher. Also farmers are encouraged to use standard metric scales whenever selling their produce. Also their immediate

aim should be to produce what they could be able to sell and not to sell what they produce i.e. farmers need planning of what to sell prior to production.

- (iv) Further, it is suggested that all problems facing the farmers, traders and miller-traders should be addressed by the government and other stakeholders to make the rice business a more paying enterprise.

5.3 Suggested Areas for Further Research

- (i) Since rice market performance may change over time and well-being levels may vary geographically, a similar study is recommended to be conducted in other parts of Tanzania to establish the extents to which rice market performance affect poverty and well being in those areas.
- (ii) Research is also required to ascertain how Tanzania's farmers, traders and miller-traders can be effectively co-coordinated to be more experienced in rice marketing to function in both domestic and international markets. Research along these lines will produce essential information on alternative approaches to be used for improving rice marketing performance and hence improve well being levels of the households in Kyela District.

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APPENDICES

Appendix 1: Operational definitions and levels of measurement of variables of the research

Variable	Operational definition	Level of measurement	Units of measurement
Farmer	Person who grow rice	Dummy	0 = Not farmer 1 = Farmer
Level of education	<ul style="list-style-type: none"> Highest level of formal education attained 	Nominal	1 = None 2= Primary 3 = Secondary 4 = Tertiary
Trader	<ul style="list-style-type: none"> Years of schooling Person dealing with selling rice	Ratio Dummy	Actual numbers 0 = Not trader 1 = Trader
Miller	Person who deals with rice husking before selling	Dummy	0 = Not miller 1 = Miller
Market transparency	Information transmission in the marketing system. Information about prices, grades and standard	Dummy	0 = No access to information 1 = Have access to information
Barrier to market entry	Restriction imposed on entry into the rice marketing system	Dummy	0 = No barriers 1 = Barriers to entry/exist
Marketing margins	Differences between prices at different market levels	Ratio	TZS
Gross margins	Total revenue minus total variable costs	Ratio	TZS
Market efficiency	A level of performance that uses the lowest amount of inputs to create the greatest amount of output.(return per shilling invested)	Ratio	TZS
Poverty	Low income and low dietary energy consumed	Ratio Dummy	TZS and kCal 0 = Poor, food insecure 1 = Non poor, food secure
Poverty reduction	Increase in income and dietary energy consumed	Ratio	TZS and kCal
Income	Net monetary value of products produced and services offered	Ratio	TZS
Change in income	Annual change of household earnings in monetary terms	Ratio	TZS
Income expenditure	Income used to meet household needs	Ratio	TZS
Market transparency	Information transmission in the marketing system. Information about prices, grades and standard	Dummy	0 = No access to information 1 = Have access to information

Appendix 2: proportion of miller-traders selling processed rice?

Opinion of miller-traders	Market centre		Overall (n = 30)
	Kalumbulu (n = 15)	Ipinda (n = 15)	
Yes	6 (40.0)	2 (13.3)	8 (26.7)
No	9 (60.0)	13 (86.7)	22 (73.3)

Appendix 3: Opinion of traders pertaining to initial capital

	Opinion	Frequency	Percentage
Do you have enough initial capital?	Yes	12	27.3
	No	32	72.7
Do you had ever requested for credit	Yes	16	36.4
	No	28	63.6
Reasons for not accessing credit	No knowledge of credit	2	7.1
	Procedure is restrictive	11	39.3
	High interest rate	15	53.6

Appendix 4: Estimate of Gini Coefficient for rice traders

Frequency of traders	Cumulative frequency of traders	Percentage of traders	Percentage cumulative frequency (X)	Total sales (N)	Percentage of total sales	Cumulative of % total sales(Y)	XY
1	1	2.5	2.5	288	6.51	6.51*	0.001628
1	2	2.5	5	204	4.61	11.12	0.00278
1	3	2.5	7.5	200	4.52	15.64	0.00391
1	4	2.5	10	200	4.52	20.16**	0.00504
1	5	2.5	12.5	198	4.47	24.63	0.006158
1	6	2.5	15	196	4.43	29.06	0.007265
1	7	2.5	17.5	192	4.34	33.4	0.00835
1	8	2.5	20	190	4.29	37.69***	0.009423
1	9	2.5	22.5	189	4.27	41.96	0.01049
1	10	2.5	25	189	4.27	46.23	0.011558
1	11	2.5	27.5	180	4.07	50.3	0.012575
1	12	2.5	30	173	3.91	54.21	0.013553
1	13	2.5	32.5	156	3.53	57.74	0.014435
1	14	2.5	35	150	3.39	61.13	0.015283
1	15	2.5	37.5	120	2.71	63.84	0.01596
1	16	2.5	40	108	2.44	66.28	0.01657
1	17	2.5	42.5	100	2.26	68.54	0.017135
1	18	2.5	45	100	2.26	70.8	0.0177
1	19	2.5	47.5	100	2.26	73.06	0.018265
1	20	2.5	50	100	2.26	75.32	0.01883
1	21	2.5	52.5	84	1.90	77.22	0.019305
1	22	2.5	55	80	1.81	79.03	0.019758
1	23	2.5	57.5	75	1.69	80.72	0.02018
1	24	2.5	60	72	1.63	82.35	0.020588
1	25	2.5	62.5	70	1.58	83.93	0.020983
1	26	2.5	65	66	1.49	85.42	0.021355
1	27	2.5	67.5	60	1.36	86.78	0.021695
1	28	2.5	70	56	1.27	88.05	0.022013
1	29	2.5	72.5	56	1.27	89.32	0.02233
1	30	2.5	75	56	1.27	90.59	0.022648
1	31	2.5	77.5	55	1.24	91.83	0.022958
1	32	2.5	80	49	1.11	92.94	0.023235
1	33	2.5	82.5	48	1.08	94.02	0.023505
1	34	2.5	85	48	1.08	95.1	0.023775
1	35	2.5	87.5	42.5	0.96	96.06	0.024015
1	36	2.5	90	40	0.90	96.96	0.02424
1	37	2.5	92.5	40	0.90	97.86	0.024465
1	38	2.5	95	40	0.90	98.76	0.02469
1	39	2.5	97.2	30	0.68	99.44	0.02486
1	40	2.5	100	25	0.56	100	0.001628
				4425.5	100		0.6535

Mean sale = 110.64 bags, Gini Coefficient = $1 - \sum XY$ i.e $1 - 0.6535$ is 0.3465 approximately 0.35

Appendix 5: Estimate of Gini Coefficient for rice miller-traders

Frequency of miller	Cumulative frequency of miller-traders	Percentage of miller-traders	Percentage cumulative frequency (X)	Total sales (N)	Percentage of total sales	Cumulative of % total sales (Y)	YX
1	1	12.5	12.5	120	18.24	18.24*	0.0228
1	2	12.5	25	110	16.72	34.96	0.0437
1	3	12.5	37.5	100	15.2	50.16	0.0627
1	4	12.5	50	96	14.59	64.75**	0.080938
1	5	12.5	62.5	90	13.68	78.43	0.098038
1	6	12.5	75	70	10.64	89.07	0.111338
1	7	12.5	87.5	50	7.59	96.66	0.120825
1	8	12.5	100	22	3.34	100	0.125
8		100		658	100		0.665338

Mean sale = 82.25bags, Gini Coefficient = $1 - \sum XY$ i.e $1 - 0.665338$ is 0.334662 approximately 0.34

Appendix 6: Return at farm level 2008/2009/hectare

S/N	Parameters	Value
1	Area under cultivation	2.50
2	Total output (150 kg bag)	15.00
3	Average selling price	60 056.00
4	Gross revenue per hectare (2 x 3)	900 840.00
5	Hiring land cost/hectare	80 664.08
6	Land clearing	64 312.5
7	Ploughing/cultivation	66 406.25
8	Seeds	54 414.05
9	Planting	55 048.75
10	Fertilizers	106 021.80
11	Fertilizer application	19 103.25
12	Weeding	159 414.10
13	Bird scaring	103 205.10
14	Harvesting	119 779.40
15	Cost of bags	14 885.95
16	Cost of sisal twine	4091.40
17	Transport costs	39550.00
18	Total costs	886 896.5
19	Gross margin (4 – 18)	13 943.50
20	Return per shilling of land rented (19)/(5)	0.4325
21	Return per shilling invested (19)/(18)	0.016
22	Return per bag harvested (19)/(2)	929.56

Appendix 7: Profit margin analysis for rice traders

S/N	Parameters	Value
1.	Quantity of rice (150 kg bags)	110.6
2.	Buying price per 150 kg bag	48744.39
3.	Purchasing cost (1)x(2) (TZS)	5 361 883.00
4.	Transport	192,000.00
5.	Market fee	11 273.40
6.	Labour charges	110 600.00
7.	Taxes/levies	105 730.60
8.	Empty bag	55 300.00
9.	Miscellaneous (bags, twines needless)	11 000.00
10.	Drying	49 225.00
11.	Husking	276 500.00
12.	Total cost incurred (3-11)	6 173 512.00
13.	Average selling price per bag of 100 kg (milled rice)	122 120.50
14.	Gross revenue(80 bags)x(13)	9 769 640.00
15.	Gross margin (14)-(12)	1 240 875.84
16.	Returns per bag of rice (15)/ (80 bags) (TZS)	15 510.95
17.	Return per shilling invested (15)/(12) (TZS)	0.201

Appendix 8: Profit margin analysis for rice miller-traders

S/N	Parameters	Value
1.	Quantity of rice (150 kg bags)	68.28
2.	Buying price per 150 kg bag	59 500.00
3.	Purchasing cost (1)x(2) (TZS)	4 062 660.6
4.	Transport	105 000.00
5.	Market fee	88 167.70
6.	Labour charges	93 600.00
7.	Empty bag	46 800.00
8.	Taxes/levies	125 625.00
9.	Miscellaneous (twines needless)	15 700.00
10.	Drying	41 125.00
11.	Husking	144 000.00
12.	Total cost incurred (3-11)	4859410.00
13.	Average selling price per bag 100kg (milled rice)	111 250.00
14.	Gross revenue(59.19 bags)x(13)	5 806 137.56
15.	Gross margin (14)-(12)	946 727.5
16.	Returns per bag of rice (15)/ (1) (TZS)	14 612.77
17.	Return per shilling invested (15)/(12) (TZS)	0.196

Appendix 9: Data of incomes of the 134 farmer households

1	2	3	4	5	6
	Freq	Percent of the poor getting the income	Income as a percentage of total income	Cumulative percent of the population getting the income	Cumulative income as percentage of total income
Income of the poor					
303 264.64	1	0.75	1.71	0.75	1.71
301 285.30	1	0.75	1.69	1.50	3.40
298 101.60	1	0.75	1.68	2.24	5.08
297 228.20	1	0.75	1.67	2.99	6.75
297 036.20	1	0.75	1.67	3.74	8.43
293 772.00	1	0.75	1.65	4.48	10.08
289 215.40	1	0.75	1.63	5.23	11.71
283 743.20	1	0.75	1.60	5.97	13.30
279 614.30	1	0.75	1.57	6.72	14.87
270 387.20	1	0.75	1.52	7.47	16.40
269 142.70	1	0.75	1.51	8.21	17.91
266 842.90	1	0.75	1.50	8.96	19.41
261 342.70	1	0.75	1.47	9.71	20.88
254 940.10	1	0.75	1.43	10.45	22.32
252 433.20	1	0.75	1.42	11.20	23.74
251 325.10	1	0.75	1.41	11.94	25.15
243 868.50	1	0.75	1.37	12.69	26.52
237 661.60	1	0.75	1.34	13.44	27.86
234 554.80	1	0.75	1.32	14.18	29.18
233 489.60	1	0.75	1.31	14.93	30.49
226 457.80	1	0.75	1.27	15.68	31.77
222 921.10	1	0.75	1.25	16.42	33.02
215 662.30	1	0.75	1.21	17.17	34.23
215 095.20	1	0.75	1.21	17.91	35.44
211 106.50	1	0.75	1.19	18.66	36.63
208 373.20	1	0.75	1.17	19.41	37.80
204 385.00	1	0.75	1.15	20.15	38.95
203 751.30	1	0.75	1.15	20.90	40.10
203 125.30	1	0.75	1.14	21.65	41.24
200 129.40	1	0.75	1.13	22.39	42.37
196 807.40	1	0.75	1.11	23.14	43.48
196 272.40	1	0.75	1.10	23.88	44.58
194 783.60	1	0.75	1.10	24.63	45.68
189 838.90	1	0.75	1.07	25.38	46.74
186 133.90	1	0.75	1.05	26.12	47.79
185 804.50	1	0.75	1.05	26.87	48.84
185 020.10	1	0.75	1.04	27.62	49.88
181 771.50	1	0.75	1.02	28.36	50.90
180 995.50	1	0.75	1.02	29.11	51.92
172 805.80	1	0.75	0.97	29.85	52.89
167 016.90	1	0.75	0.94	30.60	53.83

1	2	3	4	5	6
	Freq	Percent of the poor getting the income	Income as a percentage of total income	Cumulative percent of the population getting the income	Cumulative income as percentage of total income
Income of the poor					
164 169.80	1	0.75	0.92	31.35	54.75
162 270.60	1	0.75	0.91	32.09	55.67
158 778.40	1	0.75	0.89	32.84	56.56
158 320.20	1	0.75	0.89	33.59	57.45
155 425.90	1	0.75	0.87	34.33	58.32
154 837.10	1	0.75	0.87	35.08	59.20
154 565.10	1	0.75	0.87	35.82	60.06
154 022.20	1	0.75	0.87	36.57	60.93
150 011.30	1	0.75	0.84	37.32	61.78
146 072.60	1	0.75	0.82	38.06	62.60
141 368.70	1	0.75	0.80	38.81	63.39
141 316.10	1	0.75	0.80	39.56	64.19
138 634.00	1	0.75	0.78	40.30	64.97
136 421.00	1	0.75	0.77	41.05	65.73
130 573.10	1	0.75	0.73	41.79	66.47
130 565.40	1	0.75	0.73	42.54	67.20
129 130.60	1	0.75	0.73	43.29	67.93
127 978.10	1	0.75	0.72	44.03	68.65
126 911.10	1	0.75	0.71	44.78	69.36
124 679.30	1	0.75	0.70	45.53	70.07
123 693.50	1	0.75	0.70	46.27	70.76
123 362.00	1	0.75	0.69	47.02	71.46
122 983.30	1	0.75	0.69	47.76	72.15
121 348.80	1	0.75	0.68	48.51	72.83
117 206.00	1	0.75	0.66	49.26	73.49
116 799.90	1	0.75	0.66	50.00	74.15
115 064.60	1	0.75	0.65	50.75	74.79
114 366.80	1	0.75	0.64	51.50	75.44
114 208.10	1	0.75	0.64	52.24	76.08
113 854.20	1	0.75	0.64	52.99	76.72
113 757.90	1	0.75	0.64	53.74	77.36
113 684.20	1	0.75	0.64	54.48	78.00
112 233.50	1	0.75	0.63	55.23	78.63
109 028.80	1	0.75	0.61	55.97	79.24
108 961.80	1	0.75	0.61	56.72	79.86
108 066.10	1	0.75	0.61	57.47	80.47
105 908.60	1	0.75	0.60	58.21	81.06
105 763.90	1	0.75	0.60	58.96	81.66
103 449.50	1	0.75	0.58	59.71	82.24
102 243.50	1	0.75	0.58	60.45	82.81
101 912.00	1	0.75	0.57	61.20	83.39
99 943.06	1	0.75	0.56	61.94	83.95
96 321.06	1	0.75	0.54	62.69	84.49

1	2	3	4	5	6
	Freq	Percent of the poor getting the income	Income as a percentage of total income	Cumulative percent of the population getting the income	Cumulative income as percentage of total income
Income of the poor					
92 016.64	1	0.75	0.52	63.44	85.01
89 838.91	1	0.75	0.51	64.18	85.51
88 873.99	1	0.75	0.50	64.93	86.01
86 636.00	1	0.75	0.49	65.68	86.50
85 631.65	1	0.75	0.48	66.42	86.98
83 726.85	1	0.75	0.47	67.17	87.45
80 631.05	1	0.75	0.45	67.91	87.91
80 400.77	1	0.75	0.45	68.66	88.36
79 859.63	1	0.75	0.45	69.41	88.81
78 079.95	1	0.75	0.44	70.15	89.25
76 594.81	1	0.75	0.43	70.90	89.68
76 358.03	1	0.75	0.43	71.65	90.11
69 865.32	1	0.75	0.39	72.39	90.50
68 262.05	1	0.75	0.38	73.14	90.89
64 565.28	1	0.75	0.36	73.88	91.25
64 388.56	1	0.75	0.36	74.63	91.61
64 385.49	1	0.75	0.36	75.38	91.97
64 224.62	1	0.75	0.36	76.12	92.34
63 662.84	1	0.75	0.36	76.87	92.69
61 968.56	1	0.75	0.35	77.62	93.04
61 513.10	1	0.75	0.35	78.36	93.39
61 344.42	1	0.75	0.35	79.11	93.73
59 498.13	1	0.75	0.33	79.85	94.07
58 063.92	1	0.75	0.33	80.60	94.39
56 842.08	1	0.75	0.32	81.35	94.71
56 007.48	1	0.75	0.32	82.09	95.03
54 691.25	1	0.75	0.31	82.84	95.34
53 106.74	1	0.75	0.30	83.59	95.64
51 561.77	1	0.75	0.29	84.33	95.93
50 544.58	1	0.75	0.28	85.08	96.21
45 534.67	1	0.75	0.26	85.82	96.47
44 749.92	1	0.75	0.25	86.57	96.72
44 743.68	1	0.75	0.25	87.32	96.97
43 753.28	1	0.75	0.25	88.06	97.22
43 720.27	1	0.75	0.25	88.81	97.46
40 544.10	1	0.75	0.23	89.56	97.69
40 257.65	1	0.75	0.23	90.30	97.92
38 733.14	1	0.75	0.22	91.05	98.13
37 713.49	1	0.75	0.21	91.79	98.35
37 486.88	1	0.75	0.21	92.54	98.56
37 474.52	1	0.75	0.21	93.29	98.77
34 409.38	1	0.75	0.19	94.03	98.96
30 294.22	1	0.75	0.17	94.78	99.13

1	2	3	4	5	6
	Freq	Percent of the poor getting the income	Income as a percentage of total income	Cumulative percent of the population getting the income	Cumulative income as percentage of total income
Income of the poor					
29 171.00	1	0.75	0.16	95.53	99.30
27 445.06	1	0.75	0.15	96.27	99.45
24 473.96	1	0.75	0.14	97.02	99.59
22 778.63	1	0.75	0.13	97.76	99.72
19 509.73	1	0.75	0.11	98.51	99.83
15 915.71	1	0.75	0.09	99.26	99.92
15 530.28	1	0.75	0.09	100.00	100.00
17 775 102.00	134	100.00	100.00		

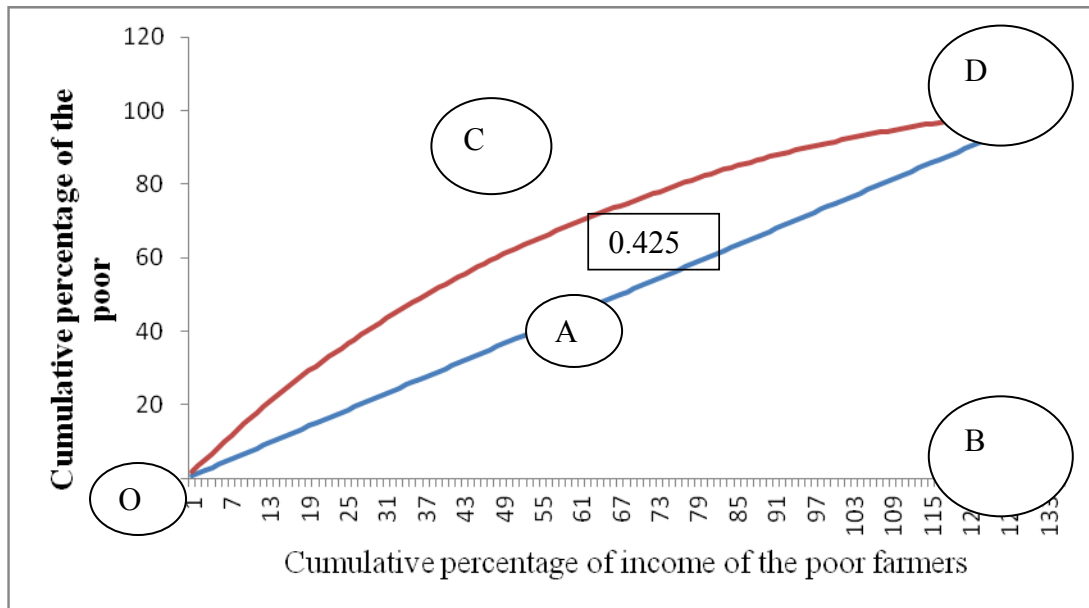
NB: Data in this table was used to plot the Lorenz curve of the poor farmer households

Appendix 10: Data of incomes of 13 miller households

1	2	3	4	5	6
Income of the poor	Freq	Percent of the poor getting the income	Income as a percentage of total income	Cumulative percent of the population getting the income	Cumulative income as percentage of total income
240 000.00	1	7.69	16.2	7.69	16.18
187 824.15	1	7.69	12.7	15.38	28.84
164 482.70	1	7.69	11.1	23.07	39.93
151 951.05	1	7.69	10.2	30.77	50.17
130 565.35	1	7.69	8.8	38.46	58.98
127 184.51	1	7.69	8.6	46.15	67.55
115 691.67	1	7.69	7.8	53.84	75.35
76 358.03	1	7.69	5.1	61.54	80.50
72 620.79	1	7.69	4.9	69.23	85.39
58 063.92	1	7.69	3.9	76.92	89.31
57 904.55	1	7.69	3.9	84.61	93.21
51 729.57	1	7.69	3.5	92.31	96.70
48962.01	1	7.69	3.3	100.	100.00
1483338.30	13	100.00	100.00		

NB: data in this table was used to plot the Lorenz curve of the poor miller households

Appendix 11: Computing the GINI coefficient of the rice farmers



In order to find the GINI COEFFICIENT WE NEED TO FIND THE AREA bounded by the Lorenz curve with the line making an angle of 45 with the horizontal axis.

To find this area we need to find the fitting curve for the Lorenz curve from the given data. Therefore, we assume the fitting curve is a polynomial of third degree.

$$Y=AX^3+BX^2+CX+D$$

Where A, B, C and D are coefficients of X

We find the coefficient for the equations above by substituting the given data at points

P1 (0.75, 1.71)

P2 (25.38, 46.74)

P3 (50, 74.15)

P4 (100,100)

We find the coefficients to be

A=0.0000489, B= -0.0182355, C=2.272112 and D=6.2438

The equation of the Lorenz curve is approximately represented as

$$Y=0.0000489X^3-0.0182355X^2+2.272112X+6.2438.$$

This gives equation approximately fit of the given

To find the area we need to integrate the equation from $x = 0$ to $x = 100$ and subtract the area bound by the line making 45 degrees with the horizontal axis thus,

$$\text{Area bounded by Lorenz curve is} = \int_0^{100} (0.0000489X^3 - 0.0182355X^2 + 2.272112X + 6.2438) dx$$

For values of $x = 0.75$ to values of $x=100$ which is

$$\text{Area} = [0.0000122x^4 - 0.0060785x^3 + 1.13556x^2 + 6.2438x] \text{ for } x = 0.75 \text{ to } x = 100$$

$$= 7123.53 \text{ square units}$$

$$\text{Area (B)} = 0.5 * (\text{BASE}) * (\text{HEIGHT})$$

$$\text{Area (B)} = 0.5 * (100) * (100)$$

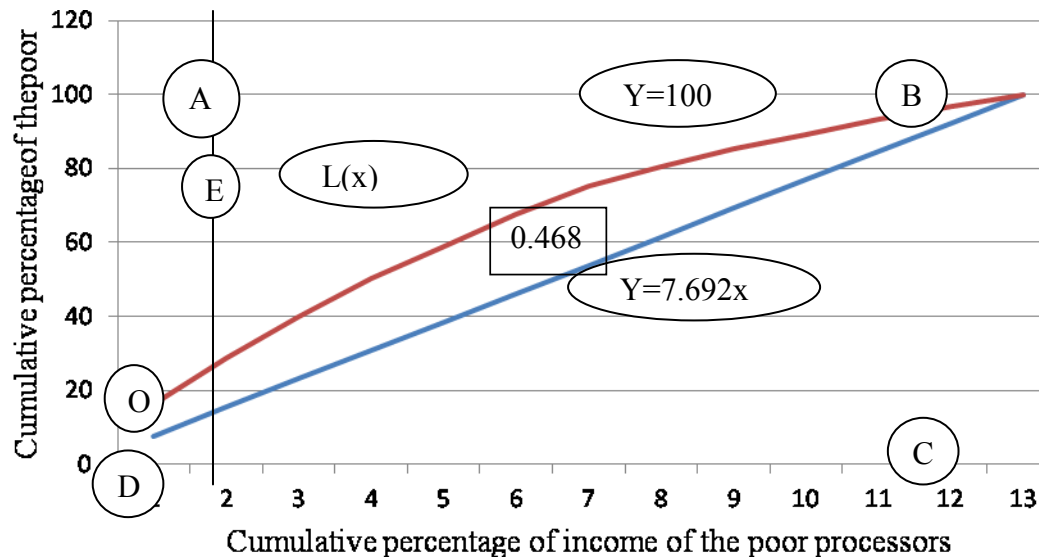
$$\text{Area (B)} = 5000 \text{ square units}$$

GINI = Area between Lorenz curve and diagonal line divided by the area between diagonal line and horizontal axis. Where $(0 \leq \text{GINI} \leq 1)$.

$$\text{GINI} = (7123.53 - 5000) / 5000$$

$$\text{GINI} = 0.42471$$

Appendix 12: Computing the GINI coefficient of the rice miller-traders



- The GINI Coefficient for Miller-traders in this case was calculated by considering the areas under the curve.
- $Y = 100$ which is the horizontal line meeting the Lorenz curve at (13,100) and the Lorenz curve given as $L(X)$, and finally area under the diagonal line with slope 7.962 passing through (10,76.92) and (1,7.692) for which the equation of the line is given by

$$F(X) = 7.692x.$$
- Area bounded by $L(X) = 1300 - \int \{7.692x\} dx$ (integration from $x = 1$ to $x = 13$) Which finally gives area under $L(X)$ equal to 1495.041 square units.
- While the area of the diagonal line is equal to the area of the trapezium (DOBC) = $0.5 * [(7.692) + (100)] * [(13)]$ equal to 700 square units.
- Hence the GINI = area bounded by $L(X)$ with diagonal line divided by the area under the curve of $Y=7.692X$ where $0 \leq \text{GINI} \leq 1$.
- **Therefore GINI Coefficient for miller-traders is 0.4682**

Appendix 13: A copy of the questionnaire used to interview rice farmers

SOKOINE UNIVERSITY OF AGRICULTURE DEVELOPMENT STUDIES INSTITUTE

A Household Questionnaire for Research on:

Qu'naire No.....
Name of HH Head

.....

RICE MARKETING PERFORMANCE AND POVERTY REDUCTION IN KILIMANJARO DISTRICT, TANZANIA

By

Juliana Andagile Mwakasendo

PhD Student

Sokoine University of Agriculture, P. O. Box 3024, Morogoro, Tanzania

INTRODUCTION LETTER

My name is Juliana Andagile Mwakasendo. I am a PhD student at Sokoine University of Agriculture Morogoro, Tanzania. I am conducting a research on **RICE MARKETING PERFORMANCE AND POVERTY REDUCTION**. I would like to know your experience on rice marketing and poverty reduction. This information will be used as a tool by government during planning and decision making with regard to policies, production, marketing and poverty reduction strategies. I would very much appreciate your participation in this research. The interview will not take too much of your time. Whatever information you provide will be kept confidential. I hope that you will participate in this research because your contributions are very important.

Do you have any question concerning this research?

May I begin the interview now?

A. Background information

Name of interviewer _____; Date _____

Name of respondent _____

Division _____ Ward _____ Village _____

B. Household & Farming characteristics

1. Household members

Serial numbers of household members	1	2	3	4	5	6	7	8
Name (Only one)								
Sex (1 = M; 2 = F2)								
Year Date of birth								

2. Age of respondent _____ years

3. Gender of respondent: 1: Male (___); 2: Female (___)

4. Marital status: 1: Married (___); 2: Single (___); 3: widow (___); 4: divorced (___); 5: separated (___)

5. Household size..... (a) Household male adults.....(b) Household female adult..... c) Household children between 12 – 17 years.....(d) Household children below 12 years.....

6. Level of education: 1: None (___); 2: Primary (___); 3: Secondary (___); 4: Tertiary (___); other specify.....

7. Main occupation: 1: Farming (); 2: employment (); 3: fishing; 4: livestock keeping; 5: Masonry; 6: petty business (); 7: carpentry (); 8: Others specify
8. Type of farmer: 1: large scale (); 2: medium (); 3: small scale ()
9. Mention the major five crops you grow : i _____ ii _____ iii _____ iv _____
10. Rank of rice in terms of its importance as food crop _____ and cash crop _____
11. Land allocation for crops; under all crops _____ acres; under rice production _____ acres
12. Land ownership 1 hired, 2. Owned 3. Both
13. Amount of land owned.....acres; amount of land hired.....acres

C: RICE PRODUCTION ASPECTS

14. What is the average distance to the plots in kilometres?.....
15. What type of technology do you use to cultivate the farm?
 - I. Hand hoe/manual ii) animal traction iii) tractor iv) other specify
16. Which type of seed do you use 1. Improved 2. Local 3. Both
17. If you use improved rice seeds, which improved varieties do you grow currently?
 - 1).....2).....3).....4).....
18. Source of improved varieties 1. Researcher, 2. Stockist, 3. NGO, 4. Farmers, 5. Traders, 6. Other specify.....
19. If not what are the reasons of not using improved rice varieties?.....
20. Do you use fertilizer? 1. YES 2. No
21. If yes what type of fertilizer are used 1. UREA 2. CAN 3. DAP 4. TSP 5 others specify.....
22. What was the total price of the fertilizer? TZS.....(specify unit of measurement)
23. If not using fertilizer why? 1. Not available 2. Expensive 3. Not required 4. Not easily accessible 5. Others specify.....
24. Farm production costs (expenditure per acre)

S/N	Activities	Amount(TZS)
1	Hiring land	
2	Land clearing	
3	Ploughing	
4	Seed	
5	Planting	
6	Weeding	
7	Fertilizer	
8	Fertilizer application	
9	Bird scaring	
10	Harvesting	
11	Bags	
12	Sisal twine	
13	Transport	
14	Yield per acre	
15	Price per bag(100kg)	
16	Total income	
17	Profit/loss	

25. Give information about rice yield in the year 2007/08

Area planted	Production per ha	Total production (kg)	Quantity sold (kg)	Price/unit	Total earnings

26. Do you plan to produce what you sell? 1. YES 2. NO
27. If NO why.....
28. Reasons for growing rice/farmer objectives
 - 1)
 - 2)
29. Do you produce rice according to the needs of traders/consumers 1. YES 2. NO

30. Which type of rice varieties preferred most? 1).....
2).....4).....

D. RICE POST – HARVESTING HANDLING

31. How is assembly at farm level?.....
32. How is packaging?.....
33. How is Grading/sorting/winnowing?.....
34. How is drying?.....and where did you dry the harvested rice? 1: in the field, 2: at home, I did not dry
35. Which method did you use to dry the rice? 1: dry on the ground, 2: on drying platform 3: as a heap in the living house
36. How rice was transported from the field to the homestead? 1: by oxen 2: as a head load 3: by lorry/tractor 4: other means specify.....
37. Costs of transport to market/bag(100kg).....

E. STORAGE OF RICE

38. What type(s) of storage is used for rice intended for (a) food ...(b) sale ...(c). seed
1. traditional structure (grass/brick type)
2. bags
3. other specify whether ceiling, pots, tins, and heap storage)
39. If you used a *kihenge* to store rice what is its capacity?.....bags
40. How long (shelf life of variety).....
41. Causes of losses.....
42. Extent of losses.....
43. Which measures you undertake to minimize losses.....
44. What problems with storage.....
45. What type of treatment did you use to preserve rice from pest damage?
1: chemical pesticides 2: natural deterrent materials 3: I did not treat it

46. If you use pesticides or natural materials name the type of material you applied:

S/N	Chemical pesticides	Natural materials
1		
2		

47. If you used chemical pesticides
(a) How many grams of the pesticide you mentioned above did you apply per bag of stored rice?
(b) What was the source of pesticide? 1: Dealer 2: Shop 3: extension agent 4: Others specify...
(c) What was the total price of the pesticide? TZS.....(specify unit of measurement)
(d) If you did not use chemical pesticides give reasons 1: lack of funds 2: little amount of stored rice 3: pesticides not available 4: lack of knowledge

48. What are the constraints related to rice production (rank in order of importance)
1.
2.
3.

F: RICE UTILIZATION AND STORAGE

49. How do you apportion your rice produce after harvest?
Quantity for sale ___ kg; consumption ___ kg; seeds ___ kg; Presents/gifts/remittance ___ kg
Labour payment _____ kg; How much rice is remaining?
50. Do you store your rice for waiting high price? 1: Yes (___); 2: No (___)
51. If yes, how long ___ months; quantity stored ___ kg; price before storage ___ TZS/kg and price after storage _____ TZS/kg

G: RICE MARKETING AND TRANSACTION ASPECTS

52. Did you sell your rice last season? 1: Yes (___); 2: No (___)
53. If yes, to whom did you sell your rice? 1: agent middlemen (___); 2: assemblers (___); 3: wholesalers (___); 4: retailers (___)

54. Why did you sell to this particular buyer? 1: good price 2: only middlemen available 3: marketing convenience
55. Source of your customers 1: in village (); 2: nearby village (); 3: in district (); 4: outside district ()
56. What factors do you consider when you decide amount of rice to sell? 1: price offered (); 2: personal ties with buyers (); 3: Household cash needs (); 4: Repay loan of the buyer (); 5: honesty of buyer; 6: Continuity of trade (); 7: lack of storage space 8: level of production 9: others specify _____
57. What are factors that determine the quantity of rice to sell? 1: cash need (); 2: good price (); 3: level of production (); 4: lack of storage capacity ()
58. What kind of rice do you mostly sell to traders? 1: husked rice (); 2: unhusked rice () 3: Both ()
59. Do the intermediaries offer price/kg, basing on rice quality? 1: Yes (); 2: No ();
60. There is any contracture arrangement before selling? 1. YES () 2. NO ()
61. How many buyers did you contact before you decided to sell your rice? _____
62. Have you been selling to the same buyer every season? 1: Yes (); 2: No ()
63. I YES, what is the relationship between you and him/her 1. My relative () 2. My friend () 3. Office mate () 4. Others specify _____
64. Why do you usually sell to him/her? 1. Credit advancement () 2. Trustful person () 3. Always pay in cash () 4. Others specify _____
65. Was it easy to sell rice when the offer of buyers was not satisfactory? 1: Yes (); 2: No ()
66. Are there observed unethical trading practices? 1: Yes (); 2: No ()
67. If yes, what are they 1: short weights (); 2: misleading price quotations (); other (specify)
68. How many days after harvest did you sell most rice _____ days
69. Why did you sell at this particular time? 1: household cash need (); 2: only buyer available (); 3: higher price ()
70. Where did you sell your rice? 1: at farm gate (); 2: in-village markets (); 3: neighbouring village (); 4: Others, specify _____
71. Why do you prefer to sell in this market? 1: high price (); 2: easy to compromise with buyers (); 3: price certainty (); 4: No alternative market (); 5: others (), specify _____
72. If you sold rice beyond farm gate; distance from home to main market? _____ Km.
73. How did you transport rice to market? 1: bicycle (); 2: truck (); 3: as a head load (); 4: OX-cart () 5: others specify _____
74. Transport costs per 100 Kg (bag)? _____ TZS.
75. Do you know prices in advance before taking your consignment to the markets? 1: Yes (); 2: No ()
76. Who is setting the price of your produce 1) Buyer 2) Supplier 3) Negotiation between buyer and supplier 4. Based on market price
77. How do you fix prices of your rice commodity? 1: take market price (); 2: calculate costs involved (); 3: others specify ()-----
78. Do you have access to market information 1. YES () 2. NO (), If yes 1. easy to obtain, 2. Sometimes difficult, 3. very difficult
79. If YES which information 1: buying price () 2. selling price () 3. buying and selling price () 4. Availability of rice () 5. quality and standards of produce () 6. price of inputs () 7. consumer behaviour, 8. others specify _____
80. Where do you collect marketing information 1. From traders () 2. From neighbours () 3. From friends () 4. Radio broadcasting and TV () 5. Magazine () 6. Internet () 7. Others specify _____
81. How do you collect information on market prices? 1: direct visit to market (); 2: crosscheck with different buyers (); 3: Friends (); 4: Extension service ()
82. How much cost do you incur in getting information? _____
83. Do you have problems in getting marketing information? 1 YES () 2. NO ()

84. If yes mention the problems and strategies to have information on time

	Problems	Strategies
1		
2		
3		

85. Are you aware about current rice price at the market? 1. YES () 2. NO ()

86. Is rice business open to every body? 1. YES () 2. NO ()

87. If No what are the barrier to market entry? Grade them

Barrier to entry	Number of response on different levels			
	No problem (0)	Less important (1)	Important (2)	Very important (3)
inadequate capital				
Low production				
High market levies				
Difficult to get the license				
Severe competition				
Inadequate rice production experience				
Others specify				

Note: average grading will be calculated based on the number of response on different levels and by using weighted average method

Grading for different levels

- No problem: grade 0
- Less important: grade 1
- Important: grade 2
- Very important grade 3

88. Mode of selling 1: Cash (); 2: Credit ()

89. What kind of measuring instruments do you normally use? _____

90. To what extent is the selling price different from the expected one? 1: above expected (); 2: equal to expected (); 3: below expected ().

91. Prices obtained seasonally

Prices obtained seasonally	Price (TZS)
At harvest May – July	
After harvest August – September	
Post – harvest October – February	
Pre – harvest March – April	

92. How many times in the year do you sell your rice? _____

93. How do you market your rice? 1: soon after harvest (); 2: waits price rise (); 3: sell before harvest (); 4: others specify _____

94. Have you ever experienced the lack of payments from the buyers? 1: Yes (); 2: No

95. How many time do you follow-up your payments from the buyer before you are paid: 1: on the spot (); 2: many times ()

96. Does a buyer pay you the price basing on the value added (i.e. sorting)? 1: Yes (); 2: No

97. How long have you known your buyer who mainly buys your rice? _____

98. Have you ever got the following services from the buyer? 1: transport (); 2: cash loan (); 3: input credit (); 4: technical advice (); 5: others (), specify _____

99. Before the transaction (selling), how many times did you meet the buyer _____

100. How many hours did you use for negotiating and setting price with buyer _____ hrs

101. Do you combine with other farmers to transport your rice? 1: Yes (___); 2: No (___)
102. How long does it take to sell your rice in the market? 1: soon (below & up to 1hr) (___); 2: some time (1-2hrs); 3: more than 2 hrs (___); 4: more than 1 day (___); 5: transaction at farm gate (___)
103. How much money did you spend in making follow-up of your payments from the buyer, i.e. travel, telephone etc? _____ TZS.
104. How long does the buyer take to affect your payments _____ days
105. Explain the contractual behaviour of your buyer: 1: makes new contract every time; 2: mostly makes contracts (___); 3: few occasions (___); 4: does not make contract at all (___)
106. Explain the functional duties of your buyers: 1: also a farmer (___); 2: transporter; 3: gives credits (___); 4: don't know (___); 5: others (___), specify _____
107. Amount of rice sold for five years

	2004	2005	2006	2007	2008
Amount of rice sold					
Price per bag (100kg)					
Total (TZS)					

H: Credit accessibility and Organization

108. Have you ever requested for credit from any agency in recent years 1. YES 2. NO

109. If yes fill the following table

Source of credit (Informal group, Bank, Friends/relatives, Government, Input distributor, informal money lenders)	Form of credit (Cash, Inputs)	Amount	Interest rate	Terms of payment (Cash, In kind, Both)

110. If no why not? 1. No knowledge of credit, 2. Not available (___), 3. Procedure is restrictive (___), 4. Not aware of credit (___), 5. high interest rate (___) 6. high risk (___) Others specify.....
111. How did you use credit? 1. Investing in business (___) 2. Investing in agriculture (___) 3. Children's school fees (___) 4. Home consumption (___) 5. others specify (___).....
112. As rice farmers do you have any Organization/farmer group? 1. YES (___) 2. NO (___)
113. If yes fill in the Table below

S/N	Name of organization	Activity	Benefits	Entry conditions
1				
2				

114. Do you usually bulk your produce and sell to customers as farmers' group? 1. YES (___) 2. NO

I: Extension services

115. Do you have access to extension services? 1. YES, 2. NO
116. If YES where do you get extension services 1. Village extension Officer (___) 2. NGO's (___) 3. Research 4 Others specify (___).....
117. Are there benefits from services provided? 1. YES (___) 2. NO (___)
118. If YES what are the benefits?.....
119. What are the major constraints related to rice marketing
1: no problem 2: low farmer price 3: lack of market outlet 4: lack of uniform measure 5: small piecemeal sales 6: unstable prices 7: delayed sales 8: lack of transport

120. Recommendations for improvements

1.
2.
3.

J: Utilisation of rice and food security

121. How many bags of each of the following crops did you harvest in the 2008/2009 cropping season? rice(b maize).....(c) banana.....(d) beans...(e) cassava.....

122. How many bags of different crops harvested were consumed/eaten by the household?

(a) rice.....bags (b) maize.....bags (c) banana.....banches (d) beans.....bags

123. Was the amount of rice harvested enough to feed your household until the next harvest? 1.

Yes 2. No

124. If the harvested rice was not enough for how many months was rice lacking?.....

125. If no, where did you get food to meet your requirements (during the time without rice)?

1. Eat maize	5. Informal sector cash	9. Use crop sales money
2. sale livestock	6. Use salary	10. Others specify
3. Sell labour	7. Petty business cash	
4. Use dry season crop	8. Fishing	

126. How much bags of rice did you receive remittances in the 2008/09 season?bags

127. How much did you buy.....bags

128. In which month(s) did you buy or receive the rice.....

129. If you bought or receive rice from whom did you buy? Fellow farmer 2. Middlemen 3. Kyela town market

130. Give reasons which forced you to buy or receive rice:

1). Little own production

2). Overselling own production 3). other (specify)

131. What do you do to make sure that there is enough food for your family throughout the year?

132. Please estimate your household expenditure per day on (a) breakfast (b) lunch (c) dinner

133. Please tell me all the foodstuffs you and all your household members ate per month from 1st to 30th June 2009 and from 1st to 31st December 2008

Types of foodstuffs	Amounts of foods eaten by all household members per month			
	Foodstuffs eaten from 1 st to 30 th June 2009		Foodstuffs eaten from 1 st to 31 st Dec. 2008	
	Amount	Value (TZS)	Amount	Value (TZS)
1. Banana				
2. Beans				
3. Bread/Buns/ Pastry				
4. Cassava				
5. Coconut				
6. Cooking oil				
7. Cow peas (kunde)				
8. Pigeon peas (mbaazi)				
9. Garden peas (njegere)				
10. Fish				
11. Fruits				
12. Ground nuts				
13. Lemon/Lime				
14. Maize				
15. Meat				
16. Milk				
17. Onions				
18. Potatoes				
19. Rice/Rice burns				
20. Salt				
21. Sardines				
22. Soft drinks				
23. Sorghum				
24. Sugar				
25. Tomatoes				
26. Vegetables				
27. Yams				

K: Inflow and outflow of income**134. How much money did you get in 2008/2009 season by source of income?**

Source of income	Amount sold(bags/kg/no)	Money obtained (TZS)
Sale of crops		
(a) rice		
(b) maize		
(c) beans		
(d) cassava		
(e) cacao		
(f) other crops		
Sub total (crops)		
Livestock sales		
Cattle		
Sheep/goats		
Chicken/poultry		
Other livestock		
Sub total (livestock)		
Non agricultural income		
Informal sector		
Salary		
Remittances		
Subtotal (non agricultural)		
Grand total		

135. Is there any change in income in while participating in selling rice? 1. YES 2. NO

136. If YES, what is the direction of change? 1. Decreased 2. Increased 3. Fluctuates

137. How do you spend the family income? 1. Buy food 2. Medication 3. Education expenses 4.

Buy agricultural inputs 5. Housing 6. Clothing 7. Buy piece of land 8. Others (specify).....

138. What other material goods did you buy as a result of income increase? 1. Radio 2. Television

3. Car 4. Bicycle 5. Motorcycle 6. Milling machine 7. others (specify)...

THANK YOU FOR COOPERATION

Appendix 14: A copy of the questionnaire used to interview rice traders

SOKOINE UNIVERSITY OF AGRICULTURE
DEVELOPMENT STUDIES INSTITUTE

A Questionnaire for Traders for Research on

Qu'nnaire No.....
Name of trader

RICE MARKETING PERFORMANCE AND POVERTY REDUCTION IN KYELA DISTRICT, TANZANIA

By

Juliana Andagile Mwakasendo
PhD Student

Sokoine University of Agriculture, P. O. Box 3024, Morogoro, Tanzania

My name is Juliana Andagile Mwakasendo. I am a PhD student at Sokoine University of Agriculture Morogoro, Tanzania. I am conducting a research on **RICE MARKETING PERFORMANCE AND POVERTY REDUCTION**. I would like to know your experience on rice marketing and poverty reduction. This information will be used as a tool by government during planning and decision making with regard to policies, production, marketing and poverty reduction strategies. I would very much appreciate your participation in this research. The interview will not take too much of your time. Whatever information you provide will be kept confidential. I hope that you will participate in this research because your contributions are very important.

Do you have any question concerning this research?

May I begin the interview now?

A. Background information

1. Name of interviewer _____; Date of Interview _____
2. Trader's name _____
3. Division _____ 4. Ward _____ Business centre _____
5. Household members

Serial numbers of household members	1	2	3	4	5	6	7	8
Name (Only one)								
Sex (1 = M; 2 = F2)								
Year Date of birth								

4. Trader's age _____ years.
5. Trader's sex: Male (), Female ()
6. Trader's marital status: 1: Married (); 2: Single (); 3: widow (); 4: divorced (); 5: separated ()
7. Household size..... (a) Household male adults.....(b) Household female adult.....
c) Household children between 12 – 17 years.....(d) Household children below 12years
Years
8. Level of education: 1: None (); 2: Primary (); 3: Secondary (); 4: Tertiary (); other specify.....
9. Type of trader 1: Village assemblers/collector (); 2. Wholesaler (); 3. Transporter (); 4. Retailer (), 5: inter – village collector () 6: Middlemen ()
10. Business nature 1) Full time (), 2) Part time (), 3. Infrequent ()
11. For how many days do you work per week? _____ days
12. Are there any other activities you normally do apart from trading? 1. YES (), 2. NO

13. If yes what are activities 1) Farming (), 2) Fishing (), 3) Employed () 4) Others specify _____
14. For how long have you been in rice marketing trader? _____ years
15. How much was your initial capitalTZS
16. Where did you obtain capital for your business? 1) Own saving(), 2) Farming(), 3) relatives/friends, 4) bank loan (), 5) Other business() 6) private money lenders () 7. SACCOS () 8. others (specify).....

B. Rice purchasing aspects

17. Are rice delivered to you, or do you go to get them? 1: Yes (); 2: No ()
18. Who is purchasing rice for you? Self purchasing (); 2. An agent (); 3. family members/relative 4. Others, specify _____
19. From whom do you often make the purchase? 1. Farmer(); 2. middlemen (); 3. Assemblers (); 4. Transporters (), 5. Wholesaler () 6. trader 7: miller 8: Others specify _____
20. Where are your major buying places? 1. In villages (); mention them _____ 2: Kyela main market (); 3. Other places (), Mention them _____
21. Do you buy rice basing on attributes that are important to you? 1: Yes (); 2: No ()
22. If yes, what are these attributes (mention) _____ price/kg (_____ TZS.); _____ price/kg (_____ TZS.); _____ price/kg (_____ TZS.)
23. How many traders that you know are buying rice in the area? _____
24. What is the average distance to these buying places from your business centre? _____ Km
25. What is your sales strategy? 1: store (); 2: sell as soon as possible (); 3: buy at harvest (); 4: buy after planting ()
26. What was the average quantity (bags) of rice purchased last season/year? ()
27. What was the average buying price per bag in the last season/year? (_____ T.sh)
28. How long do you spend in buying one rice consignment? (_____ days)
29. For how long (months) is rice readily available in your buying places? ()
30. Which months? (Mention them _____, _____, _____, _____)
31. How is buying price influenced by
- Varieties.....
 - Seasonality
 - Size.....
 - Quality
32. Dynamics of rice buying price in different months of the year
- Experienced highest buying price? Month _____, Price _____,
 - Experienced lowest buying price? Month _____, Price _____,
33. Reasons for fluctuation in buying prices? _____
34. How much is the cost of 1. Empty bag (_____ T.sh); 2. Tying string (_____ T.sh); 3. Packing labour (_____ T.sh); 4. Taxes and levies (_____ T.sh); 5. Others, specify _____, _____
35. Which transport means do you use in transporting rice? 1. Hired truck (); 2. Own truck (); 3. Bicycle (); 4. Head loads (), 5. OX - cart
36. If you hire the lorry/truck, how much does it costs per specified route?
e.g. Route: from _____ to _____; costs (_____ TZS)

C. Rice selling aspects

37. To whom do you sell your rice? 1: Contract traders (); 2: Other traders (); 3: Other farmers (); 4: Institutions (); 5. Miller-traders (); 6. consumers (), 7. Transporters
38. Where do you often sell your rice most? Inter-village markets (); 2. Kyela main market (); 3: Other districts/urban () mention them _____, _____, 4: Other regions () mention them _____, _____; 5: Crossing borders () Mention countries
39. What is the average distance to your rice selling places? (_____ Km)

40. How much volume of rice have you trade during last season?2007/2008

Type	Volume in bag (kg)	Buying price/bag	Selling price/bag
Processed rice			
Unprocessed rice			

41. What was the average selling price per bag(100kg) of unprocessed rice the last season/year (___T.sh)
42. What is the payment condition for your rice sell? 1. In cash (___); 2. In advance (___); 3. on credit (___) others specify(____),_____
43. What is the average quantity sold per transaction?(_____ bags)
44. What are the loading and unloading costs per bag of rice?(_____ TZS)
45. How long do you spend in selling one rice consignment?(_____ days)
46. Rice selling price in different months
- a) Received highest selling price? Month _____, Price/Kg _____)
- b) Received lowest selling price? Month _____, Price/Kg _____.)
47. Reasons for fluctuation in selling prices? _____
48. What are the reasons for difference in rice buying and selling prices?
- a) Access to rice surplus field (___), how? _____
- b) Season/year of rice production (___), how? _____
- c) Buying in large or small volume (___) how? _____
- d) Long or short distance of transport (___) how? _____
- e) Competition among traders (___); f). Transaction costs (___)
49. Who is setting price for rice? 1. Farmer (___); 2. Assembler (___); 3. Wholesaler (___); 4. Retailer (___); 5. Consumers; 6. Others (___) (specify.....)
50. What criteria are used in setting prices? 1. Demand and supply situation (___); 2. Seasonality (___)
3. Production costs (___); 4. Transaction costs (___); 5. Size and quality (___); 6. Varieties (___); 7. Take market prices (___)8. Quantity of produce 9. accessibility of market place (___) 10. Others specify (___) _____
53. Are you aware of prices prevailing in the nearby market? 1. YES, 2) NO
54. Do you know prices in advance before taking your consignment to the market? 1. YES, 2. NO
55. What kind of measuring instrument do you normally use?(1) local mention them.....(2) weighing balance
56. Do you normally grade your produce prior to buying/selling 1. YES (___) 2. NO (___)
57. If yes what is the grade definition?

	Grade name	Grade characteristics	Price
1			
2			
3			

58. What quality problem do you normally face?.....

D. Rice storage

59. Do you have access to storage facilities? 1: Yes (___); 2: No (___)
60. Do you store traded rice? 1: Yes (___); 2: No (___)
61. If yes, then where do you store? 1. Hired godown (___); 2. Market place (___); 3. In own house (___); 4. in own store (___)
62. How much is the average storage fee per bag of rice?(_____ T.sh)
63. How many bags do you often store at once? (_____ bags)
64. For how long are you storing your rice? 1: Days (___); 2: Weeks (___); 3: Months (___)
65. Reasons for storing your rice 1. To accumulate large quantities (___); 2. Lack of transport (___); 3. To overcome season of low price (___); 4. Other reasons _____

66. What processing are you doing between buying and selling? 1. Removing stones and unwanted staffs (☐); 2. Sorting and grading (☐); 3. Standardizing (☐); 4. Husking 5. Others (☐, _____)
67. How much cash is needed to enter in rice trade? (_____ T.sh)
68. Is the cash you have enough to run your 1. business? Yes (☐); 2. No (☐)
69. What was the source of your capital? 1. Financial organization/bank (☐); 2. Fellow grain traders (☐); 3. Relatives/Friends(☐)

E: Marketing information

70. Do you have access to marketing information? 1. YES (☐ 2. NO (☐ If yes 1 easy to obtain, 2. Sometimes difficult, 3. very difficult
71. Where do you collect marketing information 1. From traders (☐ 2. From neighbours (☐ 3. From friends (☐ 4. Radio broadcasting and TV (☐ 5. Magazine (☐ 6. Internet (☐ 7. Others specify.....
72. How do you collect information on market prices? 1: direct visit to market (☐); 2: crosscheck with different buyers (☐); 3: Friends (☐); 4: internet (☐); 5 Extension service (☐); 3. Use of mobile (☐ Others
73. Which marketing information do you get? 1. Rice price (☐); 2. Grades and standards of rice (☐); 3. price of inputs others mention them _____, _____
74. Do you incur any costs in accessing that information? 1: Yes (☐); 2: No
75. If yes, how much does it cost you? (_____ T.sh)
76. Do you have problems in getting marketing information? 1 YES (☐ 2. NO (☐)
77. If yes mention the problems and strategies to have information on time

	Problems	Strategies
1		
2		
3		

77. What is the main problems do you face in marketing of rice grains? 1: low price (☐); 2: lack of capital (☐ 3: Unstable prices (☐ 4: fluctuating rice supply and demand (☐ 5: lack of transport (6) others specify.....
78. Are there formal or informal marketing or farmer groups that affect bargaining power? 1: Yes 2: No
79. What buying/selling practices are in place for your rice? 1: auction sale (☐); 2: contract sale (☐); 3: first-come/first-serve (☐)
80. What distribution channels are used? _____
81. Are there constraints in the use of specific market channels? 1: Yes (☐); 2: No (☐); if yes, mention _____
82. What is the basis for price differentiation? 1: Rice size (☐); 2: colour (☐); variety (☐); 4: quality (☐)
83. Can you advise farmers on type of seeds to be produced? 1. YES, 2. NO
84. Do you have any contractual arrangements with buyers/sellers of rice traded? 1. YES 2. NO
85. If YES fill the following Table on the terms and conditions of sale

Form of rice	Amount sold	Terms of payment	How contract is enforced?
Processed		1) On cash 2) On credit 3) On cash & credit 4) Others specify	1) Law 2) Trustfulness 3) Others specify
Unprocessed		1) On cash 2) On credit 3) On cash & credit 4) Others specify	4) Law 5) Trustfulness 6) Others specify

86. Are there any market organization? 1. YES, 2. NO

87. If YES what is the role of the organization? _____

F: Barriers to market entry/exist

88. Is rice marketing open to everybody? 1 YES 2 NO

89. If No what are barrier to market entry? Grade them

Barrier to entry	Number of response on different levels			
	No Problem (0)	Less important (1)	Important (2)	Very important (3)
Inadequate capital				
low rice supply				
Unstable output market				
High taxes				
Difficult to get the license				
Severe competition				
Inadequate marketing				
Others				

Note: average grading will be calculated based on the number of response on different levels and by using weighted average method

Grading for different levels

- No problem: grade 0
- Less important: grade 1
- Important: grade 2
- Very important grade 3

G. Others traders' information

90. How many rice traders operating in this market (including yourself).....

91. What is the volume of trade? (i) Large ii) Average (iii) minimum

92. What kind of your customer do you prefer most?.....

93. Why do you prefer to sell to this buyer than others.....

94. Have you notice any rivals among buyers/sellers 1. YES 2. NO

H. Capital and cost analysis

95. What are the sources of capital for your business?

1. Bank loan 2. Agriculture 3. relatives/friends 4. selling livestock 5. SACCOS, 6. Own saving
7 others specify

96. What kind of marketing cost do you incur?

S/N	Costs	TZS
1	Transportation/bag of 100kg	
2	Market fees/bag of 100kg	
3	Labour charges/bag of 100kg	
4	Taxes/bag of 100kg	
5	Others specify	

I: Credit accessibility and Organization

97. Have you ever requested for credit from any agency in recent years 1. YES 2. NO

98. If yes fill the following table

Source of credit (Informal group, Bank, Friends/relatives, Government, Input distributor, informal money lenders)	Form of credit (Cash, Inputs)	Amount	Interest rate	Terms of payment (Cash, In kind, Both)

99. If no why not? 1. No knowledge of credit, 2. Not available (), 3. Procedure is restrictive (), 4. Not aware of credit (), 5. high interest rate () 6. high risk () Others specify.....

100. How did you use credit? 1. Investing in business () 2. Investing in agriculture () 3. Children's school fees () 4. Home consumption () 5. others specify ().....

101. As rice traders, do you have any Organization? 1. YES () 2. NO ()

102. If yes fill in the Table bellow

S/N	Name of organization	Activity	Benefits	Entry conditions
1				
2				

103. Do you usually bulk your produce and sell to customers as Traders' organization? 1. YES () 2. NO ()

104. What are the constraints related to rice marketing (rank in order of importance)

- 1)
- 2)
- 3)

105. Recommendations for improvements

- 1)
- 2)
- 3)

J: Utilisation of rice and food security

106. How many bags of each of the following crops did you harvest in the 2008/2009 cropping season? rice(b maize).....(c) banana.....(d) beans.....(e) cassava (f) cocoa.....

107. How many bags of different crops harvested were consumed/eaten by the household? (b) rice.....bags (b) maize.....bags (c) banana.....banches (d) beans.....bags

108. Was the amount of rice harvested enough to feed your household until the next harvest? 1. Yes 2. No

109. If the harvested rice was not enough for how many months was rice lacking?.....

110. If no, where did you get food to meet your requirements (during the time without rice)?

1. Eat maize	5. Informal sector cash	9. Use crop sales money
2. sale livestock	6. Use salary	10. Others specify
3. Sell labour	7. Petty business cash	
4. Use dry season crop	8. Fishing	

111. How many bags of rice did you receive as remittances in the 2008/09 season? ...bags

112. How much did you buy.....bags?

113. In which month(s) did you buy rice?.....

114. In which month receive the rice.....

115. If you bought or receive rice from whom did you buy?

1. Fellow farmer 2. Middlemen 3. Kyela town market

116. If you receive rice from whom did you receive 1. Fellow farmer 2. Middlemen 3. Kyela town market

117. Give reasons which forced you to buy rice 1. Little own production 2. Overselling own production 3. other (specify)

118. Give reasons which forced you to receive rice 1. little own production 2. overselling own production 3. other (specify).....

119. What do you do to make sure that there is enough food for your family throughout the year?.....

120 Please estimate your household expenditure per day on (a) breakfast (b) lunch (c) dinner

121. Please tell me all the foodstuffs you and all your household members ate per month from 1st to 30th June 2009 and from 1st to 31st December 2008

Types of foodstuffs	Amounts of foods eaten by all household members per month			
	Foodstuffs eaten from 1 st to 30 th June 2009		Foodstuffs eaten from 1 st to 31 st Dec. June 2008	
	Amount	Value (TZS)	Amount	Value (TZS)
1. Banana				
2. Beans				
3. Bread/Buns/ Pastry				
4. Cassava				
5. Coconut				
6. Cooking oil				
28. Cow peas (kunde)				
29. Pigeon peas (mbaazi)				
30. Garden peas (njegere)				
7. Fish				
8. Fruits				
9. Ground nuts				
10. Lemon/Lime				
11. Maize				
12. Meat				
13. Milk				
14. Onions				
15. Potatoes				
16. Rice/Rice burns				
17. Salt				
18. Sardines				
19. Soft drinks				
20. Sugar				
21. Tomatoes				
22. Vegetables				
23. Yams				

K: INFLOW AND OUTFLOW OF INCOME

122. How much money did you get in 2008/2009 season and source of income?

Source of income	Amount sold(bags/kg/no)	Money obtained (TZS)
Sale of crops		
(a) rice		
(b) maize		
(c) beans		
(d) cassava		
(e) cacao		
(f) other crops		
Sub total (crops)		
Livestock sales		
Cattle		
Sheep/goats		
Chicken/poultry		
Other livestock		
Sub total (livestock)		
Non agricultural income		
Informal sector		
Salary		
Remittances		
Subtotal(non agricultural)		
Grand total		

123. Is there any change in income while participating in selling rice? 1. YES 2. NO

124. If YES, what is the direction of change? 1. Decreased 2. Increased 3. Fluctuates

125. How do you spend the income? 1. Buy food 2. Medication 3. Education expenses 4. Buy agricultural inputs 5. Housing 6. Clothing 7. Buy piece of land 8. Others (specify).....

126. What other material goods did you buy as a result of income increase? 1. Radio 2. Television
3. Car 4. Bicycle 5. Motorcycle 6. Milling machine 7. others (specify)...

THANK YOU FOR COOPERATION

Appendix 15: A copy of the questionnaire used to interview rice miller-traders

SOKOINE UNIVERSITY OF AGRICULTURE DEVELOPMENT STUDIES INSTITUTE

A Questionnaire for miller-traders for Research

Qu'naire No.....
Name of processor
.....

RICE MARKETING PERFORMANCE AND POVERTY REDUCTION IN KYELA DISTRICT, TANZANIA

By

Juliana Andagile Mwakasendo
PhD Student

Sokoine University of Agriculture, P. O. Box 3024, Morogoro, Tanzania

My name is Juliana Andagile Mwakasendo. I am a PhD student at Sokoine University of Agriculture Morogoro, Tanzania. I am conducting a research on **RICE MARKETING PERFORMANCE AND POVERTY REDUCTION**. I would like to know your experience on rice marketing and poverty reduction. This information will be used as a tool by government during planning and decision making with regard to policies, production, marketing and poverty reduction strategies. I would very much appreciate your participation in this research. The interview will not take too much of your time. Whatever information you provide will be kept confidential. I hope that you will participate in this research because your contributions are very important.

Do you have any question concerning this research?

May I begin the interview now?

A.BACKGROUND INFORMATION

1. Date of Interview _____ 2. Business centre _____
3. Miller's name _____
4. Division _____ 5. Ward _____

vi. Household members

Serial numbers of household members	1	2	3	4	5	6	7	8
Name (Only one)								
Sex (1 = M; 2 = F)								
Year Date of birth								
Yrs of schooling								

7. Miller's sex: Male (☐) , Female (☐)

8. Miller's ageyears

9. Level of education 1: None (☐) ; 2: Primary (☐) ; 3: Secondary (☐) ; 4: Tertiary (☐) ;
5: other specify.....

10. What other economic activities do you have? (1) Farming (☐) , 2) Fishing (☐) , 3) Employed (☐) 4) Others specify.....

11. For how long have you been in rice marketing trader?years

12. Type o milling/processing machine.....

13. Machine costs and acquisition system.....
14. Milling machine capacity.....
15. Machine appropriateness?.....
16. Cost of facility/machine.....
17. How long can machine and facility be used?.....
18. What are the defects of the milling machine.....
19. Please indicate different processing steps.....
20. What is the source of rice 1. Farmers, 2. Traders, 3. stockist, 4. other specify.....
21. Do you have contracture arrangements with suppliers? 1. YES, 2. NO
22. How are price set?.....
23. What are quantities processed per week.....bags
24. Average number of days process a year.....
25. Do you sort rice before processing 1. YES, 2. NO
26. Do you grade rice before processing? 1. YES, 2. NO
27. Criteria for grading.....
28. What happen to various grades.....
29. Which end product is obtained.....
30. Ratio of paddy to processed rice.....
31. Do you pack rice after processing 1. YES, 2. NO
32. How many labour required per day....., 1. Owned 2. Hired
33. Expenditure for hired labour per day or week.....
34. Fuel and lubricants costs per week.....
35. Water costs per week.....
36. Packaging costs/bag of 100kg
37. Other operating costs.....
38. Annual taxes and Levis (if any).....
39. Do you sell processed rice? 1. YES, 2. NO
40. If yes who are your customers 1. Traders, 2. stokist, 3. consumers, 4. wholesalers
41. What is the average quantity sold per transaction?(_____ bags)
42. Rice selling price in different months
 - (i) Received highest selling price? Month_____, Price/Kg _____)
 - (ii) Received lowest selling price? Month_____, Price/Kg _____)
43. Reasons for fluctuation in selling prices? _____
44. What are the reasons for difference in rice buying and selling prices? 1. Access to rice surplus yield (____), how? _____ 2. Season/year of rice production (____), how?.....
45. Competition among traders (____), how?..... 4. Transaction costs (____), how?..... 8. Others (specify.....)
46. Has your business expanded in last five years 1. YES, 2. NO
47. If No why.....
48. Dou you have a ready market for your produce? 1. YES, 2. NO
49. What kind of marketing cost do you incur?

S/N	Costs	TZS
1	Transportation/bag of 100kg	
2	Market fees/bag of 100kg	
3	Labour charges/bag of 100kg	
4	Taxes/bag of 100kg	
5	Toll/bag of 100kg	
5	Others specify	

E: Marketing information

50. Do you have access to marketing information? 1. YES () 2. NO () If yes 1 easy to obtain, 2. Sometimes difficult, 3. very difficult

50. Where do you collect marketing information 1. From traders () 2. From neighbours () 3. miller-traders 4. From friends () 5. Radio broadcasting and TV () 6. Magazine () 7. Internet () 8. Others specify.....
51. How do you collect information on market prices? 1: direct visit to market (); 2: crosscheck with different buyers (); 3: Friends (); 4: internet (); 5 Extension service () 3. Use of mobile () Others (specify).....
52. Which marketing information do you get? 1. Rice price (); 2. Grades and standards of rice (); 3. Others mention them _____, _____
53. Do you incur any costs in accessing that information? 1: Yes (); 2: No
54. If yes, how much does it cost you? (_____ T.sh)
55. Do you have problems in getting marketing information? 1 YES () 2. NO ()
56. If yes mention the problems and strategies to have information on time

	Problems	Strategies to solve the problem
1		
2		
3		

57. Are you aware about current rice prices at the market 1. YES 2. NO

F: Barriers to market entry/exit

58. Is rice business open to every body? 1. YES 2. NO

59. If not what are barrier to market entry? If No what are the barrier to market entry? Grade them

	Barrier to entry	Number of response on different levels			
		No problem (0)	Less important (1)	Important (2)	Very important (3)
1	inadequate capital				
2	Low rice supply				
3	Unstable output market				
4	High taxes				
5	Difficult to get the license				
6	Severe competition				
7	Inadequate marketing				

Note: average grading will be calculated based on the number of response on different levels and by using weighted average method

Grading for different levels

- No problem: grade 0
- Less important: grade 1
- Important: grade 2
- Very important grade 3

G. Others miller-traders' information

60. How many rice miller-traders re operating in this market (including yourself).....

61. What is the volume of trade? (i) Large ii) Average (iii) minimum

62. What kind of your customer do you prefer most?.....

63. Why do you prefer to sell to this buyer than others?.....

64. Have you notice any rivals among buyers/sellers 1. YES 2. NO

H. Capital and cost analysis

65. What are the sources of capital for your business?

1. Bank loan 2. Agriculture 3. relatives/friends 4. selling livestock 5. SACCOS, 6. Own saving
7 others specify

I: Credit accessibility and Organization

66. Have you ever requested for credit from any agency in recent years 1. YES 2. NO

67. If yes fill the following table

Source of credit (Informal group, Bank, Friends/relatives, Government, Input distributor, informal money lenders)	Form of credit (Cash, Inputs)	Amount	Interest rate	Terms of payment (Cash, In kind, Both)

68. If no why not? 1. No knowledge of credit, 2. Not available (___), 3. Procedure is restrictive (___), 4. Not aware of credit (___), 5. high interest rate (___) 6. high risk (___) Others specify.....

69. How did you use credit? 1. Investing in business (___) 2. Investing in agriculture (___) 3. Children's school fees (___) 4. Home consumption (___) 5. others specify (___).....

70. As rice miller-traders do you have any Organization? 1. YES (___) 2. NO (___)

71. If yes fill in the Table below

S/N	Name of organization	Activity	Benefits	Entry conditions

72. Do you usually bulk your produce and sell to customers as Traders' organization? 1. YES (___) 2. NO (___)

73. What are the constraints related to rice processing (rank in order of importance)

- 1)
- 2)
- 3)

74. Recommendations for improvements

- 1)
- 2)
- 3)
- 4)

J: Utilisation of rice and food security

75. How many bags of each of the following crops did you harvest in the 2008/2009 cropping season? rice(b maize).....(c) banana.....(d) beans.....(e) cassava (f) cocoa.....

76. How many bags of different crops harvested were consumed/eaten by the household?

(c) rice.....bags (b) maize.....bags (c) banana.....bunches (d) beans.....bags

77. Was the amount of rice harvested enough to feed your household until the next harvest?

1. Yes 2. No

78. If the harvested rice was not enough for how many months was rice lacking?.....

79. If no, where did you get food to meet your requirements (during the time without rice)?

1. Eat maize	5. Informal sector cash	9. Use crop sales money
2. sale livestock	6. Use salary	10. Others specify
3. Sell labour	7. Petty business cash	
4. Use dry season crop	8. Fishing	

80. How many bags of rice did you receive as remittances in the 2008/09 season? ...bags

81. How much did you buy.....bags?

82. In which month(s) did you buy rice?.....

83. In which month receive the rice.....

84. If you bought or receive rice from whom did you buy? 1. Fellow farmer 2. Middlemen 3. Kyela town market

85. If you receive rice from whom did you receive 1. Fellow farmer 2. Middlemen 3. Kyela town market

86. Give reasons which forced you to buy rice 1. Little own production 2. Overselling own production 3. other (specify)
87. Give reasons which forced you to receive rice 1. little own production 2. overselling own production 3. other (specify).....
88. What do you do to make sure that there is enough food for your family throughout the year?.....
- 89 Please estimate your household expenditure per day on (a) breakfast (b) lunch (c) dinner
90. Please tell me all the foodstuffs you and all your household members ate per month from 1st to 30th June 2009 and from 1st to 31st December 2008

Types of foodstuffs	Amounts of foods eaten by all household members per month			
	Foodstuffs eaten from 1 st to 30 th June 2009		Foodstuffs eaten from 1 st to 31 st Dec. June 2008	
	Amount	Value (TZS)	Amount	Value (TZS)
24. Banana				
25. Beans				
26. Bread/Buns/ Pastry				
27. Cassava				
28. Coconut				
29. Cooking oil				
31. Cow peas (kunde)				
32. Pigeon peas (mbaazi)				
33. Garden peas (njegere)				
30. Fish				
31. Fruits				
32. Ground nuts				
33. Lemon/Lime				
34. Maize				
35. Meat				
36. Milk				
37. Onions				
38. Potatoes				
39. Rice/Rice burns				
40. Salt				
41. Sardines				
42. Soft drinks				
43. Sugar				
44. Tomatoes				
45. Vegetables				
46. Yams				

K: INFLOW AND OUTFLOW OF INCOME

91. How much money did you get in 2008/2009 season and source of income?

Source of income	Amount sold(bags/kg/no)	Money obtained (TZS)
Sale of crops		
(a) rice		
(b) maize		
(c) beans		
(d) cassava		
(e) cacao		
(f) other crops		
Sub total (crops)		
Livestock sales		
Cattle		
Sheep/goats		
Chicken/poultry		
Other livestock		
Sub total (livestock)		
Non agricultural income		
Informal sector		
Salary		
Remittances		
Subtotal(non agricultural)		
Grand total		

92. Is there any change in income while participating in selling rice? 1. YES 2. NO
93. If YES, what is the direction of change? 1. Decreased 2. Increased 3. Fluctuates
94. How do you spend the income? 1. Buy food 2. Medication 3. Education expenses 4. Buy agricultural inputs 5. Housing 6. Clothing 7. Buy piece of land 8. Others (specify).....
95. What other material goods did you buy as a result of income increase? 1. Radio 2. Television 3. Car 4. Bicycle 5. Motorcycle 6. Milling machine 7. others specify).....

THANK YOU FOR COOPERATION

Appendix 16: A checklist of items used for discussion with the District Agricultural Officer

- 1) Indicators of poverty in the area
- 2) How is the link between farmers and buyers?
- 3) How is the link between sellers and buyers?
- 4) How is the link between miller and buyers?
- 5) Does the market balance supply and demand?
- 6) Does the market stimulate output and consumption?
- 7) Does the market create new demand by improving and transforming rice products?
- 8) Does the market seek and stimulate new customers and new needs for rice?
- 9) Does the market guide farmers towards new production opportunities?
- 10) Does the market encourage innovation for rice production/marketing/consumption?
- 11) Does the rice market improve in response to demand and prices
- 12) How rice marketing can improve poverty in the area
- 13) What is the problem of rice marketing in the area?
- 14) What is the source of marketing information?
- 15) Are there any barriers to entry and exist in the rice market? Mention them
- 16) What type of measurements used in rice marketing
- 17) What are the recommendations for improvement in rice marketing?

THANK YOU FOR COOPERATION

Appendix 17: Relating specific objectives, operational definitions of variables and data source

To assess the present marketing channels and roles of different market participants in the study area	<ul style="list-style-type: none"> • How is rice marketing in Kyela • Agencies involved in rice marketing • Did you sell rice last season? • To whom did you sell your rice? • How do you sell to them, where, when, how much, at what price and why? • What factors do you consider when you decide to sell? • What kind of rice do you mostly sell to traders? (processed/unprocessed) • How do prices change within the year • How has the price been in the past five years • Do you market upon needs of traders, consumers 	<p>Identification of respondents</p> <p>Identification of farmers, traders, miller-traders</p> <p>Sampling & interview</p>	Types of market participants available, roles played by different participants	In depth interview, focus group discussion, questionnaire	Descriptive analysis involving cross tabulations, frequency
To analyze rice market structure in terms of barriers to entry, buyer concentration and market transparency	<ul style="list-style-type: none"> • How many rice traders are operating in this market including you? • What is the volume of trade? • Is rice marketing open to every body? • What are barriers to market entry? • What is the initial cost for the business? • What are the sources of capital for your business? • Do you have access to market information? • Which type of market information do you access? • What is the source of market information? • Where do you collect market information? • Do you have problems in getting market information? • How much cost do you incur in getting information? 	Conducting interview	<p>Number and size of traders/buyers at each market level, prices, amount of rice handled by each buyer/seller,</p> <p>Type of barriers to market entry/exit</p> <p>Type and source of marketing information</p>	In depth interview, focus group discussion, questionnaire, and direct observation	<p>Concentration index,</p> <p>Descriptive analysis involving cross tabulations, frequency</p>
To determine the overall performance of the rice marketing sub-system in the study area	<ul style="list-style-type: none"> • What costs do you incur in producing rice? • What are volumes of rice produce? • At what prices do you sell your produce? • How are the trends of retail price? 	Conducting interview	Prices in the markets, marketing costs, gross margin, marketing margins	In depth interview, focus group discussion, questionnaire	Gross margin, marketing margin
To compare the well being levels among household involved in selling rice and those not involved	<ul style="list-style-type: none"> • What are the levels of well being among respondents selling rice to various people? 	Conducting interview	Income among respondents selling rice	In depth interview, focus group discussion, questionnaire	Descriptive analysis involving cross tabulations, frequency
To find the likelihood of being non-poor among respondents selling rice (farmers, miller-traders and traders)	<ul style="list-style-type: none"> • What is the likelihood of being non-poor among respondents selling rice? 	Conducting interview	change of income from rice, dietary energy consumed monetary expenditure on food	In depth interview, focus group discussion, questionnaire	Descriptive analysis involving cross tabulations, frequency