CONSUMERS PREFERENCES FOR RICE ATTRIBUTES IN DAR-ES-SALAAM CITY OF TANZANIA

GEORGE STEPHEN MGENDI

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

MOROGORO, TANZANIA.

2014

ABSTRACT

As the marketing process becomes more complex and competitive in a globalized market, affluent rice consumers have more power to demand for specific attributes, especially in terms of quality which is defined by attributes of rice, health and safety. Hence, understanding consumers' preference for rice attributes becomes very important particularly for locally produced rice. Such understand will enable farmers and other actors along the rice value chain to improve rice quality in order to suit consumers' needs and therefore enhance marketability. This research was carried out to establish consumers' preference for rice attributes that define the quality of rice in Dar-es-salaam city where most of rice is consumed in Tanzania. The specific objectives were: to provide an overview of the rice marketing structure and analyze different varieties of rice sold in market places, to explore rice attributes which enhance consumers' demand for specific rice varieties and to assess consumers' willingness to pay a premium price for desired rice attributes. Data were collected from April to May 2014. The sample was picked from twelve markets, which include seven local markets and five supermarkets in the Dar-es-salaam city of Tanzania. For the market survey, 152 rice consumers were selected randomly for an interview. Data analysis was done using the Statistical Package for Social Sciences (SPSS) software, version 16.0 and Stata using conjoint and rank-ordered logistic regression respectively. The results established that, aromatic attributes highly influenced consumers' decision to purchase a certain rice variety, followed by cleanness, origin, price and proportion of breakage. Consumers were willing to pay a higher price for desired attributes. The study established that, producers should invest in producing

aromatic varieties while rice traders and processors should invest in advanced technology to improve the cleanness and reduce the proportion of broken part of rice.

DECLARATION

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

_____ _____

George S. Mgendi Date

(M.Sc. Candidate)

The above declaration is confirmed by;

_____ _____

Prof. Aida C. Isinika Date

(Supervisor)

COPYRIGHT

ACKNOWLEDGMENTS

Above all, I thank the almighty God for being so gracious to me from the beginning to the end of this research. He has always been with me, led my path and helped me to achieve my goals. This work would not have reached at this stage without the efforts and contributions of many people who gave their time and hard work, I thank all of them for their assistance.

Foremost, I thank my supervisor Prof. Aida C. Isinika to whom I am duly bound to express my gratitude. Partial financial support for this study was provided by the African Economic Research Consortium (AERC) through CMAE program as well as the Africa Rice Research center in Tanzania that coordinated by Dr. Gaudose Mujawimariya (Value chain economist-Africa Rice-Tanzania), I appreciate their contribution.

I am grateful to Temeke, Kinondoni and Ilala Municipal Councils for providing necessary support during the entire period of data collection. Moreover, I extend my gratitude to leaders of all the markets as well as all rice consumers and traders in different markets who generously offered their time and suggestions, which made this study very interesting to me.

I am particularly thankful to my mother Mrs. Martha W. Mgendi and my father Mr. Stephen Mgendi who provided wise and encouraging advice, support and prayers. I would like to thank Mr. and Mrs. Samson Manumbu for their care, understanding,

patience, and prayers during my study. I also extend my appreciation to my beloved friend Elizabeth Kaali and my brothers Kilambo S. Mgendi, Masumo Mgendi, Elisha S. Mgendi and sister Ester Mgendi for their encouraging advice and prayers.

Finally, I would like to extend my gratitude to student colleagues and staffs at Sokoine University of Agriculture, Department of Agricultural Economics and Agribusiness for their assistance and friendship.

DEDICATION

This study is dedicated to my beloved mother Martha Wegoro, my beloved father Stephen Mgendi, my beloved friend Elizabeth Kaali, my brothers Kilambo, Masumo, Elisha and sister Ester.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF ABBREVIATIONS AND ACRONYMS

ACT	Agricultural Council of Tanzania
BMGF	Bill and Melinda Gate foundation
CA	Conjoint Analysis
FAO	Food Agency Organization
LGAs	Local Government Authorities
MAFSC	Ministry of Agriculture Food Security and Cooperatives
NBS	National Bureau of Statistic
SPSS	Statistical Package for Social Science
WTP	Willingness to pay

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Rice is a seed of the monocot plants *Oryza sativa* or *Oryza glaberrima*. As a cereal grain, it is the most widely consumed staple food for a large part of the world's human population (Dutta, 2014). Rice is consumed by more than 50 percent of the world's population, particularly in India, China and countries in Asia as well as some countries in Africa (Ogundele and Okuruwa, 2006). With the exception of a few countries in Africa, which have attained self-sufficiency in rice production such as in North Africa and Egypt, rice demand exceeds production in most countries, and large quantities of rice continue to be imported to meet domestic demand at a huge cost in foreign currency (FAO, 2004).

In Tanzania, rice is the second most important food crop after maize, and demand for rice is expected to continue growing due to increasing population as well as improving income (BMGF, 2012 and Aune *et al*. 2014). The main regions for rice production include Mbeya, Morogoro, Shinyanga, Mwanza, Rukwa, Tabora and Ruvuma that account for 78% of the rice produced in the country (ACT, 2007). Rice is grown by 16% of the farmers in Tanzania, most of whom are smallholders. Only a small proportion of rice is produced on large-scale rice irrigation schemes that were formerly state owned and managed farms such as Ruvu, Dakawa, Mbalali and Kilombero (NBS, 2007). Rice is mostly traded in urban centers such as Dar-es-salaam, which is the largest rice market accounting for about 60% of national rice

consumption in Tanzania (Kawamala, 2013). The demand for rice however is not uniform for all varieties and brands. Consumers pay much attention to brands or the types of rice they buy depending on attributes they observe at the market and when they consume it. Hence, in the free markets where rice markets are liberalized, experience and rice marketing plays the roles in customers' loyalty during rice purchases and consumption.

However, in Tanzania, liberalized markets had posed challenges to producers and traders of rice in the local market especially when the government allows rice importation. Liberalized food markets created competition from imports in such that, local producers of rice have to compete in both local and export market based on price and quality attributes. During 2012/13, the government approved rice imports, but the imported rice was of poor quality compared to local rice. Traders encountered difficulties to sell the imported rice in local market. However, when higher quality rice is imported, it creates competition for locally produced rice that discourages local producers.

According to Banovic *et al.* (2009) quality expectations are formed at the purchase point (based on perceived intrinsic and extrinsic attributes) and after meal preparation and consumption. Meanwhile, quality experience is formed when quality expectations are actually confirmed or rejected. Campo *et al*. (2006) concluded that, confirmation or rejection of the expectations further determines final satisfaction with the product, which is confirmed by repeated purchases. Any interaction between a consumer and a food product involves the consumer considering and evaluating a

range of attributes in the food product before purchasing. These attributes are contributing or differing proportions to the overall level of satisfaction derived from purchasing or consuming the product. It is therefore important to pay attention to product attributes right from the production stage, since the attributes have a bearing on the final demand of the product by the final consumers.

According to Lancaster's theory, consumers often pay a premium price for desired attributes of a product (Lancaster, 1966). In case of domestic rice, this study can give insight to producers and agriculturists to improve quality so that rice that is sold has the attributes desired by consumers. Such efforts will improve the competitiveness for locally produced rice against rice imports in the local market. Locally produced rice will also be able to compete with rice from different parts of the world in the export market.

While it is obvious that, demand for rice is growing in the local market, it is not so obvious which attributes influence consumer preference for various rice varieties at the market. Aggregate data on rice consumption do not provide distinction of preference for different rice varieties and features, since such data are often bundled together under two categories; as locally produced or imported rice. However, such bundling overlooks consumers' preferences for characteristics such as; aromatic quality, appearance, cleanness, proportion of breakage, nutritional aspect and price.

According to Carr *et al.* (2006) in globalized markets, food markets have become more consumer-oriented where affluent consumers have more power to demand for

specific attributes, especially in terms of quality, health and safety for their food. As the marketing process becomes more complex and competitive, understanding consumers' decision-making process when purchasing food product is very important for improving the products' marketability.

Paying attention to attributes of locally produced rice should begin right from production and through the entire market chain. Consistent provision of attributes that are desired by consumers would maintain the competitiveness of locally produced rice, contributing towards securing future markets. Such efforts would augment ongoing efforts to improve livelihoods through productivity improvement with particular attention to meeting consumers' needs. Thus, there was a need to study and identify consumers' preferences for rice attributes in Dar-es-Salaam city, the largest market in Tanzania where most of the rice is sold and consumed.

1.2 Problem Statement and Justification of the Study

Rice is an important food crop in Tanzania and its consumption is on the rise, especially among urban residents. In addition, the rice subsector contributes to employment, employing 16% of Tanzanian farmers, majority of who are smallholders (ACT, 2007 and NBS, 2007). For this reason, as Tanzania struggles to realize enhanced growth in food production, increasing the output of rice has become an important goal (Kiratu *et al*. 2011) since it will improve the livelihoods of many. In line with this, it is critical to consider consumers' preferences in rice sector development. The importance of understanding consumer preferences has been recognized in market research for product development, design and acceptance or for

consumer segmentation (Blijlevens *et al.* 2009). Studies on rice conducted in Tanzania in the past concentrated much on agronomic aspects and breeding new rice varieties for tolerance to abiotic constraints. Several varieties have been produced including NERICA 1,2,4,7, WAB-12-2, WAB450, BL1 and DV4 (ARI-KATRIN, 2012). Such studies however overlooked market side research. Yet, consumers' needs and preferences received little attention. Studies by the Ministry of Agriculture Food Security and Cooperatives emphasize that consumers' demand for rice is not uniform for all varieties and brands; they pay much attention to brand or the type of rice they buy depending on attributes they observe at the market and when they consume it (MAFSC, 2009). Until now most rice producers sell all the rice they produced because demand exceeds supply. However, liberalized markets have raised the need to understand what the market wants so that what is produced will be sold. Hence, focusing as well on consumers preferences becomes very important in the rice sub-sector.

Preferences determine the consumers' choice of a product as reflected by their willingness to pay for the particular product. Even if the current situation has revealed that rice demand exceeds local supply hence local producers can depend on the domestic market, paying attention to rice attributes is still important for improving the competitiveness of local rice varieties in the liberalized market as well as for future rice market (local and export). As income level increase and the market for rice expands, more people will be willing to pay premium prices for specific rice attributes. Moreover, knowledge of consumer preferences for rice attributes enables actors such as farmers, researchers, processors, and traders to design appropriate

strategies for incorporating or retaining such attributes during breeding, production, processing and marketing rice. This study identifies consumers' preferences for rice attributes in Dar-es-Salaam city of Tanzania.

1.3 Objectives of the Study

1.3.1 General objective

The general objective of this study was to identify consumers' preferences for specific rice attributes in leading markets of Tanzania to inform future improvement of rice quality for enhancing competitiveness of locally produced rice in liberalized markets and for market expansion.

1.3.2 Specific objectives

The specific objectives of the study were;

(i) To provide an overview of the rice marketing structure and different varieties of rice sold in market places.

(ii) To explore rice attributes which enhance consumers' demand for specific rice varieties.

(iii) To assess consumers' willingness to pay a higher price for desired rice attributes.

1.4 Research Questions

The following research questions were put forward for the study;

(i) How is the market for rice organized?

(ii) What rice varieties are sold in the market?

(iii) How is rice prices formed in the markets?

(iv) Do consumers prefer a certain rice variety to others?

(v) What attributes do consumers look for when purchasing a specific rice variety?

(vi) Are consumers willing to pay a higher price for desired rice attributes?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview

Consumer theory suggests that consumers make choices based on preferences for attributes of goods. However, these attributes are not always valued in real markets. Consumers evaluate products based on characteristics integrated in the physical products including factors such as the wholeness of grains, taste, aroma, and the proportion of damaged and discolored grains as well as the proportion of kernels and milling level (Kaosa-ard and Juliano, 1992). According to the Lancaster theory (Lancaster, 1966), consumers derive utility from attributes of a good rather than the good itself. The purpose of this chapter is to review different studies in relation to factors affecting demand, the role of attributes on commodity demand, consumer preferences for attributes and how consumers' preferences are measured.

2.2 Definition of Terms and Concepts

2.2.1 Concept of consumers preferences

Consumer preference is defined as how an individual would rank or compare the desirability of any two baskets of goods, assuming the baskets were available at no cost. In addition to preference, consumer's actual choice in the end depends on a number of other factors, such as income and how much the basket costs. Nevertheless, preferences are independent of income and prices because the ability to purchase goods does not determine a consumer's like or dislike. A consumer makes decisions by allocating their scarce income across all possible goods in order to

obtain the greatest satisfaction, subject to budget constraints. Consumer preferences are measured by the utility they derived from various bundles of goods. Utility is defined as the satisfaction that a consumer derives from consuming a good. Preferences therefore permits the consumer to rank these bundles of goods according to the levels of utility they obtain.

2.2.2 Theory of consumers preferences

The theory of preferences give insight on how consumers rank commodity bundles according to the amount of utility obtained from them. Consumers have different preferences over different combinations of goods defined by the set of commodity bundles. There are some assumptions about the consumer's preferences. The first is decisiveness, which explains that given any two commodity bundles in commodity space, the consumer must be able to rank them and say which one they prefer. The second assumption is consistency, which states that, a consumer must be consistent in preference and rankings. The last assumption states that, consumers prefer more quantity than less, however when quantity is equal for all varieties of such commodity (for example one kilogram of rice package for different varieties), a consumer will reveal preference for a single variety (Chakravarty, 2002).

2.3 Factors Affecting Demand

Demand for a commodity is defined as the quantity of a commodity which consumers are willing and able to buy at a given price during a particular period. Some determinants of demand for a product include its price, consumers' income, the price of other goods (compliments and substutes), consumers' taste and

preferences and the population (Purcell, 2007). Price changes of goods reflect movement along the demand curve while other factors determine shift of the demand curve. The traditional theory of demand, also deals with consumers' preferences, which is the main focus in this study.

Result of Goodwin *et al.* (1996a) in a study of rice demand among Asian-Americans in Houston Texas indicated that the price explained very little of the variation in the quantity of rice demanded. Likewise, income was not significant in determining rice demand for Asian Americans. However, their demand appeared to be driven primarily by consumers' preference such as rice packaging, long grain and household characteristics such as ethnicity.

2.4 Role of Attributes on Commodity Demand

A study by Abiriwe *et al.* (2011) ranked factors that identify consumer preference for attributes of rice in Ghana. Using a hedonic price model, they determined factors that influenced consumers' preference which in turn influence demand for various rice brands in the city of Tamale and the quality characteristics that affected prices. The study found that, attributes that define the quality of rice most preferred by consumers were taste, cooking quality, cooking time and aroma.

In another study Linnemann and Suwannaporn (2008) analyzed consumer preferences and buying criteria in the export market for Thailand Jasmine rice. Discrimination analysis was performed to investigate differences in buying criteria between traditional rice consuming and non-rice-consuming countries. Marketing

activities, price, and country of origin were the best discriminators, whereas quality was a poor discriminator for Thailand. Denegri *et al.* (2009*)* suggests that the effect of the country of origin means consumers use a product's origin as an attribute related to its quality. This is supported by the finding of Hara (2000) who estimated a hedonic function for the Japanese rice market. He found that consumers pay a premium for domestic certified rice, pesticide free and fertilizer free rice in comparison with comparable imported rice. In addition, Demont, *et al.* (2009) used vickery second price auctions to compare consumer WTP for Senegalese rice and Thai rice in the Senegalese rice market, and found that consumers were willing to pay up to 80% more for local rice than imported rice. He concluded that bids were influenced by taste, but socio-demographic factors were not important.

In another study, Ara (2003) adopted a stated preference approach to elicit consumer willingness to pay for multiple attributes of organic rice in the Philippines using conjoint analysis. Attributes that were covered included; price, reduced health risk level, environmental quality, eating quality, type of organic certification and a fair trade factor. Health risk was the primary concern among all consumers. In Manila, consumers revealed organic certification to be the second most important factor while improvement of the farm environment was the second highest factor in Naga city. Results showed that consumers who lived further from the production site had a higher preference for certification while those living in rural areas expressed a lower demand for certification.

2.5 Consumer Preferences for Attributes

Azabagaoglu and Gaytancıoglu (2009) used focus groups and market surveys to analyze consumer preference for different rice varieties in Turkey in order to analyze consumer behavior. Results indicated that consumers expressed that Baldo and US Calrose rice varieties were significantly different from ordinary rice regarding the outlook, good cooking, palatability and cleanliness. Consumers were willing to pay more for Baldo than for other varieties. Gunaratne and Walisinghe (2012) used a conjoint analysis model to assess the consumer preference for various rice attributes in Srilanka. Results indicated that rice attributes such as flavor and aroma, taste, price, and location (area of rice production) also affect the consumers' choices of the brands available in the market. The majority of the consumers preferred to purchase local white rice instead of varieties imported from overseas because local brands had the attributes they preferred. The results pointed to the need of producing high quality local rice and developing pricing and marketing strategies, which enabled local varieties to remain competitive.

2.6 Implication for the Rice Market in Tanzania

Studies reviewed above have revealed that the demand for rice is influenced by different factors including consumers taste and preferences, which are a function of rice variety attributes. The combination of different attributes determines spatial differences of preferences among consumers from different regions. The current study is designed to assess consumer preferences for rice attributes which are important for Dar es salaam markets. This is important as the nation strives to

develop agriculture so that the sector remains competitive, contributing to households income as well as national development.

2.7 Measuring Consumers Preferences

There are several approaches to determine consumer's preferences for a particular commodity. However, data collection under each method determines the time and cost of the method to be used for investigating consumers' preferences (Breidert *et al*. 2006). The preferences are also reflected through willingness to pay, which can be quantified through revealed preference or through stated preferences. Revealed preferences are obtained from price responses in the market while stated preferences are taken from surveys and designed studies. This study use stated preference data, even though revealed preferences had been exposed by consumers in the market as depicted by rice price differences. The stated preference provide more information regarding the variation of attributes among commodities while data from revealed preference groups attributes together. Moreover, under stated preference an experiment can be designed to contain as much variation in each attribute as the researcher thinks is appropriate. Several authors have proposed different hierarchical classification frameworks to organize existing methods for identifying consumers' preferences, based on data collection methods as presented in Figure 1.

At the highest level, methods distinguished by whether they utilize survey techniques or use data from simulated price responses. Through response data, market observations can be established. Alternatively, data can be generated by performing experiments. These can further be divided into field experiments, laboratory

experiments and auctions. Looking at survey-based techniques to estimate consumers' preferences or willingness to pay, there are direct and indirect surveys for collecting relevant data. Stated preferences in direct surveys are recognized by directly asking consumers about their preferences for a certain product, while indirect surveys use ranking or sorting of products or product characteristics. A respondent is presented with one or more choices in an experiment where more options are described and then the respondent is asked which option he/she would choose in the real world.

Conjoint analysis and discrete choice analysis are two examples for indirect surveys. The framework by Breidert (2006) proposed a useful guideline for choosing an appropriate method. In the current study, consumers' preferences are captured by conjoint analysis, which measures an individual's preference structure via systematic variation of the product attributes. Conjoint methods are recommended over discrete choice when the competition for or between does not need to be considered for research purposes and the number of brands is so large that a discrete choice study that included brand would be too large and expensive.

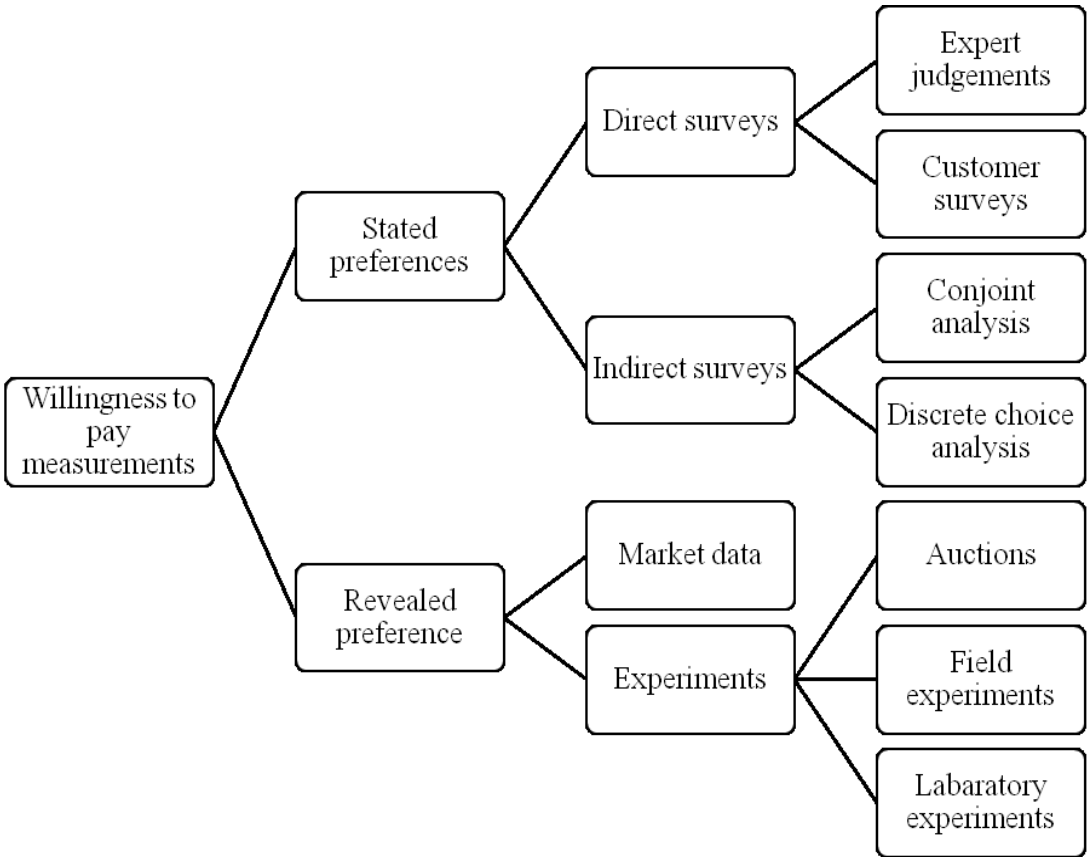

Figure 1: Classification framework for methods to measure willingness to pay

Source: Adapted from Breidert (2006)

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This section covered the conceptual structure based on which the research was conducted. It presents the research design, selection of the population of study, area of the study, methods used to collect data and procedures and techniques of data analysis.

3.2 Conceptual Framework

A conceptual framework adopted for the study is presented in Figure 2. According to traditional demand theory, consumers seek to maximize their utility function by purchasing goods and services in the market. The best preference is the one giving consumers the highest utility. Given other factors are constant, rational consumers rank the appropriate consumption bundles according to their best preferences. Preferences are revealed by the price that consumers are willing to pay for a certain product variety. The price of rice, which assigns an economic value to different attributes, is a function of rice attributes including; aromatic, freshness, appearance, the proportion of breakage and impurities, location of production origin, taste and rice varieties. These attributes vary between rice varieties and drive consumer choices. Hence, consumer *i* chooses alternative *j* among *J* alternatives that yield the greatest utility (*Uj*). As depicted in Figure 2, rice attributes influence the quality of rice, which in turn influences consumers' preferences. Together the quality and preference attributes determine the price of rice that consumers are willingness to

pay in a particular market for rice. This framework has been used to address the objectives of this study.

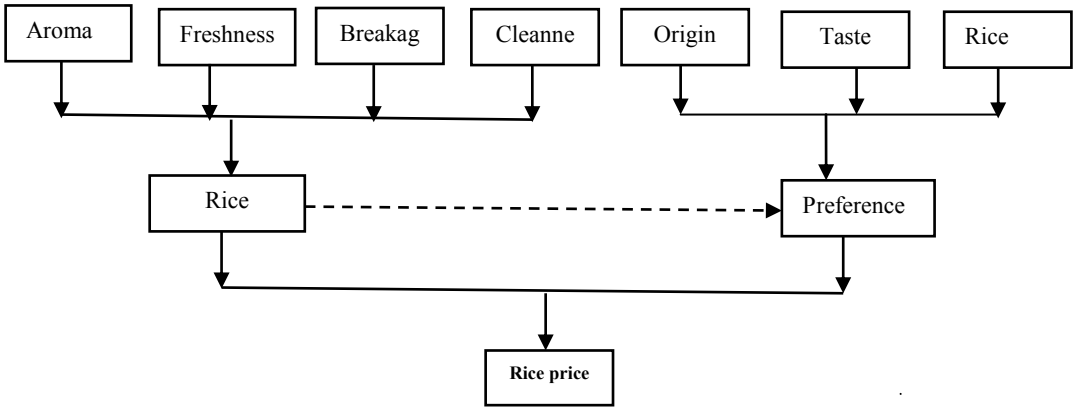

Figure 2: Conceptual Framework on Consumer Willingness to Pay

3.3 Research Design

This study employed a cross sectional research design whereby data were collected from respondents at one point in time. Primary data were obtained from rice consumers in Dar-es-salaam city. One hundred and fifty two (152) respondents were selected from 12 identified market places (7 local markets and 5 supermarkets).

Respondents were chosen randomly during the interview (each individual who purchased rice had an equal chance of being selected among rice consumers in each market) whereby sixteen respondents chosen from each local market and eight respondents from each supermarket. Interviews, observation and questionnaires were used for data collection. Data were collected on various variables including; household characteristics such as family size and income; rice prices and rice

attributes which were based on stated preference and information on rice attributes including aroma, breakage, impurities, and location of origin and rice varieties.

3.4 Description for the Study Area

In Tanzania, rice is generally traded in urban centers such as Dar-es-salaam and all the regional and district headquarter, however Dar-es-salaam is the largest rice market accounting for 60% of national rice consumption (Kawamala, 2013). The study was conducted in Dar-es-salaam region, which is one among 30 administrative regions in Tanzania. The regional capital is the city of Dar es Salaam, which is the largest city in Tanzania lying between Latitude 6°48' S and Longitude 39°17' E.

According to the national census of The United Republic of Tanzania, in 2012 Dar-es-salaam region had the highest population of 4 364 541 people growing at 5.6% per annum from 2002 to 2012, the city is the third fastest growing in Africa after Bamako and Lagos and ninth fastest in the world (City mayors' statistics, 2014). The current population (2014) is therefore estimated to be 4 853 370 and is expected to reach 5.12 million of people by 2020. According to Minot (2010) majority of households in urban areas of Tanzania depend on rice for food, which comes second after maize. Dar-es-salaam is Tanzania's most important city for both business and government. The city contains a high concentration of trade, manufacturing and other services compared to other parts of Tanzania. The city was selected for this study due to highest rate of rice consumption. Dar-es-salaam consists of three Local Government Authorities (LGAs) or administrative districts, which are Kinondoni, Ilala and Temeke. From the city, mainly seven local markets and five supermarkets

were selected for this study (Figure 3). The selected local markets included Kisutu, Tandika, Tandale, Kinondoni (Mtambani), Mwananyamara, Buguruni and Kariakoo small market for food stuff. Supermarkets that were surveyed included Uchumi, Imalaseko, Baraka, Sifamart and Shoppers plaza.

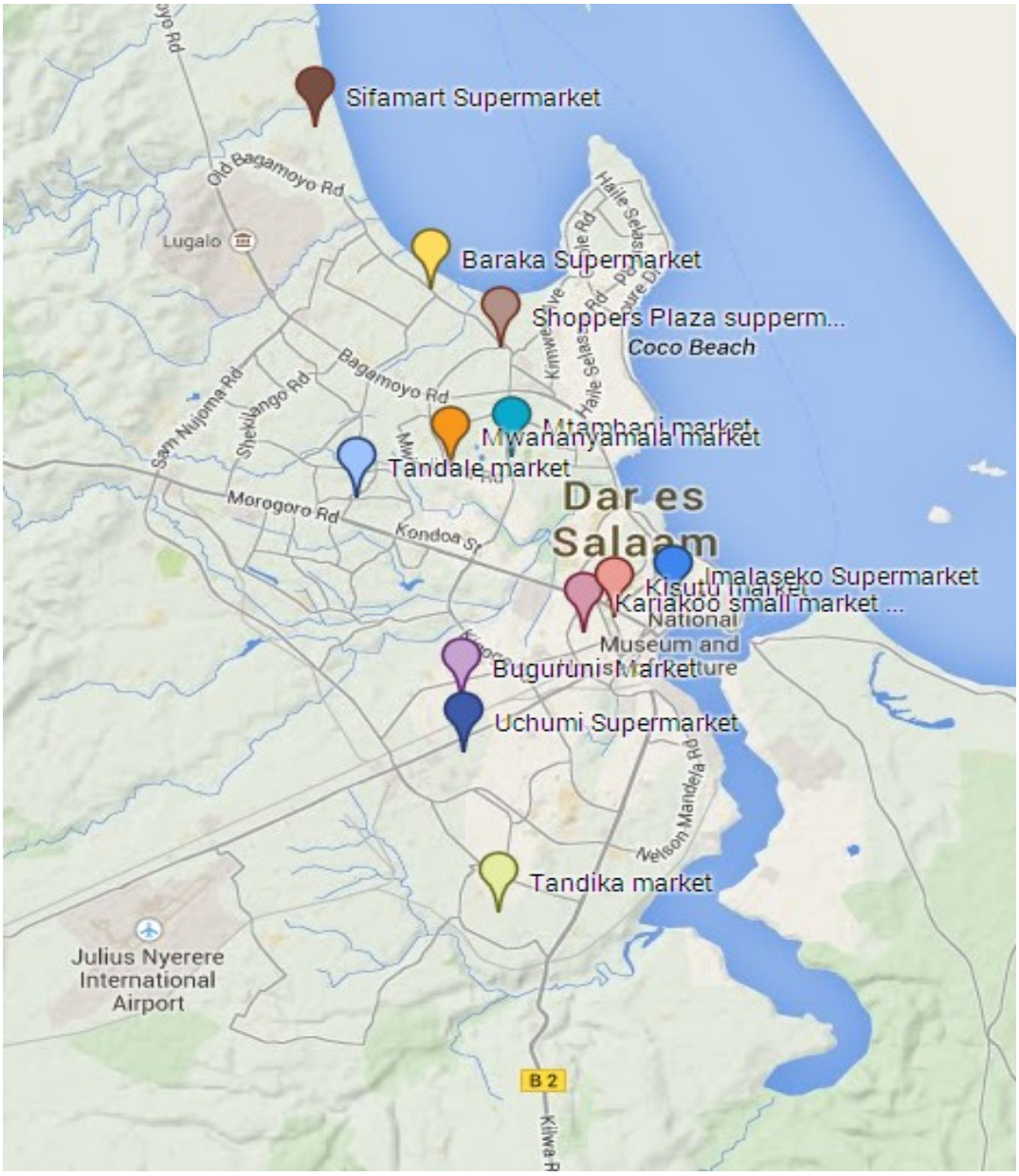

Figure 3: Dar-es-salaam with location of markets surveyed

Source: Google map, 2014

3.5 Sampling Procedure and Sample Size

A minimum representative sample was calculated based on the formula given in equation (1) as proposed by Kothari (2004). This study assumed there was an infinite population of rice consumers however the variability in the proportion that choose to consume rice was not known. The sampling unit from the population was an individual rice consumer who was chosen to represent a household. If "n" is the sample size, "Z" is the standard variation of 1.96 representing the data are clustered closely around the mean at a required confidence level of 95%, "p" is the estimated proportion of an attribute that is present in the population, and "q" is 1-p. Assuming p=0.5 then each individual in the population has equal chance of being selected. The term "*e*" is an acceptable error of 8.95% as presented in Kothari (2004). The resulting sample size was computed according to equation (1) below.

$$n = \frac{Z^2 pq}{e^2} = \frac{(1.96^2)(0.5)(0.5)}{(0.0895)^2} = 120 \quad \text{..... (1)}$$

A minimum sample of 120 rice consumers was proposed for interview; however, data from 152 respondents were collected during the survey. The markets surveyed and the distribution of respondents are shown below (Table 1).

Table 1: Surveyed markets and distribution of sample size

Market category	Market name	Frequency	Percent (%)
Local markets	Tandale market	16	10.5
	Kisutu Market	16	10.5
	Tandika Market	16	10.5
	Mwananyamara market	16	10.5
	Kariakoo (small market for food staff)	16	10.5
	Kinondoni (Mtambani market)	16	10.5
	Buguruni market	16	10.5
	Total	**112**	**73.7**
Supermarkets	Uchumi Super market	8	5.3
	Imalaseko Super Market	8	5.3
	Baraka Super Market	8	5.3
	Sifamart Super Market	8	5.3
	Shoppers Plaza Super market	8	5.3
	Total	**40**	**26.3**
	Grand total	**152**	**100.0**

3.6 Data Processing and Consumers Preference Analysis

The study used qualitative techniques to investigate attributes that enhance consumers' choice for specific brands of rice and assess their WTP for selected rice attributes. Data that was collected through interview, questionnaires and observation were analyzed using SPSS. The descriptive analysis were used to provide an overview of rice marketing structure and rice varieties sold at the market place (object 1). The relationship that defined product demand was developed based on consumer theory which states that consumer's demand is a function of different factors as shown in equation (2).

$$Dx = f(Px, I, Pxy, Tx, ...) \quad \ldots\ldots (2)$$

Where, Dx is the consumer's demand for rice

Px is the price of rice

Pxy: the price of substitutes for rice such as maize flour

I is the consumer's income

Tx: Consumer's rice preferences.

Conjoint analysis was then used to identify important attributes that enhance consumers' preference for rice variety (objective 2) and calculate the willingness to pay a premium price for desired attributes (objective 3) and then rank-ordered logit model used to confirm results from conjoint analysis. Conjoint Analysis (CA) involved interrelated steps, which are categorized into three main steps. The first step identifies appropriate attributes and their levels as stimuli for consumer choice. The second step selects an experimental design and formulates a survey instrument for collecting conjoint data. The third step involves choosing an appropriate composition model and estimating buyer part-worth utilities and WTP. Conjoint analysis, measures individuals' preference structure via systematic variation of product attributes. A rice attribute is considered as a set of possible realizations that are referred to as attribute levels. The preference evaluation was used to make inferences on the relative contribution of the different attribute levels. The latter are called part-worth and the evaluation of a full product stimulus is referred to as the product's utility. The model assumes that, a product is a bundle of attributes. The utility of the product is a simple function of the utilities of the attributes and utility predicts behavior. Hence, utility from rice variety *X* is calculated as the sum of the part-worth of the levels of all rice attributes. The linear conjoint analysis model was represented according to equation (3).

$$U(X) = \sum_{a=1}^{f} \sum_{l=1}^{p_a} \beta_{al} \times x_{ial} \quad \text{..... (3)}$$

Where: $U(X)$ = Overall utility of an alternative rice variety

β_{al}= Parameter for unknown part-worth for a^{th} attribute and l^{th} level of attributes.

x_i= rice product profile *i,*

x_{ial}= 1 if product profile "x_i" has level of attribute desired by consumer and 0 otherwise.

The selected attributes are price interval, aroma, breakage rate, origin and cleanness. The attribute and corresponding levels used in the study are shown in Table 2. The lowest and middle price intervals are the average rice price per kilogram in local markets including rice stores and street shops whereas the highest average price is at the supermarket.

Table 2: Rice attributes and levels of attribute used in the study.

Attributes	Description	Level of attributes
Price interval	Retail price of rice per kg	Tsh. 1000-1500 Tsh. 1500-2000 Tsh. 2000-2500
Aroma	Odor of rice	Aromatic rice Non-aromatic rice
Breakage rate	Rice which is broken	Broken rice Non-broken rice
Origin	Rice name describing where specific rice is produced	Rice from Morogoro (Saro5) Rice from Mbeya (Super Mbeya) Rice from Shinyanga (Kalamata)
Cleanness	Absence of foreign materials in rice such as dark grain and sand)	Clean rice Non-clean rice

In creating combinations of factor levels that represent the product profiles in CA, which permit consumers ranking, number of attributes and levels for each attribute

would lead to unmanageable number of possible product profiles. For that reason, it was necessary to generate a representative subset known as an orthogonal design. In this case, 72 hypothetically possible combinations (product profiles) (3x2x2x3x2) were observed from the main attributes and their respective levels, which are too many combinations for an individual consumer to rank. Using a computer program (SPSS 16), sixteen product profiles were generated and presented to respondent during interviews (Table 3).

Table 3: Orthogonal design for rice profiles

Card ID	Origin	Cleanness	Breakage	Aroma	Price interval
1	Shinyanga	Non-clean	No-breakage	Aromatic	Tsh. [2000-2500]
2	Morogoro	Clean	No-breakage	Non-aromatic	Tsh. [1000-1500]
3	Shinyanga	Clean	Breakage	Non-aromatic	Tsh. [1000-1500]
4	Shinyanga	Clean	No-breakage	Aromatic	Tsh. [1500-2000]
5	Morogoro	Non-clean	Breakage	Aromatic	Tsh. [1500-2000]
6	Morogoro	Non-clean	No-breakage	Non-aromatic	Tsh. [1500-2000]
7	Shinyanga	Non-clean	Breakage	Non-aromatic	Tsh. [1000-2000]
8	Morogoro	Clean	No-breakage	Non-aromatic	Tsh. [2000-2500]
9	Mbeya	Non-clean	No-breakage	Aromatic	Tsh. [1000-1500]
10	Morogoro	Non-clean	No-breakage	Non-aromatic	Tsh. [1000-1500]
11	Mbeya	Clean	Breakage	Non-aromatic	Tsh. [1500-2000]
12	Morogoro	Clean	Breakage	Aromatic	Tsh. [1000-1500]
13	Morogoro	Clean	Breakage	Aromatic	Tsh. [2000-2500]
14	Morogoro	Non-clean	Breakage	Aromatic	Tsh. [1000-1500]
15	Mbeya	Non-clean	Breakage	Non-aromatic	Tsh. [1000-1500]
16	Mbeya	Clean	No-breakage	Aromatic	Tsh. [2000-2500]

By considering, the rice attributes and level in Table 2 and rice profiles in Table 3, the econometric representation of the conjoint utility model (3) is expressed in equation (4).

$$R_p = \beta_0 + \sum_{i=1}^{3} \beta_{1i} D_{1i} + \sum_{j=1}^{2} \beta_{2j} D_{2j} + \sum_{k=1}^{2} \beta_{3k} D_{3k} + \sum_{l=1}^{3} \beta_{4l} D_{4l} + \sum_{m=1}^{2} \beta_{5m} D_{5m} + \varepsilon_p \quad \ldots. (4)$$

Where: R_p is independent variable which measured by rice profile ranking (p=rice profiles card which is 1,2…16).

$\beta_1 i$, $\beta_2 j$, β_{3k} , β_{4l} , β_{5m} are the coefficient characteristics of each attribute.

D=dummy of characteristics of each rice attribute, i=price interval per kg (three), j=aroma (aromatic rice and non-aromatic rice), k=breakage (broken rice and non-broken rice), l=origin (Morogoro, Shinyanga and Mbeya), m=cleanness (clean and non-clean) and ε_p is the error term.

The estimations were performed using conjoint analysis method in SPSS. In confirming the conjoint results, rank-ordered logit model (rologit) in economics according to Beggs *et al*. (1981) was used, which is also known as the choice-based method of conjoint analysis (Hair *et al.* 2010). The model fits rank-ordered logistic regression model and applied to analyze how decision makers combine attributes of alternatives into overall evaluations of the desirability of these alternatives. The model identify how decision-makers rank the alternatives rather than just specifying the alternative that they like best. Coefficients are estimated using maximum likelihood methods. The probability of observing a specific ranking of rice profiles, represents a sequential decision interpretation in which the most preferred alternative is chosen out of the rest alternative. Probabilities for alternatives to be ranked first are conveniently computed under the assumption that the error in each level of attribute is independent and follow an extreme value type I distribution. Luce (1959) showed that the probability (πi) that rice product profile ($X_{i=1}$) is valued higher than product profile *2,3…16* can be written in the multinomial logit form according to

equation (5) whereby value of product profile ($X_{i=1,2...16}$) is the function of levels of attributes parameters estimated by the rank-ordered logit model.

$$\pi_i = \Pr\{X_{i=1} > Max(X_{i=2,3;....16})\} = \frac{\exp(X_{i=1})}{\sum_{i=1}^{16}\exp(X_{i=1})} \quad \text{..... (5)}$$

Following conjoint results and rank-ordered logistic regression, most important attributes were identified and then WTP were calculated for these attributes. The WTP shows a rate of consumers' willingness to offer some amount of income that can be taken away from consumer after a price change to restore the consumer's original welfare level. However, the compensation gap focus on the initial level of welfare that consumer held prior to price and/or income changes. The WTP for a specific rice attribute in particular rice alternative can be derived from the estimated parameters in conjoint analysis model by including price as one of the selection criteria for each rice alternative. Following Alias *et al.* (2012), Hu *et al.* (2012) and Diagne, *et al.* (2013), the WTP is considered to be linear form of the equation, which is given by the ratio of the coefficients of non-price attributes and price attributes (equation 6). Where βk is the coefficient of desired attribute (non – price attribute). The estimates of WTP provide an insight into the value that consumers place on its preferred attributes.

$$WTP = \beta k/\beta p \quad \text{.....(6)}$$

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Introduction

Data from 152 rice consumers selected from 12 markets in Dar-es-salaam was analyzed according to the analytical tools presented in the previous chapter. Results of the analysis from market survey are presented in this chapter. The chapter covers social-demographic and socio-economic characteristics of respondents, rice-marketing structure, preferences for rice attributes and willingness to pay.

4.2 Demographic Characteristics of Respondents

4.2.1 Sex and family size of respondents

The surveyed results revealed that, most of the respondents who come at the market place to buy rice were women, representing a higher of proportion (63.8%) in the sample. This relates to the fact that, women in the family are mostly responsible for food preparation than men do. Among respondents who participated in purchasing rice, 36.2% were male. The distribution of household's size were 1-3 people (25%) in which 15.8% were female and 9.2% were male. Households that constituted the majority (63.2%) had 4-6 people including 37.5% females and 25.7% males respondents. The rest of the households (11.8%) had seven or more members (Table 4).

Table 4: Distribution of family size of respondents

Household size	Frequency		Total	Percent (%)		Total (%)
	Male	Female		Male	Female	
1-3 people	14	24	38	9.2	15.8	25.0
4-6 people	39	57	96	25.7	37.5	63.2
7 and above people	2	16	18	1.3	10.5	11.8
Overall total	**55**	**97**	**152**	**36.2**	**63.8**	**100.0**

4.2.2 Origin of respondents and distribution by age

Dar-es-salaam is an urban city in Tanzania, and it therefore accommodates a mixture of people from different place within and outside the country. In the market survey, native respondents were 86.8% including 55.9% females and 30.9% males. The remaining 13.2% respondents were foreigners being 7.9% female while 5.3% were males. In term of age distribution, more people (34.2%) fell in the range of 25 to 35 followed by population of 35 to 45 (30.3%), 45 to 60 years (19.1%), 18 to 25 years (10.5%) and above 60 years (5.9%) as shown in Table 4. Respondents' age ranged in economic active population except small group (5.9%) above 60 years, which referred as economic inactive population (population not in labor force) (Table 5).

Table 5: Age of respondents

Age	Frequency				Percent (%)			
	Male		Female		Male		Female	
	Native	Foreigners	Native	Foreigner	Native	Foreigners	Native	Foreigner
18-25	6	0	10	0	3.9	0.0	6.6	0.0
25-35	14	2	30	6	9.2	1.3	19.7	3.9
35-45	13	4	26	3	8.6	2.6	17.1	2.0
45-60	12	1	15	1	7.9	0.7	9.9	0.7
60+	2	1	4	2	1.3	0.7	2.6	1.3
Total	**47**	**8**	**85**	**12**	**30.9**	**5.3**	**55.9**	**7.9**

4.3 Socio-economic Characteristics of Respondents

4.3.1 Education level of respondents

Results in Table 6 show that, proportion of respondents participated in rice purchasing for their family, most of them (51.3%) had university or college education, followed by secondary education (28.3%), primary education (19.1%) and no formal education (1.3%). Among respondents who had college or university education, 28.3% were females and 23% were males. Out of those who had attended secondary education, 18.4% were females, 9.9% were males while those who had primary education, 15.8% were females and 3.3% were males, and the rest (1.3%) who had no formal education were all females.

Table 6: Education of respondents

Education level	Frequency		Total	Percent (%)		Total (%)
	Male	Female		Male	Female	
None	0	2	2	0.0	1.3	1.3
Primary	5	24	29	3.3	15.8	19.1
Secondary	15	28	43	9.9	18.4	28.3
College/university	35	43	78	23.0	28.3	51.3
Overall total	**55**	**97**	**152**	**36.2**	**63.8**	**100.0**

4.3.2 Respondents' economic activities

The distribution of economic activities among respondents is shown in Table 7. Rice consumers in Dar-es-salaam engaged in different economic activities through which they generate income for buying rice and for other needs. Most of the respondents were engaged in their own business (54.6%) while others were employed (40.8%), studying (2.0%), and the rest (2.8%) were dependents. From the theory of consumer

demand, there is a relationship between overall consumer's income and purchasing power (ability to purchase). Hence, income obtained from various economic activities can influence rice consumption pattern of the household. The results reveled that, the highest proportion of rice consumers in this city were self-employed, especially those who were engaged in general commerce (36.2%) followed by those who are employed in the formal and informal sector.

Table 7: Economic activities of respondents

Category of activity	Economic activities	Frequency		Total	Percent (%)		Total (%)
		Male	Female		Male	Female	
Dependent	None	0	4	4	0.0	2.6	2.6
Self-employed	Agriculture	1	4	5	0.7	2.6	3.3
	Livestock	1	2	3	0.7	1.3	2.0
	Commerce general	16	39	55	10.5	25.7	36.2
	Rice commerce	2	6	8	1.3	3.9	5.3
	Handcraft	0	1	1	0.0	0.7	0.7
	Laborer	2	1	3	1.3	0.7	2.0
	Driver/Motorcyclist	7	1	8	4.6	0.7	5.3
	Sub-total	**29**	**54**	**83**	**19.1**	**35.5**	**54.6**
Employed	Employee	22	31	53	14.5	20.4	34.9
	House girls/boys	1	8	9	0.7	5.3	5.9
	Sub-total	**23**	**39**	**62**	**15.1**	**25.7**	**40.8**
Studying	Students	3	0	3	2.0	0.0	2.0
	Overall total	**55**	**97**	**152**	**36.2**	**63.8**	**100.0**

Note: Dependent in this table refer to the economically active population that do not perform any economic activities.

4.4 Respondents Expenditure on food and rice Consumption Pattern

4.4.1 Rice Consumers expenditure on food

According to Table 8 most respondents (36.8%) spent between 200 000 to 300 000 Tshs on food per month, followed by (18.4%) who spend between 400 000 to 500 000

Tshs. Another 16.4% spend between 100 000 to 200 000 Tshs per month while 14.4% spend between 300 000 to 400 000 Tshs per month. A small proportion of 6.6% spent between 500 000 to 600 000 Tshs per month, 3.9% spend less than 100 000 Tshs per month and 3.3% spend between 600 000 to 700 000 Tshs per month. These results suggest that more than 75% of respondents spent at least 200 000 Tshs per months on the food budget for the household. Given other factors being constant the results imply that, rice purchases and consumption pattern of household is influenced by the budget allocated to food.

Table 8: Rice consumers' monthly expenditure on food

Expenditure in Tshs.	Frequency		Total	Percent (%)		Total (%)
	Male	Female		Male	Female	
Less than 100 000	3.0	3.0	6.0	2.0	2.0	3.9
100 000-200 000	9.0	16.0	25.0	5.9	10.5	16.4
200 000-300 000	17.0	39.0	56.0	11.2	25.7	36.8
300 000-400 000	8.0	14.0	22.0	5.3	9.2	14.5
400 000-500 000	12.0	16.0	28.0	7.9	10.5	18.4
500 000-600 000	4.0	6.0	10.0	2.6	3.9	6.6
600 000-700 000	2.0	3.0	5.0	1.3	2.0	3.3
Total	**55.0**	**97.0**	**152.0**	**36.2**	**63.8**	**100.0**

4.4.2 Frequency of purchasing rice

Results in Table 9 show that, majority of respondents (46.1%) bought rice monthly, followed by respondents who bought rice weekly (38.8%) and the rest (15.1%) bought rice every day. Majority of female respondents (28.9%) and males (17.1%) purchased rice once per month, followed by females (17.8%) and males (15.1%) who purchased rice once per week, while only 5.9% female purchased rice thrice per week, the rest 11.2% females and 3.9% males purchase rice once per every-day.

Table 9: Respondents frequency of rice purchasing

Category	Rice purchases rate	Frequency		Total	Percent (%)		Total (%)
		Male	Female		Male	Female	
Monthly	Once per month	26	44	70	17.1	28.9	46.1
Weekly	Once per week	23	27	50	15.1	17.8	32.9
	Thrice per week	0	9	9	0.0	5.9	5.9
	Sub-total	**23**	**36**	**59**	**15.1**	**23.7**	**38.8**
Daily	Once per day	6	17	23	3.9	11.2	15.1
Total		**55**	**97**	**152**	**36.2**	**63.8**	**100**

4.4.3 Frequency of rice consumption

Results in Table 10 show that, majority of respondents (74.3%) consumed rice every day in their households, however most of them (67.1%) consuming rice once per day, but a small proportion of respondents (7.2%) consuming rice twice per day. The rest of respondents reported consuming rice three days per week (21.1%), once per week (2.6%) and once per month (2%).

Table 10: Rate of rice consumption of respondents

Category	Rice consumption rate	Frequency		Total	Percent (%)		Total (%)
		Male	Female		Male	Female	
Monthly	Once per month	2	1	3	1.3	0.7	2.0
Weekly	Once per week	2	2	4	1.3	1.3	2.6
	Three days per week	10	22	32	6.6	14.5	21.1
	Sub-total	**12**	**24**	**36**	**7.9**	**15.8**	**23.7**
Daily	Once per day	37	65	102	24.3	42.8	67.1
	Twice per day	4	7	11	2.6	4.6	7.2
	Sub-total	**41**	**72**	**113**	**27.0**	**47.4**	**74.3**
Total		**55**	**97**	**152**	**36.2**	**63.8**	**100.0**

4.4.4 Relationship between rice purchases rate and consumption of respondents

The relation between rice purchases and consumption is obvious. The frequency of rice purchases determining the availability of rice for the household, which is available for consumption. However, it is not necessary that, the frequency of rice purchases should be equal to the frequency of rice consumption in the household, because sometime the household can purchase a large quantity of rice at once for the whole week or month consumption. Results in Table11 shows that, the relationship between rice purchases frequency of respondents (Table 9) and rice consumption frequency of respondents (Table 10) is indicated by 23.1% of correlation, which is significant at 1%.

Table 11: Correlation between rice purchases rate and consumption of respondents

		Frequency of rice consumption	Frequency of rice purchases
Rice consumption	Pearson Correlation	1	0.231**
	Sig. (2-tailed)		0.004
Rice purchases	Pearson Correlation	0.231**	1
	Sig. (2-tailed)	0.004	
	N	152	152

**. Correlation is significant at the 0.01 level (2-tailed).

4.5 Rice Consumers and Marketing Structure

4.5.1 Rice marketing situation

In Dar-es-salaam city, markets for rice are widely distributed. Rice is sold in local markets for food, which have been designated by the local government for marketing activities as well as in supermarkets, streets shops and rice stores. Among the

markets surveyed in the study, the largest stores are found at Tandika market, followed by Tandale market. At the rice store, paddy were collected from the producers/farmers in the field through commissioned agents (paddy collectors or collection agents), then milled and sold to wholesalers. At the wholesalers and supermarkets, some rice varieties were imported and exclusively sold at the supermarkets. Supermarkets also purchased some local varieties from wholesalers. The retailers in the local markets and streets shops purchased rice from wholesalers and rice stores (rice millers). In addition, most rice respondents (68.4%) purchased rice at the local markets which includes markets at nearby streets or/and street shops within their neighborhood.

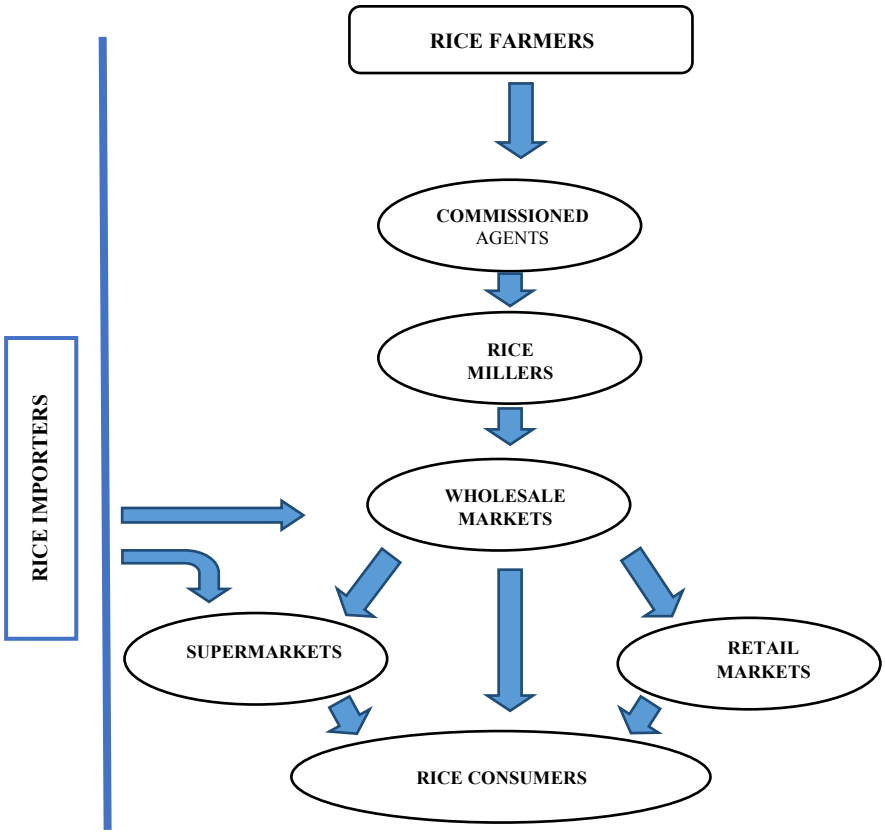

Figure 4: Rice value chain in Dar-es-salaam city

The rice market chain actors in Dar-es-salaam (Figure 4), involved rice farmers, commissioned agents dealing with paddy collection from farmers as well as movement from the field to the millers/processors, wholesalers, retailers, rice importers and final consumers. Rice that is sold in these markets is mostly produced in Mbeya, Shinyanga, Morogoro, Arusha and Rukwa regions and some is imported. The rice varieties sold in local markets are mostly locally produced but a small number of traders were also selling imported rice from Pakistan, locally known as VIP rice, which was the cheapest in the markets followed by local rice variety and then other imported rice varieties. Most of the rice consumers in Tanzania prefer locally produced rice than imported varieties. However, a small percent (5.9%) of rice respondents still preferred imported rice varieties.

Rice consumers in local markets mostly used the origin, brands, taste, aroma, and appearance of rice to distinguish between imported rice against local rice variety. Meanwhile rice consumers in supermarkets rely on branding and origin to make their choice. In addition, the study established that, consumers' experience in rice consumption of a certain variety (palatability) also plays a role in buying decision, and therefore foreigners consumed most of imported rice guided by their past experience in consuming those varieties. For example, most Indians consumed basmati rice variety, which was imported from India and Pakistan.

Rice varieties at the supermarket were better organized in term of packaging, branding and labeling compared to local markets (Plates 1). At the supermarket, buyers found relevant information about the rice on the cover of the packages. At

local markets, rice consumers had to face the problem of information asymmetry regarding the rice varieties, especially for those who cannot identify the best rice by physical appearance. For example, Mbeya rice were considered to be superior over the other rice varieties, therefore some consumers were willing to pay a higher price for Mbeya rice but they failed to identify it in the market place among other available varieties. Hence, most consumers who failed to choose the preferred variety among many others available at these markets had to depend on the knowledge and honesty of sellers regarding rice varieties. This problem sometimes led consumers to purchase varieties, which were not their best choice especially when traders are untrustworthy.

(i) Rice varieties arrangement in the local markets

(ii) Rice varieties arrangement in the supermarkets

Plate 1: Arrangement of rice varieties in the market

4.5.2 Rice varieties in the markets

Local rice varieties at the markets were identified according to origin of production rather than by their scientific variety name. Meanwhile, at the production site, farmers identified rice varieties by their local names, for example Mwenda mbio, Tule na Bwana, Kalamata, Magugu, Saro5 and Wahiwahi rice, which are not well known by rice consumers. Meanwhile consumers choose rice based on its origin of production, farmers do not grow a single variety at these sites. Rather, in the farming areas farmers grow different local rice varieties including aromatic and non-aromatic types, which have different characteristic and history. Table 12 show example of varieties, which are grown by farmers in Mbeya, Morogoro, Shinyanga, Arusha and Kilimanjaro.

Table 12: Example of common varieties grown by farmers

Production area/ origin	Name of local varieties
Mbeya	Supa Zambia, Rangi mkia, Supa Kyela, Mwenda mbio, Mahia, Kahogo, Supa Shinyanga, Tule na bwana, Rangi mbili, Kisekese, Pigo, Mpauko, Kilombero, Shingo ya mwali, Saya dume and Saya jike
Morogoro	Supa India, Kalamata, Supa Zambia, Kisegese and Saro (ndefu and fupi), Supa Kilombero and Ifakara.
Shinyanga	Umano, Kalamata, Bisholi (Pisholi), Supa Kabangala and Bulungwa–Magu, Supa, Supa India, Beyenge and Mabeyenge
Kilimanjaro and Arusha	Wahiwahi, Kahogo, Supa Magugu and Saro

Inspite of many rice varieties, which are grown by farmers at the site of production, varieties that are famous in the market include; Supa Kyela from Kyela (Mbeya), Kalamata (Shinyanga), Magugu (Manyara, Kilimanjaro and Arusha) Saro, Kilombero and Ifakara rice (Morogoro). At the local markets in Dar-es-salaam, rice

varieties that are sold were mostly identified as super Mbeya or super Kyela, Morogoro rice and Shinyanga rice. Rice from Arusha is not very prominent in these markets. Mbeya rice was considered the best among local rice varieties, and it sold at the highest price followed by Shinyanga rice. Morogoro rice was regarded as being and of poor quality, hence it was sold at the lowest market price compared to Shinyanga and Mbeya rice. Moreover, among these three rice varieties super Mbeya or Kyela rice (Mbeya), Kalamata (Shinyanga) and Saro5 (Morogoro) super Mbeya was the only rice variety that was also present in the supermarkets. Other varieties sold in supermarkets include brown local rice and other imported rice such as basmati, Jasmine, brown rice and pudding rice (Italian rice). Example of some rice varieties, which was sold in the markets, are shown in the Plates 2.

Plate 2: Example of rice varieties in the market

4.5.3 Rice markets for respondents

The distribution of respondents based on the market from which they purchased rice is shown in the Table 13, where respondents were bought rice from local markets, stores (rice millers), and supermarkets. However, the retail price of rice at supermarkets was higher than in local markets. In rice stores (rice millers), rice was sold in wholesale price, which is lower than the retail price.

Table 13: Rice markets for respondents

Rice purchases	Frequency		Total	Percent (%)		Total (%)
	Male	Female		Male	Female	
Local market	34	70	104.0	22.4	46.1	68.4
Rice stores	2	6	8.0	1.3	3.9	5.3
Local markets & stores	12	12	24.0	7.9	7.9	15.8
Super market	7	9	16.0	4.6	5.9	10.5
Total	**55.0**	**97.0**	**152.0**	**36.2**	**63.8**	**100.0**

Results in Table 13 revealed that most respondents (68.4%) bought rice from local markets and only 10.5% bought rice from supermarkets. The remaining 15.8% bought from both markets and 5.3% from rice stores. Among the respondents who purchased rice in local markets, 22.4% were males while 46.1% were females. At the supermarkets, 4.6% were males while 5.9% were females. Among respondents who bought rice from both markets, 7.9% were males and 7.9% were females while 1.3% males and 3.9% females were among respondents purchased rice from rice stores.

4.5.4 Price formation

The sellers' prices were determined at the point of supply and there was no uniform price at the markets. Transaction costs and consumers' preferences were taken into

account in price formation. Transaction costs involves all expenses that seller incurred to bring rice to the market. In the case of rice attributes such as aromatic versus non-aromatic rice and broken versus non-broken rice, prices were not equal, however, the price differences between or within attributes are informal and therefore not well known in the market. Rice from Morogoro, Shinyanga and Mbeya, were also sold at different prices. In addition, rice prices in the markets varied seasonally as shown in Figure 7. During the harvesting season, rice price were at a minimum because of minimum wholesale rice prices due to oversupply.

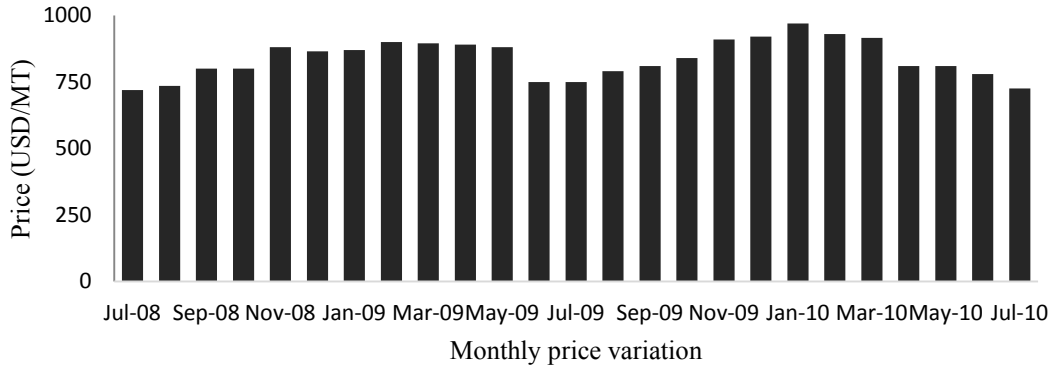

Figure 5: Wholesale prices of rice in Dar (USD/MT – July 2008 to July 2010)

Source: Match maker associates Ltd, 2010

4.6 Preferences for Rice Attributes

4.6.1 Relative importance of attribute for rice

The results of conjoint analysis presented in the Table 14 indicate that consumers made the choice on rice purchases based on rice attributes. Analyzed rice attributes were price interval, aroma, breakage rate, origin and cleanness. In the case of price interval, the lowest and middle price intervals were the range of average rice price

per kilogram in local markets including rice stores and street shops while the highest average price interval was the average price per kilogram at the supermarket.

Table 14: Conjoint utility estimates

Attributes	Levels	Utility Estimate	Std. Error	Relative importance (%)
(Constant)		-5.3	1.34	
Origin	Morogoro	-0.7	0.30	
	Shinyanga	0.3	0.35	17.7
	Mbeya	0.3	0.35	
Cleanness	Non-clean	2.6	0.45	19.5
	Clean	5.1	0.90	
Breakage	Broken	1.2	0.45	11.0
	Non-broken	2.4	0.90	
Aroma	Non-aromatic	4.9	0.45	37.4
	Aromatic	9.9	0.90	
Price per Kg	Tsh [2000-2500]	0.4	0.27	
	Tsh [1500-2000]	0.8	0.54	14.5
	Tsh [1000-1500]	1.2	0.82	

Pearson's R = 0.974 Kendall's tau = 0.833 Sig= 0.000

Pearson and Kendall's tau-b statistic shows stability of the estimated model between the rice attributes and rank orders of respondents' preference, which were 97.4% and 83.3% respectively. The Pearson and Kendall's tau-b statistic imply that, there is a strong correlation between the observed preferences and those estimated by model, and therefore suggests a high predictive validity of the model given the value obtained are significant. The attribute of aromatic was the most important for rice buyers (respondents consumers) as indicated by 37.4% of the respondents. Cleanness was the second (19.5%), followed by origin (17.7%).

Price comes fourth (14.5%) and breakage was last (11%). The utility value of rice attributes' levels were estimated by conjoint analysis based on how respondents

ranked the rice profile. A positive value indicated higher preference between levels whereas a negative value indicated a lower preference between levels of an attribute. Furthermore, preferences of a certain level within attributes become stronger as level values increase. The utility value of attributes' levels are shown by conjoint results in Table 14.

The utility value for aromatic rice was the highest among attribute levels (9.9) as shown in Table 14. Utility decreased to 4.9 when rice is non-aromatic. This implies that, respondents assigned higher value to aromatic rice varieties than non-aromatic. These results can explain why super Mbeya rice variety, which has a strong aroma, is preferred in Tanzania followed by Shinyanga rice, while Morogoro rice was less preferred as it has low or no aroma. This result was similar to that presented by Abiriwe *et al*. (2011) who ranked factors that identify consumer preference for attributes of rice in Tamale city of Ghana. The aromatic attribute was among factor that defined the quality of rice most preferred by consumers.

Likewise, in another study Bediako-Amoa *et al*. (2010) established that most Ghanaians rice consumers in Accra-metropolis preferred imported rice due to aromatic attribute whereas local varieties were considered as the poorest varieties. In describing levels of cleanness, respondents reveal preference for cleanliness, hence they assigned a higher value of utility (5.1) to cleaned rice than non-cleaned rice (2.6). This explains why most rice traders especially retailers incurred additional cost to hire labor for cleaning rice to attract rice consumers. In another analysis of consumer preferences for different rice verities in Turkey, Azabagaoglu and

Gaytancioglu (2009) found that cleanliness of rice was among the factors that defined consumers' preference. Consequently, imported US Calrose rice was more consumed than other varieties.

In the case of level of price, respondents assigned higher utility value (1.2) to the low price interval of 1 000 to 1 500 Tshs per one kilogram of rice, followed by medium price interval of 1 500 to 2 000 Tshs which was assigned utility value of 0.8. The least assigned utility value (0.4) was in the highest price interval of 2 000 to 2 500 Tshs because as price increases, the ability to purchase decreases given other factor are constant (theory of demand). As the rice price interval per kilogram increases, the assigned utility value by respondents decreased. These results indicate that, respondents were price sensitive, such that at the higher price, some rice consumers would switch to low price varieties while others did not buy at all. This may imply that, some respondents failed to buy the preferred variety in the rice markets due to higher market price. For example, some consumers that preferred Mbeya and Shinyanga rice due to strong aromatic attribute, possibly failed to buy these varieties continuously due to higher market price. A study by Azabagaoglu and Gaytancioglu (2009) in Turkey revealed similar findings where US Calrose rice was mostly consumed due to suitable price at the market, however Baldo rice-a local variety-were most preferred than other varieties but it was less consumed due to higher price.

In case of the rice origin, respondents assigned equal value of utility to both Mbeya rice (super Mbeya) and Shinyanga rice (Kalamata), which was 0.3 while Morogoro rice (Saro5) was assigned the least negative value of utility (-0.7), and therefore implies that, respondents had equal positive preference for rice from Mbeya and

Shinyanga while had negative preference toward rice from Morogoro. Meanwhile, the results reflected a similar situation in the world rice market where the country of origin has been an important criterion in buying rice especially in rice consuming countries while consumers from non-rice consuming countries were not much concerned about the origin of the rice (Linnemann and Suwannaporn, 2008).

Probably, consumers from non-rice consuming countries had little knowledge about rice varieties and did not even note where the rice came from. However, according to Napsintuwong (2012), there were some relations between preferences and countries of origin for certain grain types such as Jasmine rice with Thailand, Japonica (known as Japanese rice or Sushi rice) with Japan, Basmati with India/Pakistan, Risotto with Italy. This may explain an established reputation as the place of origin could be related with quality and product reliability. Meanwhile, aromatic quality was the most important criterion for buying by most respondents in Dar-es-salaam, expressing higher preference for rice from Mbeya and Shinyanga probably reflecting consumers' demand for strong aromatic attributes in those varieties.

In the case of breakage levels, respondents indicated the preference for non-broken rice to which they assigned a higher utility value (2.4) compared broken rice (1.2). This is consistent with consumer survey from Ghana in 2008 where non-broken or minimal broken rice grains was the second important selection criteria for urban traders whereas cleanliness was the first criteria (Dormon and Kula, 2009). In international markets broken rice is considered an inferior product, and is therefore is

at much cheaper than the whole rice, which is non-broken rice (Demont *et al*. 2013). Hence, from the marketing perspective, high quality often means more whole grains (non-broken rice) after milling, however poor processing (milling) machines could result in high percentage of broken rice, which is not preferred by consumers. Rice producers and traders may therefore increase their profit margin by improving rice-processing machines that will reduce breakage of grains.

4.6.2 Rice attributes influences respondents decision

Results of conjoint analysis in Table 14 highlight how respondents evaluated rice varieties based on perceived utility value of the attribute level, assigning higher utility levels to attributes they considered most important in their purchase decision. Respondents' preferences were mostly influenced by aromatic rice, followed by clean rice, non-broken rice and the price between 1000 to 1500 in Tshs per kg. Morogoro rice (Saro5) had a negative utility score among consumers. These results also can be confirmed via the rank-ordered Logit model (choice-based conjoint model) which analyzed how respondents combined attributes of alternatives into overall evaluations of the attractiveness of these alternatives. The parameters of attributes were estimated via maximum likelihood tools through a rank-ordered Logistic regression model in STATA statistical software package.

The overall model predictive ability of the rank-ordered Logit model to analyze the relationship between respondents' ranks of rice profile and the combination of attributes in a rice profile is tested by the models likelihood ratio chi-square test, whereby the likelihood ratio chi-square was found to be 927.780, which was

significant at one percent level. Hence, confirming the goodness of fit of the model to predict the existence of a relationship between preferences ranks of rice profile and the combination of rice attributes in a rice profile.

The results in Table 15 show the coefficients of rice attributes which influenced respondents' preferences for rice varieties (rice profile). These coefficients included Mbeya rice, Morogoro rice, clean, non-broken, aromatic, and price interval between 1000 to 2000 Tsh per kilogram. All the coefficients were significant at 5% ($p < 0.05$) except Mbeya rice ($p > 0.05$). The sign of coefficients (positive or negative) imply the rate of influence of the rice attribute level to overall preferences of rice varieties which were denoted by respondents' ranks of rice profiles. In addition, the rate of influence of an attribute level becomes stronger as coefficients' absolute value increases.

The results of rank-ordered logistic regression (Table 15) are similar to those of conjoint analysis results (Table 14) in explaining the most important attributes level, which govern consumers' preference for rice varieties during purchases and consumptions. Results indicate that, aromatic rice was highly likely to influence respondents' decision to purchase a certain rice variety, followed by cleaned rice (rice without impurity) and non-broken rice and price interval per kilogram in Tshs ranged from 1000 to 2000. The last level was Morogoro rice, which had a higher negative value implying a negative influence to overall preference of rice variety. The results confirm the fact that, there are rice attributes, which drive preference and willingness to pay by consumers.

Table 15: Ranked-order logistic regression estimate

Attributes category	Ranks of rice profile	Coefficients	Std. Err	P>|z|
Origin	Mbeya	-0.02	0.06	0.751
	Morogoro	-0.22	0.05	0.000
Cleanness	Clean	0.69	0.05	0.000
Breakage rate	Non-broken	0.32	0.04	0.000
Aromatic	Aromatic	1.28	0.05	0.000
Price interval per kg	Tsh [1000-1500]	0.29	0.06	0.000
	Tsh [1500-2000]	0.28	0.06	0.000

Log likelihood = -4830.278
LR chi2 (7) =927.780, Sig = 0.000
Note: the model omitted none influential attributes level

Both results imply that, the best attribute that defined consumers' preferences of rice in Dar-es-salaam city was aroma, hence aromatic rice fetches a higher price than non-aromatic varieties in the market. Similarly, in a study by Kaosa-ard and Juliano (1992) in selected international markets, aromatic rice was perceived as premium quality in several rice-consuming countries. However, consumer preferences towards aromatic rice were different among countries. For instance, in some international markets including South Asia, the Middle East particularly India, Pakistan, and Thailand, the aromatic rice fetches higher prices, which is similar situation in Dar-es-salaam rice markets. Nevertheless, in countries such as China, consumers prefer semi-aromatic rice to pure aromatic rice (Khush *et al*. 2000) while in the Philippines, consumers do not give preferences to aroma, particularly among medium income group, and only less than one third in the low and high income groups give preferences towards aromatic characteristics (Abansi *et al*. 1992).

According to Ferrero and Nguyen (2004) in European markets, consumers demand for aromatic rice varieties, particularly Basmati, has being increasing since the early

1990's due to an increasing number of immigrants from far-eastern countries and the growing interest in ethnic cuisine. Aroma is also rated the highest desired trait for Indians, followed by taste and elongation of the grain after cooking. This preference also applies to Thais, Chinese and Taiwanese. The unique texture and aroma is what gives Jasmine rice from Thailand the perception of an expensive quality rice among buyers. Similarly, the highest consumers' preference for aromatic rice in Dar-es-salaam indicated higher demand for similar varieties, however other factors such as cleanliness, non-broken rate and price were taken into account (Table 14 and 15).

4.7 Estimation of Willingness to pay (WTP) for Rice Attributes Demanded

Estimating the willingness to pay for demanded attributes is very important for rice traders, producers and processors as motivation to supply what the market demands. While traders, processors and farmers are interested on making profit, consumers always seek to maximize satisfaction/utility by consuming rice varieties they prefer. Hence, demanded rice needs to be economically viable to traders, processors and farmers as well. The calculated WTP representing respondents' rate of willingness to pay premium price after adding or improving a rice attribute or rice attributes. It implies the willingness of respondents to add up to the minimum price at the market in order to acquire certain rice attributes. Through conjoint analysis results and rank-ordered Logit model results, the most important attribute levels were identified, which are aromatic rice, clean rice and non-broken rice. Following Alias *et al.* (2012), Hu *et al.* (2012) and Diagne *et al.* (2013), the WTP for desired attributes were calculated from utility coefficients in conjoint analysis results. The willingness to pay was considered as a ratio of utility coefficient of preferred attribute (non-price

attribute coefficient) to negative price coefficient. Following Table 14, all coefficients of price interval per kilogram were taken into calculation, and therefore average WTP for desired attributes are shown in Table 16.

Table 16: Calculated average willingness to pay for desired attributes

Attribute level	Conjoint utility coefficients	Average WTP (Tshs/Kg)
Clean	5.1	8.0
Non-broken	2.4	3.8
Aromatic	9.9	15.5

Results in Table 16 show the calculated average WTP for non-broken rice was 3.8 whereas cleanliness of rice 8.0. Among preferred attributes, aromatic rice fetches the highest average WTP of 15.5. Moreover, in a survey of recent innovations in aromatic rice, Napsintuwong (2012) also found that among the rice traded in the world market, aromatic rice such as Pakistan Basmati and Jasmine rice-Thai fragrant has been given the highest value. In addition, study of Goodwin *et al.* (1996b) found that Filipino and Southeast Asian consumers in the U.S. were strongly willing to pay more for Thai aromatic rice while Taiwanese consumers were willing to pay less. Meanwhile, these results clearly show that, producers, processors and rice traders in Tanzania can gain more profit by improving rice variety to suit consumers demanded attributes both in the local and export market because rice consumers always pay a premium price aroma and cleanliness among other attributes.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

In the globalized markets where food market are tuned to consumer-oriented needs, the affluent rice consumers have more power to demand for specific attributes, especially in terms of quality, health and safety. As the marketing process becomes more complex and competitive, understand consumers' preference for rice attributes is becoming very important in order to improve the rice quality for marketability. Hence, paying attention to attributes of locally produced rice is therefore important right from production and through the entire market chain for improving competitiveness as well as securing future rice markets.

The study of consumers' preferences for attributes of rice defined the quality of rice in Dar-es-salaam city based on attributes. The study used conjoint analysis tool, which measures individuals' preference structure via systematic variation of rice attributes. The conjoint analysis results were confirmed by rank-ordered Logit model which is also known as a choice-based method of conjoint analysis, that analyzes how respondents combined attributes of alternatives goods (in this case rice varieties) into overall evaluations of the desirability of these alternatives. Data analysis for 152 respondents rice consumers form local markets and supermarket was done to understand the consumer preferences for rice variety and WTP for desired attributes. The study found that, the aromatic attribute had the most influence on respondents' preference for a rice variety and had a higher calculated WTP, followed by

cleanliness and the non-broken rate of rice respectively. On this basis the study concludes that the ideal rice in Dar-es-salaam city should be aromatic, clean and non-broken in order to improve rice marketability. Hence, this study call for improvement of rice varieties to incorporate attributes desired in the rice markets.

Greater respondents' preference and WTP for aromatic rice point toward sufficient market potential for the local farmers who grown aromatic rice variety. Advanced machinery for rice processing is important for improving rice cleanness and reducing broken rate as well. Moreover, the study also found that, at the markets consumers identified rice based on origin of production regions, but in the area of production, there were multiple varieties being grown. This call for labeling of rice in terms of variety certified name, attributes and nutritional contents in order to give freedom for consumers to choose their preferred rice.

Finally, the study expressed the potential for using conjoint analysis to determine consumers' preferences for rice attributes, however this research approach has some limitations. For example, there are many attributes and levels of attributes for rice variety. It is difficult to choose what attributes to include in the study design and what to exclude. In this study, selection of attributes was based on the literature and market survey where rice consumers were asked which attributes they considered important when purchasing and consuming rice varieties. It is most likely that, there are other attributes of rice variety that are important to consumers which were not considered by this study such as taste of rice type/brand after rice consumption.

5.2 Recommendations

The results from this study provide information to rice producers and traders as well as researchers, government and other development partners about consumers' perception towards attributes of rice varieties. Consumers in general check for rice attributes when purchasing rice. Aroma, cleanliness and non-broken attributes were the most important attributes considered by consumers when they made choices to buy rice, paying a premium for these attributes. Sellers and rice producers should therefore focus to invest on such varieties and improving rice-processing machinery with the intention of reducing rice impurity and breakage rate so that to enhance rice marketability and competitiveness for local produced rice. Moreover, improving post harvest handling of rice by farmers and traders should be taken into account to enhance these attributes. For example, the right moisture content is important to minimize the proportion of broken rice during milling.

Furthermore, the study calls for government and other development partners to support operating markets in the rice sector through investing in rice research, especially breeds' improvement to incorporate preferred attributes and scientific naming of local rice varieties. Currently, rice farmers and traders face challenges in selling non-aromatic rice varieties especially during the harvesting season. As a result, these varieties are sold at very low price. This highlight the importance of research institutions to focus on improving the performance of higher-yielding non-aromatic varieties or/and improve yield of aromatic varieties so that they are more widely adopted, with the purpose of improving producers/farmers profitability and consumers satisfaction.

REFERENCES

Abansi, C. L., Duff, B., Lantican, F. A. and Juliano, B. O. (1992). Consumer demand for rice grain quality in selected rural and urban markets in the Philippines. In: *Consumer demand for rice grain quality*. Edited by (Unnevehr, L. J., Duff, B. and Juliano, B. O.). International Rice Research Institute, Manila, Philippines. pp. 37-57.

Abiriwe, S. A., Anang, B. T. and Adjetey, S. N. A. (2011). Consumer Preferences for Rice Quality Characteristics and the Effects on Price in the Tamale Metropolis, Northern Region, Ghana. *International Journal of AgriScience* 1 (2): 67–74.

Agricultural Council of Tanzania (ACT) (2007). Report On Output Market Support. [http://internetsolutions.co.tz/tap.or.tz/documents/200704_OUTPUT_MARKETING_SUPPORT.pdf] site visited on April 15th, 2014.

Alias, R., Hanis, I. A. H. A., Jinap, S., Nasir, S. M., and Shahrim, A. K. M. (2012). Consumers' demand and willingness to pay for rice attributes in Malaysia. *International Food Research Journal* 19(1): 363-369

Ara, S. (2003). *Consumer willingness to pay for multiple attributes of organic rice: A case study in the Philippines.* International Association of Agricultural Economists, Annual Meeting, August 16-22, 2003, Durban, South Africa.

ARI-KATRIN (2012). *Regional Rice Center of Excellence (RRCoE)-ARI-KATRIN.* KATRIN – RRCoE News Bulletin Nov. 2012.

Aune, J. B., Esser, K., Sekhar, N. U. and Tesfai, M. (2014). *Opportunities for Support to System of Rice Intensification in Tanzania, Zambia and Malawi*. Report commissioned by NORAD under the NMBU – Norad Frame Agreement. Noragric Report No. 71

Azabagaoglu, M. O. and Gaytancıoglu, O. (2009). Analyzing consumer preference for different rice varieties in Turkey. *Journal of Agricultura Tropica et Subtropica*, Vol. 42 (3) 118-125.

Banovic, M., Grunert, K. G., Barreira, M. M. and Fontes, M. A. (2009). Beef quality perception at the point of purchase: A study from Portugal. *Journal of food quality and preference,* Vol. 20 (4): 335-342.

Bediako-Amoa, B., Diako, C., Saalia, F. K., Sakyi-Dawson, E. and Manful, J. T. (2010). Consumer Perceptions, Knowledge and Preferences for Aromatic Rice Types in Ghana. *Nature and Science*, 8 (12):12-19.

Beggs, S., Cardell, S. and Hausman, J. A. (1981). Assessing the potential demand for electric cars. *Journal of Econometrics* Vol. 17: 1–19.

Bill and Melinda Gate foundation (BMGF) (2012). Developing the rice industry in Africa. Tanzania rice value chain analysis.

Blijlevens, J., Creusen, M. E. H. and Schoormans, J. P. L. (2009). How Consumers Perceive Product Appearance: The Identification of Three Product Appearance Attributes. *International Journal of Design,* Vol. 3 (3): 27-35.

Breidert, C. (2006). *Estimation of willingness to pay, theory, measurement and application*. Deutscher University, Wiesbaden.

Campo, M. M., Furnols, M., Nute, G. R., Oliver, M. A., San-Julián, R. and Sañudo, C., (2006). Eating Quality of Beef, from Different Production Systems, Assessed by German, Spanish and British Consumers. *Meat Science journal,* 74(3): 435-442.

Carr, D., Hart, R., Henson, S., Jones, A., Knowles, L., Majowicz, S., Masakure, O., Sockett, P. (2006). Consumer Assessment of the Safety of Restaurants: The Role of Inspection Notices and Other Information Cues. *Journal of Food Safety* 26(4): 275-301.

Chakravarty, S. R. (2002). *Microeconomics*. Allied Publishers Pvt. Ltd, New Delhi. 808pp.

City mayors' statistics (2014). World's fastest growing cities and urban areas. [http://www.citymayors.com/statistics/urban_growth1.html] site visited on August 5th, 2014.

Demont, M., Ndour, M., Rutsaert, P. and Tollens, E. (2009). *Competitive rivals: Willingness to pay for Senegal River valley versus imported rice*. II Workshop on valuation methods in Agro- food and environmental Economics Experimental Auction: Theoretical background and empirical applications. Barcelona.

Demont, M., Rutsaert, P. and Verbeke, W. (2013). Consumer preference for rice in Africa. In: *Realizing Africa's promise*. CAB International.

Denegri, M., Ruiz1, D., Schettler, B., Sepúlveda, O. and Sepúlveda, J. (2009). Importance of origin in rice purchasing decisions in Talca and Termus, Chile. *Journal of AGRARIA* 36(2): 239-248.

Diagne, A., Fiamohe, R., Nakelse, T. and Seck, P. A. (2013). *Assessing the effect of consumer purchasing criteria for types of rice in Togo: A choice modeling approach.* Fourth International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia.

Dormon, E. and Kula, O. (2009). Global food security response Ghana rice study. In: *Global food security response West Africa rice value chain analysis*. Micro-report no. 156, USAID.

Dutta, A. K. (2014). Narrow Range of Adaptability of Hybrid Rice Production to Abiotic Stresses Utilizing CGMS System. *International Journal for Pharmaceutical Research Scholars* 3(2): 70-76.

FAO (2004). *International Trade in Rice, Recent Developments and Prospects*. Food and Agriculture Organization, Rome, Italy. World Rice Research Conference 2004, Tsukuba, 5-7 November.

Ferrero, A. and Nguyen, N. V. (2004). *Constraints and opportunities for sustainable development of rice-based production systems in Europe*. Paper presented at the FAO Rice Conference, Rome, Italy, 12-13 February 2004.

Goodwin, H. L., Holcomb, R. B., Jr., Rister, M. E. (1996b). Implicit price estimation of rice quality attributes for Asian Americans. *Journal of Agricultural and Applied Economics*, 28 (2): 291-302.

Goodwin, H.L., Holcomb, R. B., and Rister, M.E. (1996a). Asian-American Rice Demand in Houston, Texas. *Journal of Food Distribution Research*, 27(3):41-48.

Gunaratne, L. and Walisinghe, B. (2012). Consumer Preferences for Quality Attributes of Rice: A Conjoint Analysis. *Sri Lankan Journal of Agricultural Economics* Vol. 10 (0), 19-30.

Hair, J. F. Jr., Black, W. C., Babin, B. J. and Anderson, R. E. (2010). *Multivariate data analysis.* (Seventh Ed.). Upper Saddle River, NJ: Prentice Hall.

Hara, M. (2000). Measuring positive externalities in Japanese rice production: A hedonic price analysis. In: *Ecological Economics*. New York, Rensselaer Polytechnic Institute. D Phil.

Hu, W., Batte, M. T., Woods, T. and Ernst, S. (2012). Consumer preferences for local production and other value-added label claims for a processed food product. *European Review of Agricultural Economics* Vol. 39 (3) 489–510.

Kaosa-ard M. and Juliano, B. O. (1992). Assessing quality characteristics and price of rice in selected international markets. In: *Consumer demand for rice grain quality*. Edited by (Unnevehr, L. J., Duff, B. and Juliano, B. O.). International Rice Research Institute, Manila, Philippines. Pp. 201-219.

Kawamala, P. (2013). Rice Sector: ASA-RLDC collaboration in improving rice in the central corridor. NMDF, Morogoro. [http://www.rldp.org/national-markets-development-forum/2013/rice-program-in-collaboration-between-asa-and-rldc.pdf] site visited on May 7th, 2014.

Khush, G. S., Singh, R. K., Singh, U. S., Singh, A. K. and Singh, S. (2000). Breeding aromatic rice for high yield, improved aroma and grain quality. In: *Aromatic Rice*. Edited by (Singh, R. K., Singh, U. S., and Khush, G. S.). International Rice Research Institute, Manila, Philippines. Pp. 107-133.

Kiratu, S., Marker, L. and Mwakolobo, A. (2011). *Series on Trade and Food Security, Food Security: The Tanzanian Case.* International Institute for Sustainable Development, Winnipeg- Manitoba, Canada.

Kothari, C. R. (2004). *Research Methodology: Methods and Techniques.* New Delhi: New Age International (P) Limited, Publishers.

Lancaster, K. J. (1966). A new approach to consumer theory. *Journal of political economy* 74(2).

Linnemann, A. and Suwannaporn, P. (2008). Consumer Preferences and Buying Criteria in Rice: A Study to Identify Market Strategy for Thailand Jasmine Rice Export. *Journal of Food Products Marketing Vol.* 14 (4): 33–53.

Luce, R. D. (1959). Individual Choice Behavior. In: *A theoretical analysis*. Wiley: New York.

Match Maker Associates Limited (2010). *Value chain analysis of rice and maize in selected districts in Tanzania*. Volume II: Rice sub-sector and value chain analysis final report.

Ministry of Agriculture Food Security and Cooperatives (MAFSC) (2009). *National Rice Development Strategy: Final draft.* Dar es Salaam, Tanzania.

Minot, N. (2010). Staple food prices in Tanzania. In: *Food price variability: Causes, consequences, and policy options*. Paper prepared for the COMESA policy seminar on 25-26 January 2010 in Maputo, Mozambique under the COMESA-MSU-IFPRI African Agricultural Markets Project (AAMP).

Napsintuwong, O. (2012). *Survey of Recent Innovations in Aromatic Rice*. Paper prepared for presentation at the 131st EAAE Seminar 'Innovation for Agricultural Competitiveness and Sustainability of Rural Areas', Prague, Czech Republic, September 18-19, 2012.

National Bureau of Statistics (NBS) (2007). *Results of the 2002-03 National Agricultural Sample Census.* Volume II. National Bureau of Statistics, Ministry of Agriculture and Food Security, Ministry of Cooperatives and Marketing, and Ministry of Livestock. Dar es Salaam.

Ogundele, O. and Okuruwa, V. (2006). Technical efficiency differential in rice production technologies in Nigeria. In: *Africa Research Consortium*. Research paper 154.

Purcell, W. (2007). Analysis of Lamb Demand in the United States.