ASSESSMENT OF CONSUMER'S WILLINGNESS TO PAY FOR RICE ATTRIBUTESIN MOROGORO MUNICIPALITY

HAIKALAURA NICHOLAS SHAYO

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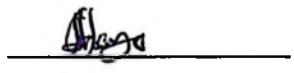
ABSTRACT

The exact attributes which consumers are looking for and willingness to pay (WTP) in both cooked and uncooked rice and the value comparison between imported and local rice is unknown. For this reason this study was conducted with the goal of assessing consumer's WTP for rice attributes in Tanzania. The specific objectives of the study were to analyze consumer willingness to pay for different rice attributes of raw rice and cooked rice and to compare the preference of imported rice versus local rice in terms of sensory characteristics. The research was based on a survey of rice consumers in Morogoro municipal. Sensory test together with a consumer survey of 100 randomly selected respondents were conducted from February to March 2013, using a structured questionnaire. Double bounded dichotomous choice contingent valuation methodology (CVM) was employed to elicit consumers WTP information. From the analysis rice attributes such as appearance of uncooked rice, aroma, taste of cooking, price and location affect the choices of rice brands available in the market. The results also indicate marital status, income level, occupational status, gender of head and household number to have significant influence on consumer's WTP decisions. The majority of the consumers however prefer to purchase local aromatic rice instead of the imported brands from Asia. Consumers were loyal to local rice specifically rice from Mbeya, and source of origin of rice is the major criteria in selecting what type of rice to purchase. The results pointed to the needs of producing high quality local rice and to sort, pack and label the product according to source of origin of rice and usage. Generally the pricing and marketing strategies of rice should be improved following the basis provided in this study.

DECLARATION

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



20/11/2014

Haikalaura Nicholas Shayo **Date**

(MSc. Candidate)

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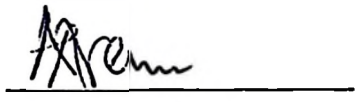

20/11/2014

Dr Anna A. Temu **Date**

(Supervisor)

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DEDICATION

I dedicate this work to my lovely family, my supportive husband George Jerome Kifaru and my beloved children Riley and Raylene. This work is for you

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LIST OF ABBREVIATION

B & M	Bill and Melinda Gates Foundation
COO	Chief Operating Officer
CVM	Contingent Valuation Methodology
DRC	Democratic Republic of Congo
FAO	Food and Agriculture Organization
GMO	Genetically Modified Organism
IRRI	International Rice Research Institute
KPL	Kilombero Plantation Limited
MAFC	Ministry of Agriculture Food Security
NRDS	National Rice Development Strategy
PCA	Principal Component Analysis
RLDC	Rural Livelihood Development Company
SNAL	Sokoine National Agricultural Library
SPSS	Statistical package for Social science
SUA	Sokoine University of Agriculture
URT	United Republic of Tanzania
TZS	Tanzanian Shillings
USA	United States of America
WTO	World trade Organization
WTP	Willingness To Pay
SAGCOT	Southern Agriculture Growth Corridor of Tanzania
USDA	United States Development Authority

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Rice is one of the most important food and commercial crop in Tanzania after maize. It is among the major sources of employment, income and food security for Tanzania farming households (RLDC, 2009). Rice is an important crop in Tanzania with 60% of the population eating rice at least once a day. Annual per capita consumption of rice has risen from less than 15kg in the 1970's to more than 35.40kg in 2005 (IRRI,2006). Paddy producing regions in Tanzania includes Shinyanga, Mwanza, Morogoro,Mbeya and Tabora (MAFC,2005).

Different varieties of rice compete in Tanzania's rice consumer market like imported Basmati and Jasmine from Pakistan and India respectively and locally produced rice from various production areas. There are local varieties known by local names such as "Supa," "Behenge," "Kula na bwana," and "Kalamata" (RLDC, 2009).

The consumption of rice is influenced by a number of factors including demographic characteristic of consumers, information level available to consumer and external or internal sensory attributes. External attributes include characteristics that are observed before cooking rice like grain length, aroma, brokenness, amount of foreign matters and status.; for example Alpha *et al*, (2011), asserted that consumers prefer rice cultivated from certain geographical areas in Tanzania, for instance some consumers prefer rice from Kyela, because it is perceived to be good quality, it usually does not have stones and it has special aroma and taste. The intrinsic rice attributes or eating qualities includes stickiness, palatability, aroma and flavor. These attributes have influence on consumers

purchasing decision (Abazari, 2012). Of importance in this study was the definition of the correlation that exists between the price of rice and the demand for local varieties of rice. Price is crucial factor affecting consumer demand apart from its sensory characteristics.

Due to the complex issues influencing the consumption and market price of rice – this study gives a blueprint to private investors and entrepreneurs on what attributes they should seek to include in their product, at what price, and how to be competitive. In addition, it is the beginning to an understanding of the returns to investment on rice breeding research for selected attributes that consumers are ready to pay.

1. 2 Problem Statement and Justification

The majority of the role players or key actors in the food value chains in Tanzania are not aware about the preferences of their immediate customers. This is actually a big problem from marketing point of view, since it is advised that a producer/supplier should produce or supply whatever his or her customers need. It is likely that a business that does not consider consumer preferences as the drivers of the trade will collapse because what is being offered does not meet consumer preferences. It should also be noted that consumers are at the beginning of the value chain from which flow of information about food preference moves back to retailers, manufacturers and to farmers and scientific laboratories as well (Kinsey, 2001).

In particular, a certain answer to rice attributes that consumers are willing to pay for and exact relation between rice attribute and consumer preference is still in question. External attributes such as size, brokenness, amount of foreign matter, cultivars, and reputation are found to be important influences on product price and demand (Trontad, Huthoefer and Monke, 1992; Carew, 2000; Quagrainie, McCluskey and Loureiro, 2003). However

internal attributes or eating quality are key drivers in determining repeat purchase (Kajikawa, 1998).

This is a great challenge to business person, and in particular small scale farmers, who have insufficient information on what customers wants or how much they are willing to pay for. This limits product improvement since managers will not know how to price their products and how to grade products to satisfy various consumers groups and be able to increase profit and sales at the same time. Hofstetter, (2009) noted that, precise knowledge of consumers' willingness to pay (WTP) is instrumental for pricing decision-making. It is important for managers to know consumers' willingness to pay as precisely as possible in order to harvest their product's profit potential as much as possible.

However, very little is known about the willingness of consumers to pay for certain characteristics of food in Tanzania particularly rice for the interest of this study. In addition, consumer preferences in the rapidly growing urban markets are almost un-documented (Mishili *et al.*, 2011). This is the reason why most farmers and merchants do not understand the preferences of their immediate customers. This situation puts producers, middlemen and other key players in the marketing chain at a disadvantage. Information on whatever consumers regard as important could also guide research related to issues such as plant breeding and hence increase the returns to research and development (Faye *et al.*, 2006). Therefore it is of paramount importance to undertake researches on consumer preferences on rice characteristics and how it affects their willingness to pay. This will enable role players in the rice marketing chain to know about consumer preference and offer rice variety that consumers are willing to pay premium prices.

Therefore this study is important for rice sub-sector development as it has a potential for improving entrepreneur ability to meet the needs of consumers in the value chain. By knowing what attribute consumers are willing to pay for, entrepreneurs in the rice value chain will make better and informed decisions and thus improve their rice marketing strategy.

1.3 Objectives

1.3.1 Overall objective

The purpose of the study was to assess consumer's willingness to pay (WTP) for different rice varieties in order to understand sensory characteristics that attract premium prices in traditional open markets in Tanzania.

1.3.2 Specific objectives

To determine the main attributes that consumers look for when purchasing rice.

i. To determine main attributes that consumer looks for when purchasing rice
ii. To determine main attributes that consumer looks for in cooked rice.
iii. To compare the demand of imported rice versus local rice in terms of sensory characteristics
iv. To analyze consumer willingness to pay for different rice attributes of raw rice and cooked rice.

1.4 Hypothesis

This study attempts to test the following hypothesis:-

H_1: Sensory characteristics of raw rice have significant influence on consumer preference

H_2: Sensory characteristics of cooked rice have significant influence on consumer preference

H_3: Consumers are much more willing to pay for aromatic rice than non-aromatic rice.

1.5 Organization of the Study

This study is organized into five chapters. Following this chapter is chapter two which provides an extensive theoretical review on Tanzania rice industry including its production, marketing, factors affecting WTP, and empirical and theoretical literature review. In chapter three a detailed description of the study area, sampling techniques adopted for data collection and the sample size used in the study. Chapter four presents descriptive analysis and empirical findings of this study. Finally chapter five provides a summary of the research findings, conclusion, policy recommendations, and suggestions for future research.

CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter reviews the relevant literature obtained from studies to provide the context within which this study can be properly understood. The theoretical framework that has been applied for the analysis is also highlighted in this chapter. The topics covered include: theory of consumer choice (the consumer utility theory), empirical studies on consumers' WTP, socio-economic variables affecting WTP for rice attributes.

2.1 The Concept of Willingness to Pay (WTP)

In economics the willingness to pay (WTP) is the maximum amount a person would be willing to pay, sacrifice or exchange for a good (Piyasiri *et al.*, 2007). Willingness (and ability) to pay is the foundation of the economic theory of value. The idea is, if something is worth having, then it is worth paying for. WTP helps to determine how much a product is worth. The idea extends to environmental resources like water quality and natural resources like trees. Economic methods can be used to attach estimates of willingness to pay to changes in the level of environmental quality and natural resource use.

The study of WTP has taken on a variety of forms in the applied economics literature. The traditional approach has been the use of contingent valuation, which is a questioning technique that asks individuals what they would be willing to pay, contingent on market availability of the product or service (Ready and Skees, 1995).

2.2 Relationship between Demand and Willingness to Pay

Demand for rice as the function of its price is an important concept in rice WTP. Demand is also sometimes referred to as "willingness to pay." The further to the right a person's demand curve is, the more he's willing to pay for all quantities of the good (Hofstetter,

2009). Demand for a commodity, in this case rice, can be defined as the quantity of rice which consumers are willing and able to buy at different prices during a particular period of time (Kassali *et al.*, 2010). In this study it is important to know the influence of price on demand for rice.

2.4 Overview of Tanzanian rice Industry

2.4.1 Rice production

Rice production internationally is highly concentrated in India, Thailand, the USA and Vietnam. SAGCOT, (2010). In Tanzania the leading regions in rice production are Shinyanga, Tabora, Mwanza, Mbeya, Rukwa and Morogoro. Kilimanjaro, Arusha, Manyara, Iringa, Mara, Tanga, and Kigoma also produce rice in small quantity (NRDS, 2009).

Tanzanian productivity is lower than most neighboring countries, and one of the lowest in the world. However, Tanzania is the second largest producer in Southern-Eastern Africa (SAGCOT, 2010). The Mbeya region is the major rice producer with various medium to large scale producers, processors and traders. The Morogoro region is the second largest producer of rice in Tanzania driven by Kilombero Plantantion limited (KPL) with (12% of total production), and rice is the second most important crop in the region after maize, with over 250k smallholders currently producing rice (NRDS,2009). NRDS, (2009) reported Tanzania's, annual milled rice production in the last ten years to range between 530,000 and 851,000 tons (USDA, 2009). With the population of approximately 40 million, annual growth rate of 2.8 percent and annual milled rice consumption per capita of 25kg, the forecasted production to meet demand is expected to increase annually at around 100,000 tons of milled rice.

2.4.2 Rice marketing

Rice is considered a "premium" staple which consumers aspire to move to as their income rises, FAO, (2013). According to Gabagambi *et al.*, (2010) rice has high income elasticity of demand and its local prices are influenced by international prices. The price of rice is higher than other cereals such as maize, thus consumer preference for rice has grown in line with disposable income and urbanization, and is preferred among the Tanzania middle class.

The growth of the Tanzanian rice industry has been driven in part by increasing urbanization and population. Rice is popular in urban areas as it symbolizes increased status, and is easy and quick to prepare. (B&M, 2010: Gabagambi *et al.*, 2010). For instance, rice produced in Mbeya and Morogoro is largely consumed by Dar es Salaam markets (Tandale and Tandika) due to rising urbanization, incomes, and population growth, B&M, (2010). In total, 70% percent of rice produced in Tanzania is sold in Dar es Salaam (Eskola *et al.*,2005).

The observed rice consumption location concentration is mainly due to the fact that most of the people in non-rice growing rural areas of Tanzania are poor and cannot afford to buy rice on a regular basis (Nzomoi et al, 2013). However, the B&M, (2010) report added that high rice producing regions also consume a high percentage of rice due to availability and cost effectiveness.

2.4.2.1 Import and export of rice, in Tanzania

Tanzania is linked to the world market through rice imports and exports. Statistics indicate that the country is a net importer of rice. Gabagambi, (2010) recommended that in order to meet local demand imports are necessary NRDS, (2009). The gap is the result

of consecutive poor harvest, FAO (2013). For example, to meet the domestic demand in 2001-2005, 50,000 to 100,000 tons of milled rice was imported mainly from Asia (WTO; 2005, NRDS, 2009; Minot, 2010).

Nevertheless, the country exported rice from 1998 and 2004 to Rwanda, Kenya, Uganda, Comoros, DRC and Burundi. During the period, 98.7% of rice exported from Tanzania was bought by African countries (Minot, 2010). Generally the Tanzania rice industry supported by government policies has grown rapidly over the last decade and is largely self sufficiency, NRDS, (2009). Its production has doubled in the last decade supported by import tariffs and supportive policies. Good quality rice (aromatic,20% broken) captures 70% of national rice consumption. Local production meets 92% of consumption despite a 21% price premium over imported rice giving it a competitiveness in meeting consumer demand (aromatic, fresh, clean and 20% broken). Local production is expected to triple by 2020 due to rising urbanization, incomes and population (B&M, 2010).

2.4.3 Factors affecting consumers WTP for rice

2.4.3.1 Sensory attribute

Consumer behavior theory states that consumers evaluate a product based on intrinsic and extrinsic attributes. Intrinsic attributes include factors such as the wholeness of grains. taste, aroma, amount of damaged and discolored grains and kernels (Koasa-ard, 1991). Extrinsic attributes collectively known as credence (acceptance, confidence) attributes include GMO free food, organic food, pesticide free food and country of origin (COO), in the case of this study region of origin when referring to local rice (Mhlanga, 2010).

According to Horna et al. (2005), grain quality is one of the key selection criteria highly prioritized by farmers and consumers of rice, it plays a significant role in the stated willingness to pay for food products, rice for the case of this study (Kiria, 2010).

Premium prices are usually given to aromatic rice type e.g. Kyela brand and rice brand of premium or grade one in attractive package (NRDS, 2009).

2.4.3.2 Urbanization and lifestyle

The greatest influencing factor in the dietary change and subsequent changes in nutritional status is urbanization and the myriad of lifestyle changes associated with it (FAO, 2004). In Tanzania the focus on rice marketing is on the urban household, whether in regional towns or in Dar-es-salaam and Arusha. Rice flows to the urban market from the zone of production as well as from imports. Most of the rice eaten in urban areas is purchased on the retail produce markets in bulk (buy by the kg), though quite a bit is also purchased from supermarkets and stores in pre-packaged bags (Geetha, 2011).

The demand by urban medium-high income consumers is increasing for quality and branded aromatic rice which is primarily produced in Tanzania (SAGCOT, 2010). Furthermore, NRDS,(2009) reports, added that this projection of demand is due to greater number of consumers and the diversified use of rice in urban areas. For instance, the urban market fine textured rice attract a better price than coarse type with chaffs or broken grains. The price variation hardly occurs in the rural markets where the fine textured rice is scarce (Bosorom, 2012).

2.4.3.3 Price and income effect

When making choices, consumers must combine budget constraints and preferences. Budget constraints are determined by both the income of the consumer and the relative prices of products (Mhlanga, 2010).

2.4.3.4 Information/ awareness/ knowledge of rice varieties

This is common during experimental auction, for example when studying the role of sensory experiences and information on the willingness to pay for organic wheat bread. Boxall *et al.*, (2007), discovered that in the absence of taste information respondents' WTP when environmental information was provided was greater than WTP when health information was given. When sensory taste information was included, however, the WTP estimates under the health information treatment were about twice those under the environmental information. Providing consumers with more product information helps consumers behave more consistent in terms of having same preference ranking for different rice samples in the auction and the choice experiments, but their average does not substantially affect the discrepancy (Su lianfan *et al.*, 2012).

In general information about environmental effects or characteristic of specific goods may therefore influence or trigger consumers' preferences for product attribute (Andersen, 2008).

2.4.3.5 Brand loyalty

Consumers are brand conscious. In Tanzania the region of origin of the rice is a major factor in consumer purchasing decisions. Rice in Tanzania is branded by the region it is from; kyela rice is viewed as good quality rice followed by Mbeya rice. Morogoro is viewed as good quality rice but inferior to Kyela and Mbeya. Shinyanga rice is viewed as low quality as it is not aromatic and historically had significant amount of foreign matter in it (B&M, 2010).

Other price variations may be due to outlet type (wholesale, retail, supermarket), region (rural, urban), price discrimination, services purchased, seasonal effects and quality differences caused by heterogeneous commodity aggregates (Mhlanga, 2010).

2.5 Theoretical Framework

A number of models are available to explain the consumer product purchases based on the characteristics of the products, (Housthakkar, 1952; Lancaster, 1966) and these models are referred to as Lancaster characteristics demand model (Walisinghe *et al.*, 2007). As per the Lancaster's characteristics theory of value choice, modeling approaches assume that any good can be described in terms of its attributes or characteristics. According to this model consumer buying behavior consists of activities involved in the buying and using of product or service for personal and household use. The value consumers put on food depends not only on their income but several other influencing factors: extrinsic attributes are used by consumers to perceive a product's quality. Hence such attributes are described to have influence on consumers' purchasing motive (Drechsel *et al.*, 2013). This departed from the traditional approach that the goods are the direct object of utility (Mhangala, 2010).

The model is deterministic in that the consumer is assumed to choose the alternative with the highest utility. The model is based on the premise of a utilitarian consumer who bases preference on the characteristics a good possesses other than on the good per se (Lancaster, 1966; Mhangala, 2010).

Hence, researchers can assess the cognitive component of the preference by analyzing attributes. Therefore, attributes have to be selected with care as it influences the accuracy of the results and the relevance of the stimuli (Ara, 2003; Walisinghe *et al.*, 2007). Therefore this study concept is supported by Lancaster theory of food commodity characteristics as stated in the context above of which details are given in the following subsection.

2.5.1 The consumer utility theory

Lancaster theory postulates that consumers maximize a utility function $\mathbf{U}(\mathbf{v}_i)$ where $\mathbf{v}_i$ is defined as the total amount of characteristics i obtained by the consumer. Here a choice bundle $\mathbf{v}_i$ represents the utility derived indirectly through its attributes. This could be derived as a linear function of consumption technology that relates the vector of characteristics to the quantity of commodity consumed $\mathbf{Z}_i=\sum \mathbf{V}_i\mathbf{X}_i$ where $\mathbf{X}_i$ is the quantity of commodity i consumed. The consumer is assumed to choose quantity that maximizes utility subject to the consumption technology (the consumption technology is the seed or genotype) and the budget constraint (Lucas, 1975). This is represented as:

$$Max\ U(v)$$

$$s.t.\ Z = V_x$$

$$Y \geq Pq$$

P is the market price of the commodity and Y is consumer's income. The major assumption is that the consumer is limited to choosing one integer unit of X from among the various brands of the product i.e. the maximum attainable utility could be derived from consuming only one brand at a time among the given choices (Ratchford, 1979).

Griliches (1961) asserts that when a product has multiple brands, price differentiation occurs mainly due to quality characteristics. Thus he expresses price P_i as a function of a set of quality attributes X and some additional small and random factors measured by the disturbance term E_i.

$$P_i = f(x_{1i}, X_{2i}, X_{ki}, E_i)$$

If the sample is large enough, quality characteristics can be represented with dummy variables that take on the value of one if the product possesses the particular attribute and

zero if it does not. Moreover proxy characteristics can be used to represent some basic dimensions which may be difficult to measure if the two characteristics are well correlated. One can then derive the average contribution of each quality characteristic to the price of the product (Griliches, 1961).

2.6 Approaches in Estimating Consumer's WTP on Food /Commodity Characteristics

Many researchers opt to use Hedonic model framework so as to capture consumer preferences for commodity quality characteristics. Hedonic framework was applied by several researchers in their studies such as (Abansi *et al.*,1990, Mishili *et al.*, 2009; Faye *et al.*, 2006; Langyintuo *et al.*, 2004). Abansi *et al.*, (1990), in their study used Hedonic pricing method to evaluate rice consumers' preferences in Philippines. The findings showed that the texture and softness of rice after cooking, have the highest effect on the price and the price paid by both groups of urban and rural consumers. Of recent contingent valuation (CV) is widely used method in estimating WTP of market good. At first it was commonly used for valuing environmental programs because of its ability to estimate WTP due to changes in environmental amenities and services, mainly for public goods or non-market goods, by hypothetical markets (Cerda *et al*, 2007).

However, CV can also be used to estimate WTP for changes in food attributes (Maynard and Franklin, 2003; Campiche *et al.*, 2004). This method has been applied by various economists like Boxall, *et al.*, (2007); Aizaki, 2007 ; Zhang, *et al.*,(2010); Chabikuli, 2011) to elicit consumer's willingness to pay for different food qualities. Boxall, *et al.*, (2007), combines both contingent and sensory evaluation to capture bread characteristics that consumers are willing to pay for. He presented samples of bread to consumer for sensory acceptance and survey of their attitude, behaviors and characteristics, and also

included a closed-ended contingent valuation question to examine consumer's WTP. Zhang *et al.* (2010) also utilize sensory analysis and contingent valuation (CV) to evaluate consumer's WTP for Anjou pears. Contingent valuation has received more attention than hedonic pricing because it is easy to combine sensory valuation when assessing consumer's WTP (Boxall, *et al.*, 2007).

2.7 Sensory Evaluation

Sensory evaluation techniques have been used by several researchers to evaluate the effect on storage (Perez and Juliano1979, 1981; Okabe 1979; Chrastil 1990); on processing (Rousset *et al.*, 1995); on variety (Juliano *et al.*, 1984, Damardjati *et al.*, 1986, Kumari and Padmavathi 1991, Perez *et al.*, 1993); and on end-use quality of rice (Jean-Francois, 1998). Sensory profiling or descriptive analysis methods consist of formal procedures for assessing, in a reproducible manner, specific attributes of a sample and rating intensity on a suitable scale. These methods can be used for evaluating aroma, flavor, appearance, and texture, separately or in combination (ISO, 1994). For example, the Shayo *et al.*, (2006), five point hedonic scales ranging from very poor to highly acceptable to conduct a sensory evaluation of cooked rice and appearance, smell, taste and general acceptability of each sample were evaluated.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Conceptual Framework

Based on theories reviewed from the literature on willingness to pay and consumer preferences of food characteristics an idea of consumer's willingness to pay for different rice attributes can be conceptualized. Fig. 1 depicts the causal paths from the influencing factors and willingness to pay for rice attributes under study.

Extrinsic and intrinsic rice attributes together with Consumer Socio-demographic factors determine consumer preference of type of rice to purchase hence WTP (as shown by green oval shaped features in figure 1.

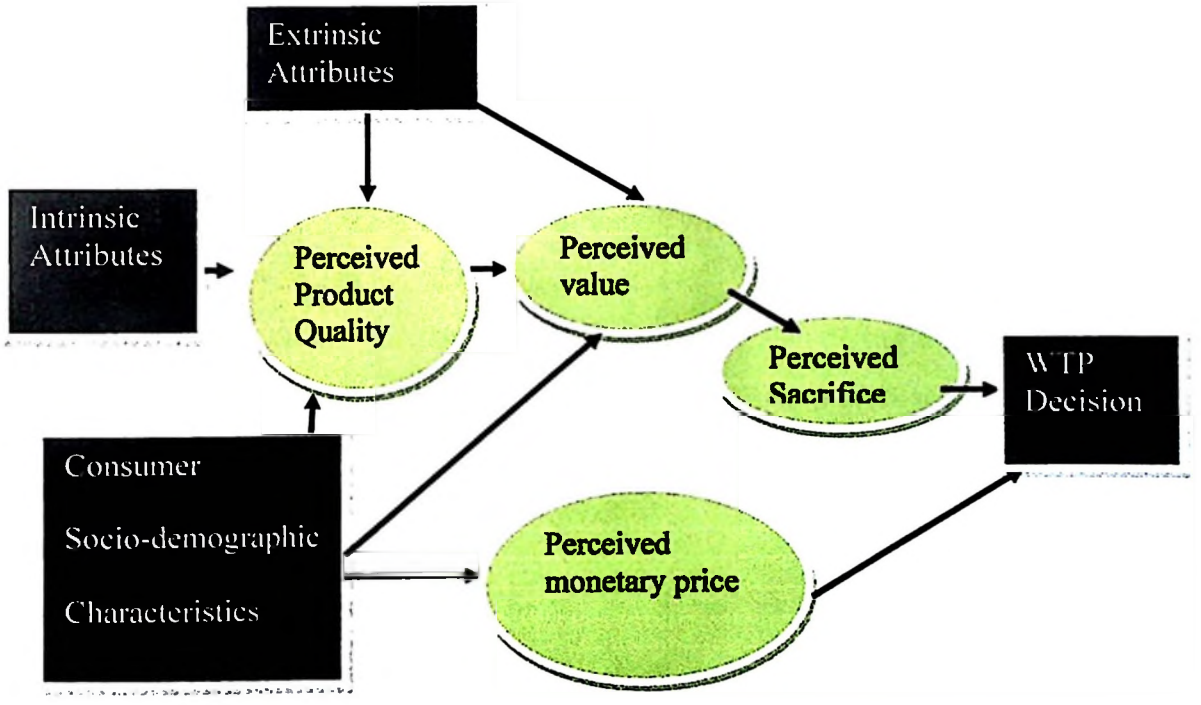

Figure 1: Conceptual framework showing factors affecting consumers' willingness to pay for different rice attributes

Source: Adapted and modified from Zeithaml (1988) and Marreiros (2011)

3.2 Description of the Study Area

Morogoro municipal is one of the fastest growing urban towns in Tanzania with an estimated population of 315, 866, of which about 48% are male and 52% are female (URT, 2013b). The municipality is about 195kms west of Dar es Salaam and is situated in the lower slopes of the Uluguru Mountain whose peak is about 1600 feet above sea level. It lies at the crossings of longitudes 37.0 East of the Greenwich meridian and latitude 4.49 South of equator. Morogoro municipality enjoys one peculiar advantage of being a hub whereby there is a highway road link to East, West, South and Northern parts of the country (URT, 2013a).

Morogoro municipality has a total land area of 531 square kilometers with 19 administrative wards including Kichangani, Mbuyuni, Mazimbu and Kihonda (URT, 2013a). This land coverage constitutes 0.8% of the total regional area. The major physical features include the famous Uluguru Mountains which lies in the southern part and Nguu mountains which lie in the western part. There are three main rivers with several tributaries, which form a number of alluvial flood plains. These rivers are the Morogoro, kilakala and Bigwa. The municipality has two major seasons, the rainy and dry seasons. The rainy season experiences major rains between November and December with an average of about 400mm. The average temperature ranges from 10 C to 14 C during cold season (June-August) daily. During the hot season (November-December) the minimum and maximum temperatures are 28 C and 30 C respectively (URT, 2013a).

The main economic activities in the municipal are divided into five categories, commercial undertakings, wholesale and retail trading (35%), subsistence farming and livestock keeping (33%), office works (16%), employment in elementary occupations (11%) and industrial production (5%), about 75% of the working force in the municipality

engages in agricultural related activities. Farming is largely carried out in the outskirts of the town and in the neighboring district of Mvomero. The major crops cultivated include rice, maize and sisal. The reason for choosing this area for the study is accessibility and the target being urban consumers. In addition Morogoro play key role in research of new rice varieties (RLDC, 2009).

3.3 Data Collection and Data Type

3.3.1 Primary data

Different Rice samples were collected from open market around Morogoro municipal depending on where they were produced from (Mbeya or Ifakara) and Basmati rice was collected from supermarkets. Data comprising of consumer awareness, sensory evaluation and prices consumers would be willing to pay for various types of rice were collected from February to March 2013. Primary data were collected using a structured questionnaire (Appendix 1) administered to consumers who participated in the study. The questionnaire was designed to gather information on socio-economic characteristics of the respondents such as, age, education and Income level, sex, marital status, household size, and purchasing behavior of consumer on local and imported rice brands. It also included sensory valuation forms for both uncooked and cooked rice samples to evaluate aroma, cleanliness, brokenness for uncooked rice attributes and taste, aroma, texture, tenderness for cooked samples. The later are much more important for institutional catarers.

3.3.2 Secondary Data

Characteristics affecting consumer's WTP on different rice attributes were collected from secondary data to supplement identification and selection of explanatory variables. The major sources of secondary data were Sokoine National Agriculture Library (SNAL), internet, published and unpublished dissertation / thesis and other materials relevant to the study.

3.3 Survey and Sample Size

The survey of consumers was carried out by administering semi-structured questionnaire to purposively selected consumers who were willing to participate in the study in Morogoro municipal. The study recruited 100 respondents and an additional of 20 as precaution against last minute cancellations.

3.4 Data Analysis

Statistical Package for Social Science computer software (version 16.0) was used to simplify the analysis of data. Furthermore, both descriptive and econometric analyses were employed. Descriptive statistics such as mean, percentages, standard deviation and coefficient of variation were used to analyze data. Also the study combined both contingent and sensory evaluation as by Boxall, *et al.*, (2007) in order to capture rice characteristics that consumers are willing to pay a premium price.

3.4.1 Contingent valuation

The contingent valuation was used to elicit consumer's willingness to pay for rice attribute. Double-bounded dichotomous choice procedure was used. It uses two consecutive bids in which the second bid is contingent upon the response to the first bid (Kimenju *et al.*,2005, Zhang *et al.*, 2010).

Double – bounded dichotomous approach;

The first question was asked after description of rice qualities, and the respondent considering situation on hand is supposed to give a " yes" or " no" answer. A second question associated with a higher or lower value was asked based on the responses from the first question. If the initial offer was accepted a premium then was asked, while if the initial offer was rejected, a discount was offered. Using two sequential bidding questions,

boundaries of WTP are therefore observed (Hanemann, *et al.*, 1999). The procedure was repeated until bidding was completed and means WTP were calculated from consumer's responses.

Expected Outcomes

The four possible outcomes of responses in double-bounded model are; "no/ no", "no/yes", "yes/ no", "yes/ yes".

The bidding outcomes of the bidding process were presented by;

$$Y=\begin{cases} 1 \text{ if } WTP_i < B_D \\ 2 \text{ if } B_D \leq WTP_i < B_I \\ 3 \text{ if } B_I \leq WTP_i < B_P \\ 4 \text{ if } WTP_i \geq B_P \end{cases}$$

The bid function for rice is specified as;

$$Y_i = \alpha - \rho\beta_i + \lambda' Z_i + \varepsilon_i \text{ for } I = 1 \ldots\ldots\ldots n.$$

Where β_i is the ultimate bid faced by individual i ; Z_i is the vector explanatory variable associated with individual i, including the assessment of rice attributes and demographic characteristics; the error term ε_i captures unobservable factors and characteristics affecting consumers decision; and α, ρ, and λ are unknown parameters to be estimated. The participant were urban consumers who were familiar with rice, and the initial bid price based on the prevailing market price (1600 TZS at the time of research) this helped to reduce starting point bias (Zhang *et al.*, 2010).

A multiple regression model was estimated to show the relationship that existed between respondent socio-demographic characteristics and WTP decision separately depending on whether the rice samples were uncooked or cooked.

Specifically the multiple regressions explaining consumers' WTP for different rice attributes of uncooked rice was specified as:

$$WTP_{ij} = \alpha - \rho_j B_{ij} + \lambda_{j1} Aroma_{ij} + \lambda_{j4} Appearance_{ij} + \lambda_{j5} Overallacceptability_{ij} + \lambda_{j6} Nationality_{ij} + \lambda_{j7} Age_{ij} + \lambda_{j8} Sex_{ij} + \lambda_{j9} Martstat + \lambda_{j10} HHsize_{ij} + \lambda_{j11} Education\ level_{ij} + \lambda_{j12} Income\ level_{ij} + \varepsilon_i \quad (1)$$

Multiple regressions explaining consumers' WTP for different rice attributes of cooked rice was specified as:

$$WTP_{ij} = \alpha - \rho_j B_{ij} + \lambda_{j1} Aroma_{ij} + \lambda_{j2} Texture_{ij} + \lambda_{j3} Taste_{ij} + \lambda_{j4} Appearance_{ij} + \lambda_{j5} Overallacceptability_{ij} + \lambda_{j6} Nationality_{ij} + \lambda_{j7} Age_{ij} + \lambda_{j8} Sex_{ij} + \lambda_{j9} Martstat + \lambda_{j10} HHsize_{ij} + \lambda_{j11} Education_{ij} + \lambda_{j12} Income_{ij} + \varepsilon_i \quad (2)$$

Where $i = 1, \ldots, n$ denotes the ith individual; $j = 1, 2, 3 \ldots$ represents the jth sample; and α, ρ, and λ's are unknown parameters to be estimated.

The detailed definitions of the variables employed in the empirical models (11) are provided in Table 1.

Table 1: List of variables and their definitions

Variables	Measures of Variables	Expected sign
Bid	Bid price faced by respondents (TZS)/kg	-
Socio-economic and demographic characteristics		
Sex	Dummy (1 = married, 0 = otherwise)	+/-
Marital status	Dummy (1 = married, 0 = otherwise)	+/-
Education level	Years of schooling	+/-
Household size	Number of household members	-
Income level	Monthly earning of Individual (TZS)	+
Age	Number of years of individual since birth	+/-
Product Characteristics		
Aroma	A score for product aroma	+
Appearance	A score for product appearance	+
Taste	A score for product taste	+
Texture	A score for product texture	+
General acceptance	A score for product general appearance	+

3.5 A Priori Expectation

The negative sign of the bid coefficient was expected because consumers are more likely to indicate they will buy the product if it is offered at a lower price (Owusu, 2009; Zhang *et al.*, 2010). Various socio-economic and demographic variables of consumers' were predicted to influence WTP in different directions. For gender and marital status of the respondent an effect is sometimes found, although there is no expectation on the direction of the effect. The other socio-economic variables indicated respondent's ability/inability to pay. A household monthly income were expected to impose positive effects on WTP hence indicate a higher ability to pay (Akankwasa, 2007; Owusu, 2009). For household size variable, it was expected that the more number of members in the respondents household, the less willing he/she would pay due to more expenses for the household. On the other hand, age could have both positive and negative effects depending on how they value the product use. Lastly, sensory attributes of both uncooked and cooked rice were

expected to influence WTP in a positive direction, the more appealing attribute by the respondent the higher he/she would be willing to pay for it (Akankwasa, 2007; Zhang *et al.*, 2010; Mhangala 2010).

3.4.2 Sensory methodology

A sensory profile of cooked rice and raw rice samples were prepared and attributes identified (Jean-Francois, 1998). In two separate settings raw and cooked rice were evaluated by the same respondent. The first setting contained raw rice, which was sub-divided into sorted and unsorted locally produced rice (Mbeya, Ifakara). It also included raw Basmati rice (imported). There after participants were asked to use sensory organs to detect: smell, coarseness, brokenness and grain length. The second setting contained cooked samples of the same rice; samples were cooked for 20-30 minutes in household steam rice cooker. Respondents were required to taste each group and rate the attributes of tasted rice including stickiness, aroma, flavor, and palatability. A five point hedonic scale was used for sensory evaluation ranging from dislike most to like most.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This chapter presents results and discussion of the study. The findings are presented in four sections. Section one begins by describing study sites and the individual's social-demographic characteristics. Section two deals with sensory evaluation results where it describes which cooked and uncooked rice attributes consumers prefer the most. Section three discusses an estimate of the price that consumers are willing to pay for both cooked and uncooked rice and the relationship that existed between the price attached to particular rice and its sensory characteristics. Section four shows the comparison between imported and local rice variety, consumers purchasing behavior on rice brands, together with other factors that can affect rice consumer purchasing behavior.

4.1 Study Sites and Sample Characteristics

The study population included households residing in Morogoro municipality specifically in Kihonda, Morogoro Town, Kigurunyembe and Mazimbu residential areas. The data were collected from each sites and consisted of two main categories; the first category included respondent socio-demographic characteristics and the second one consisted of sensory evaluation responses as presented in the second section of this chapter. The sensory evaluation together with questionnaires were taken in four different sites which were; the food science laboratory at Sokoine University of Agriculture, Fr. Franklyn Memorial hall at Morogoro teachers college in Kigurunyembe, Idiva hall in Kihonda and at Morogoro municipal hall.

4.2 Social- Demographic Characteristics of Respondents

Social-demographic characteristics have important implications on consumers' decision making. They are important to any society as they reflect its behavior in decision making in this case purchase behavior/ decision and expected response to many stimuli. Social-demographic characteristics of the sampled respondents are summarized in Table 2 below.

The respondents in this survey consisted of 45 males and 55 females (as shown in table 2). Although women were mostly responsible for the household and food purchase decision but both, almost equally, exert preference on cooked rice. Ninety six respondents involved were Tanzanian, two were Kenyans, and the remaining two respondents were from Namibia and United States of America. Age of the majority of the respondents ranged between 20-30 years old (42 percent), followed by a group of 31-40 years (31 percent), and individuals aged between 41-50 (11 percent). Out of 100 respondents surveyed, 65 percent were married, 19 percent were single, 4 percent divorced / separated, and 5 percent widowed. About 15 percent had attained primary education, 1 percent were at the secondary school level, 8 percent at the secondary A level and the remaining 42 percent had attained higher learning education and 34 percent had no formal education. The majority of consumers 43 percent had an average household size between 4-6 members, 39 percent of household has 1-3 members, followed by those with 7-9 members (17%), and families with 10-12 members compose (1%).

Most of the respondents (68 percent) earned a monthly income ranging from Tshs. 400,000 – 1,000,000/= per month, followed by those who earned between Tshs. 120,000 – 400,000/= per month (20 percent). Ten percent of the respondents earned < 120,000/=

and the group that earned lowest income compose 2 percent of all respondent with income range between Tshs. 30,000 -120,000/= per month.

Table 2: Individuals socio-demographic characteristics

Characteristics	Category	%
Gender	Male	45
	Female	55
Nationality	Tanzanian	96
	Namibian	1
	American	1
	Kenyan	2
Age	20-30 yrs	42
	31-40 yrs	31
	41-50yrs	11
	51-60 yrs	16
Marital status	Married	84
	Single	6
	Divorced/ Separated	2
	Widowed	5
Education level	Primary education	15
	Secondary O' level education	1
	Secondary A' level education	8
	Higher education	42
	No formal education	34
Household size	1-3	39
	4-6	43
	7-9	17
	10-12	1
Occupation	full time house wife	4
	Full time student	3
	Full time employment outside home	47
	Full time student and employed	46
Income level	<30,000- 120,000 Tshs./ month	2
	120,000-400,000 Tshs./month	20
	400,000-1,000,000 Tshs/ month	68
	> 1,000,000 Tshs./ per month	10

4.3 Sensory Evaluation Results

4.3.1 Consumer study procedures

Consumer tests of four samples of cooked and uncooked rice; Basmati, sorted rice Mbeya, unsorted rice Mbeya and sorted rice Ifakara was carried out in the Department of Food Science Laboratory by 100 untrained consumers aged 18 and above using a standard five point hedonic scale method (where 1 = dislike very much and 5 = like very much) as described by Lawless and Heyman (2010). The samples were coded with 3-digit random numbers using statistical random tables and served to the panelists at around 10:15 a.m. with distilled water (for cooked samples) in a randomized order. The test started with uncooked rice samples where the judges were instructed to rate their degree of liking for appearance, aroma and overall acceptability attributes by putting a number as provided in the hedonic scale. The test was repeated for cooked samples on another day using same panelists with addition of texture (stickiness) and taste attributes in assessment. (Appendix 6-shows a sensory questioner).

4.3.2 Statistical data analysis

The data were analysed by using Statistical package for social science (SPSS) version 16 (Michigan State University, USA) for one-way analysis of variances to determine the significant differences between the rice factor means at ($p<0.05$). Means were separated by Duncan Multiple Range test at $p<0.05$. Results are presented in tables and bar charts as Mean±SD. Principal Component analysis (PCA) was also performed using the PanelCheck software (Nofima, Norway) to study the systematic variation and relationship between samples and sensory attributes. The PCA results are presents as bi-plot graph.(As shown in figure 3 and 5).

4.3.3 Demographic and consumption characteristics

Demographic and consumption characteristics of consumers are shown in Table 2. The results show that, out of 100 consumers who participated in the study, 45 percent were males and 55 percent were females. Forty two percent were between 20-30 years old while only 15 percent were between 51-60 years old suggesting youth dominance in the study. As for consumption frequency, the results showed 87 percent of the consumers. consumed rice almost every day. This suggests that rice is a main staple food for urban consumers and mostly boiled rice and fried rice, *pilau*

4.3.4 Uncooked rice samples

Figure 3 shows the mean hedonic scores of four uncooked rice samples. The results showed that, there were significant differences ($p<0.05$) in all sensory attributes studied between uncooked sample rice. The Basmati sample had the highest mean appearance score (4.29) followed by sorted rice from Mbeya and unsorted rice from Mbeya with mean scores of 3.74 and 2.92 respectively. The rice from Ifakara scored lowest for this attribute. When panelist were asked why they rated Basmati the highest in terms of appearance they said "it has long whole grains which is attractive whereas Ifakara rice has a lot of broken grains, that is why it was ranked the lowest."

Both sorted and unsorted rice from Mbeya, had statistically ($p>0.05$) similar higher mean aroma scores of 3.95 and 3.66 respectively followed Basmati with mean score of 3.15 and rice from Ifakara with lowest mean value of 2.84. When panelists were asked why they ranked sorted rice from Mbeya the highest they said "it is so aromatic and smell fresh," On the other hand, they said although Basmati rice has good aroma it smells aged.

As for overall acceptability, the results showed that, sorted rice from Mbeya and Basmati had the statistically highest acceptability scores by consumer of 4.20 and 4.17 respectively while had significantly ($p<0.05$) lowest mean acceptability values (2.12). These findings suggest that uncooked sorted rice from Mbeya was highly accepted due to its good aroma compared to the rest of samples and due to its good appearance and long grains (as shown in figure 2). Basmati was ranked second because of its excellent appearance, which is mainly characterized by absence of broken grains. Based on these findings, it is therefore `a reasonably good to conclude that, aroma and appearance are the main sensory qualities attributes for consumer acceptability when purchasing rice.

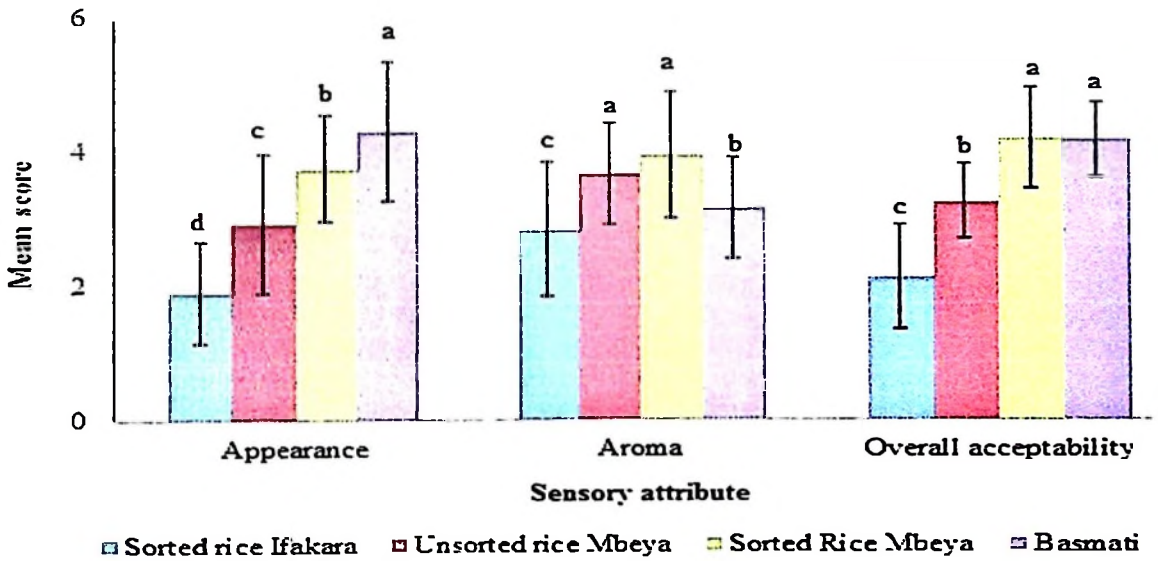

Figure 2: Mean hedonic scores of four uncooked rice samples

The Bi-plot from PCA showing the relationship between uncooked rice samples and sensory attributes is presented in Figure 4. It shows that, PCI accounted for 91.2% of variation while PC2 accounted for 8.7% of systemic variation in samples. Basmati sample was correlated positively with appearance attribute while sorted Mbeya correlated positively with aroma and acceptability attributes. The variation along PCI was between

Sorted Ifakara and unsorted rice from Mbeya on one side and sorted Mbeya rice and Basmati on the other hand while along PC2 was sorted and unsorted Mbeya on one side and sorted Ifakara and Basmati other side. The finding suggest that, sorted Mbeya and Basmati were the most acceptable rice sample due to their high correlation with aroma and appearance attributes respectively which support the hedonic result.

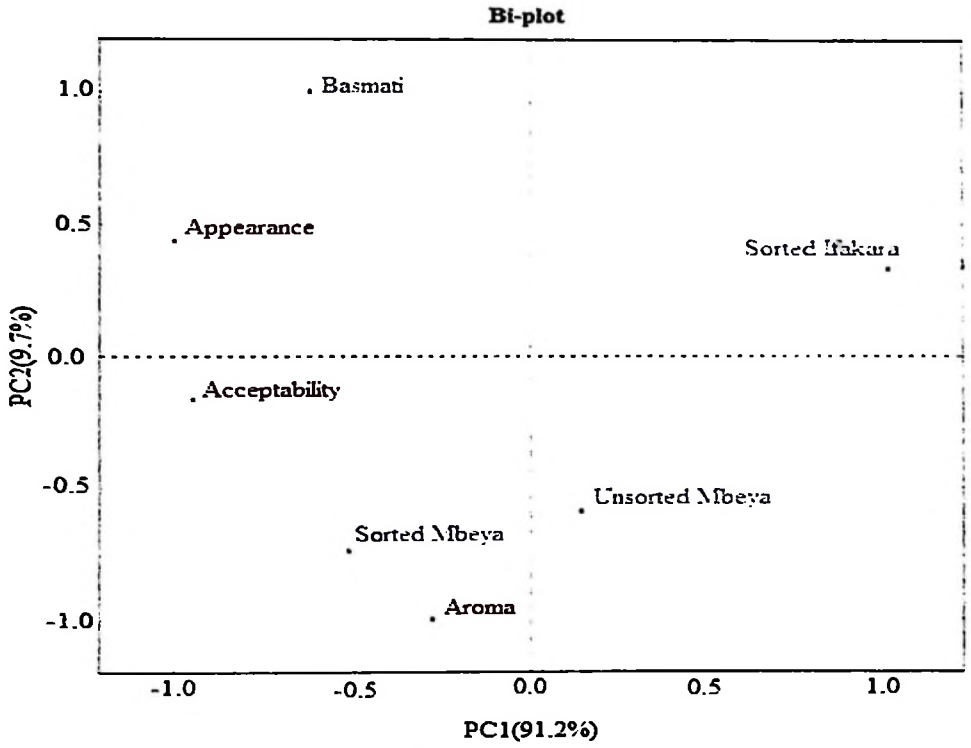

Figure 3: Bi-plot from PCA of four uncooked rice samples

4.3.5 Cooked rice samples

Figure 4 shows the mean hedonic scores of four cooked rice samples. The results showed that, there were significant differences ($p<0.05$) in all sensory attributes studied between cooked sample rice. Sorted Mbeya, Basmati, and unsorted Mbeya had statistically similar highest mean appearance scores of 3.54, 3.43 and 3.35 respectively while sorted rice Ifakara had lowest value of 2.75. The variation in aroma between the samples was also

significant ($p<0.05$) with Basmati having lowest value of 3.13 compared to other samples which had statistically similar of values that ranged from 3.3 to 3.79. (As shown in appendix 10).

The result also showed that, Basmati had highest mean texture score of 3.82 while sorted Ifakara had lowest value of 3.14. The sorted Mbeya and unsorted Mbeya samples had statistically ($p>0.05$) similar values to Basmati and sorted Ifakara respectively. When panelists were asked why they ranked basmati rice the highest, they said "Basmati rice is non-sticky which makes its texture the best compared to the rest of the samples." This implies that, the best texture of cooked rice is the one which is non-sticky (*Unachambuka* in Swahili). Unsorted rice from Mbeya ranked the third (3.56) and the rice with poor taste was Basmati rice with mean value of 3.29

As for acceptability, the result showed that, sorted rice from Mbeya was the most acceptable sample by consumers with mean score of 3.98 while Basmati was the least acceptable rice sample. The unsorted rice samples from Mbeya and sorted Ifakara had statistically ($p>0.05$) similar values and showed no significant ($p>0.05$) difference with sorted sample from Mbeya. These findings suggest that, the rice consumers are more sensitive to the taste and aroma of cooked rice. Sorted rice from Mbeya scored the highest value in all the attributes evaluated hence the most accepted cooked rice.

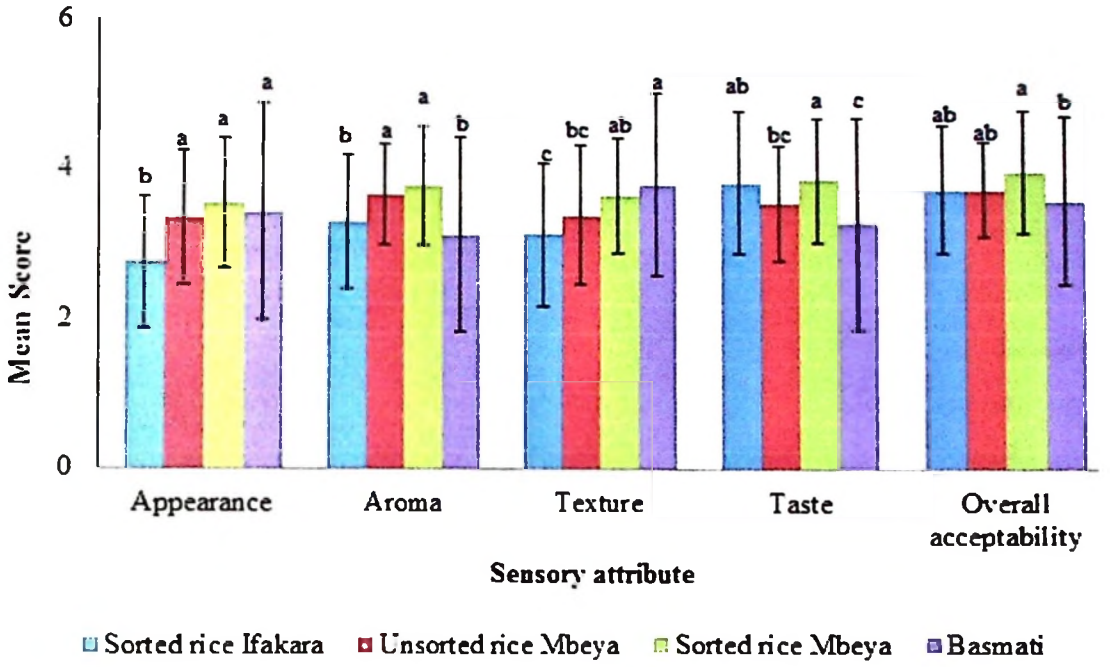

Figure 4: The means hedonic scores of four cooked rice samples

The Bi-plot from PCA showing the relationship between cooked rice samples and sensory attributes is presented in Figure 5. It shows that, PCI accounted for 54.4% of variation while PC2 accounted for 40.4% of systemic variation in samples. The sorted and unsorted rice samples from Mbeya correlated positively with aroma and appearance attributes and overall acceptability while Basmati correlated with texture. The sorted rice sample from Ifakara correlated with taste attribute. The variation along PCI was between sorted basmati, sorted and unsorted rice from Mbeya on one side and sorted Ifakara on the other side while variation along PC2 was between Mbeya sample with their associated attributes on one side and the remaining samples with their associated attributes. The finding suggest that, cooked sorted and unsorted Mbeya rice were the most acceptable samples sample due to their high correlation with aroma taste and appearance attributes. Basmati was most acceptable

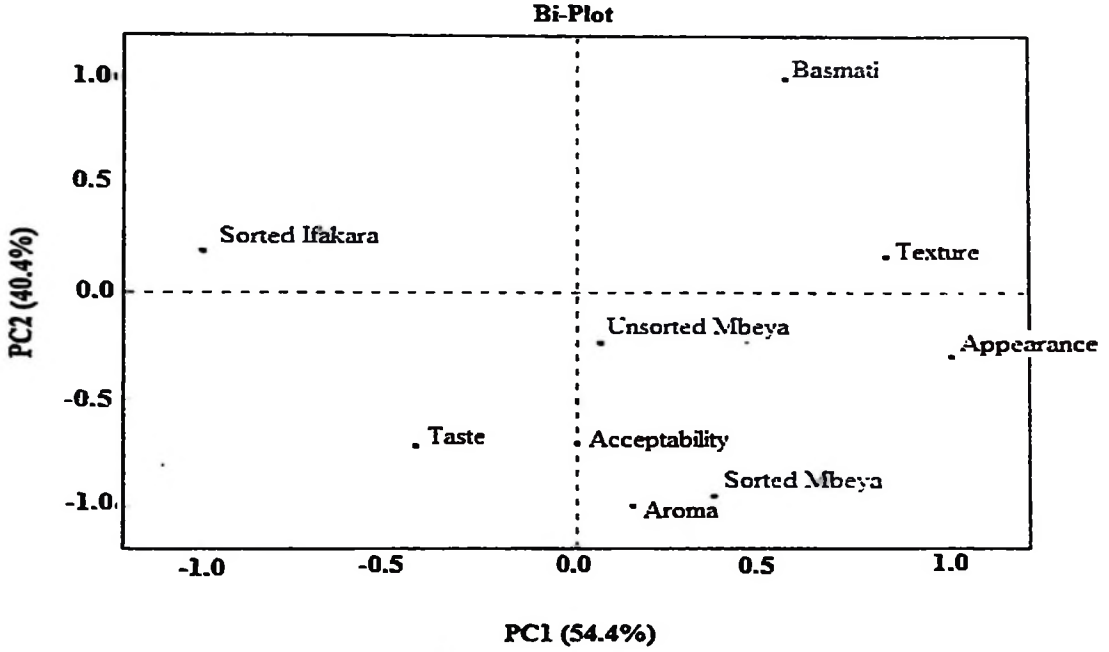

Figure 5: Bi-plot from PCA of four cooked rice sample

4.4 Analysis of Consumer's Mean WTP for Different Attributes of Uncooked and Cooked Rice

4.4.1 Comparison between different rice brands of uncooked rice.

An independent sample test was used to compare the mean WTP between rice samples and the results are displayed in Table 3.

The mean WTP among Basmati and Sorted rice (Mbeya), Basmati and unsorted rice (Mbeya), Sorted rice (Mbeya) and Unsorted rice (Mbeya) was statistically insignificant, the difference between the prices of the rice sample was too small to explain the difference that exist between the brands. These results matched with those presented in the Bi-plot from PCA of uncooked rice samples in Figure 3 of this chapter. These rice brands (with statistically insignificant mean WTP) share the same attributes, for instance Basmati and sorted rice (Mbeya) were both more attached to the appearance and highly

accepted by respondents. Sorted rice (Mbeya), and unsorted rice (Mbeya) also shared the same attributes (aroma, and acceptability).

However the study was able to prove that the average mean WTP between; Basmati and sorted rice (Ifakara), sorted rice (Mbeya) and sorted rice (Ifakara) and unsorted rice (Mbeya) and sorted rice (Ifakara), were statistically significant at 1% level of significance. These results also matched with those in Figure 3: Bi-plot diagram of uncooked rice samples. Sorted rice (Ifakara) was different from all other rice samples in terms of attributes. It was not associated with any attribute (located on the second quadrant of the diagram far from other rice brands).

In table 3 above, Basmati rice scored a high price (2,398/=) and was attached to appearance in the Bi-plot diagram in Figure 3. Sorted rice (Mbeya) followed with bid price of (2,318/=) and was attached to appearance and aroma. Unsorted rice (Mbeya) was attached to aroma in the Bi-plot diagram. This means consumers are WTP more for appearance of uncooked rice followed by aroma. (Armstrong *et al.*, 2005; Eric S. Tokpah. (2010). Also we found that appearance is a critical quality attribute for rice, that rice consumers judge the quality of the rice on the uniformity of its size and shape as well as the appearance of its overall size-shape relationship.

Thus millers, institutional and residential buyers should consider uniformly, grain shape and size (appearance) to be important as well.

Table 3: Mean WTP for uncooked rice samples (In TZS)

Rice attributes	N	Mean	Std	F	Sig
Basmati	100	2394	243.63	0.67	0.414
Sorted rice (Mbeya)	100	2318	216.66		
Basmati	100	2394	243.63	0.39	0.843
Unsorted rice (Mbeya)	99	2133	226.77		
Basmati	100	2394	243.63	11.362	0.001
Sorted rice (Ifakara)	87	1818	192		
Sorted rice (Mbeya)	100	2318	216.66	0.454	0.501
Unsorted rice (Mbeya)	99	2133	226.77		
Sorted rice (Mbeya)	100	2318	216.66	8.155	0.005
Sorted rice (Ifakara)	87	1818	192		
Unsorted rice (Mbeya)	99	2133	226.77	11.85	0.0011
Sorted rice (Ifakara)	87	1818	192		

Source: Author's calculations, 2014

4.4.2 Comparison of mean WTP among different attributes of cooked rice

The mean WTP between Basmati vis-a-vis unsorted rice (Mbeya), Basmati vis-a-vis Sorted rice (Ifakara) and unsorted rice (Mbeya) vis-a-vis sorted rice (Ifakara) was not statistically significant. These results matched with those presented in figure 6; Basmati vis-a-vis unsorted rice Mbeya shared same attribute (texture, appearance), Basmati vis-a-vis sorted rice (Ifakara) were both attached to texture, and unsorted rice (Mbeya) vis-a-vis sorted rice (Ifakara) shared taste. The mean WTP in the independent test results above was close to rice samples that shared same attributes.

The study was able to prove that there is statistical difference between mean WTP of sorted rice (Mbeya) and Basmati, Sorted rice (Mbeya) and Sorted rice (Ifakara) at 1% level of significance. In table 4 above; sorted rice (Mbeya) scored highest price (2,284/=) and it was attached to aroma, taste and good appearance in the Bi-plot diagram in Figure 5, followed by unsorted rice (Mbeya) which scored 2210/= and was attached to appearance, aroma texture and taste. Sorted rice (Ifakara) scored 2,167/= and was attached to taste attribute. Basmati rice scored the lowest price 2,120/= and was attached to texture.

This means consumers are willing to pay more for appearance, aroma and taste and they are willing to pay for combination of attributes rather than a single attribute. For example, sorted rice (Ifakara) scored lower price and it was attached to taste only, Basmati scored the lowest price and was attached to texture only (as shown in figure 5). Although taste and texture were among the cooked rice attributes that were preferred by consumers they scored high prices when in combination with other attributes as in sorted rice (Mbeya) and unsorted rice (Mbeya). Generally rice consumers often express their preferences for product quality by paying a premium for the product with the desired characteristics (Saneliso, 2010).

Table 4: Mean WTP of cooked rice samples (in TZS)

Rice attributes	Frequency	Mean	Std	F	Sig
Basmati	100	2120	322.86	10.42	0.001
Sorted rice (Mbeya)	100	2284	259.26		
Basmati	100	2120	322.86	0.977	0.324
Unsorted rice (Mbeya)	100	2210	297.29		
Basmati	100	2120	322.86	0.436	0.51
Sorted rice (Ifakara)	98	2167	299.4		
Sorted rice (Mbeya)	100	2284	259.26	5.722	0.018
Unsorted rice (Mbeya)	100	2210	297.29		
Sorted rice (Mbeya)	100	2284	259.26	8.013	0.005
Sorted rice (Ifakara)	98	2167	299.4		
Unsorted rice (Mbeya)	100	2210	297.29	0.143	0.706
Sorted rice (Ifakara)	98	2167	299.4		

Source: Author calculation, 2014

4.5 Consumer Characteristics on Imported and Local Rice Brands

In this section the results are grouped into three main parts depending on the questions respondents were asked; the first part discusses the imported rice brands, the second part discusses the purchasing behavior of individual on local rice and the preference of individuals between the two rice samples is explained in part three.

4.5.1 Discussion on imported rice brands

Eighty seven respondents which account for 87 percent of total respondent surveyed were aware of imported rice in the country, and only 13 respondents (13 percent) were ignorant of the presence of imported rice in Tanzania (figure 6). After an depth interview with the respondents, the study found out that even the 13 respondents who said they are not aware of presence of imported rice in the country, were aware of such products, but they did not know if the brands were imported. For example one respondent remarked that she did not know that "kitumbo" was an imported rice brand.

In order to know the familiarity of respondents with imported rice, respondents were asked which imported rice they were familiar with, Most of the respondents (40 percent) were familiar with VIP, followed by Kitumbo (27 percent), Basmati (24 percent), 9 percent of the individual were familiar with Jasmine. Fifty two (52%) of respondents did not prefer any of the imported rice brands, they argue it is expensive, there is a lot of quality rice in the country and imported rice brands are not as tasty as local rice when cooked. As shown in figure 6.

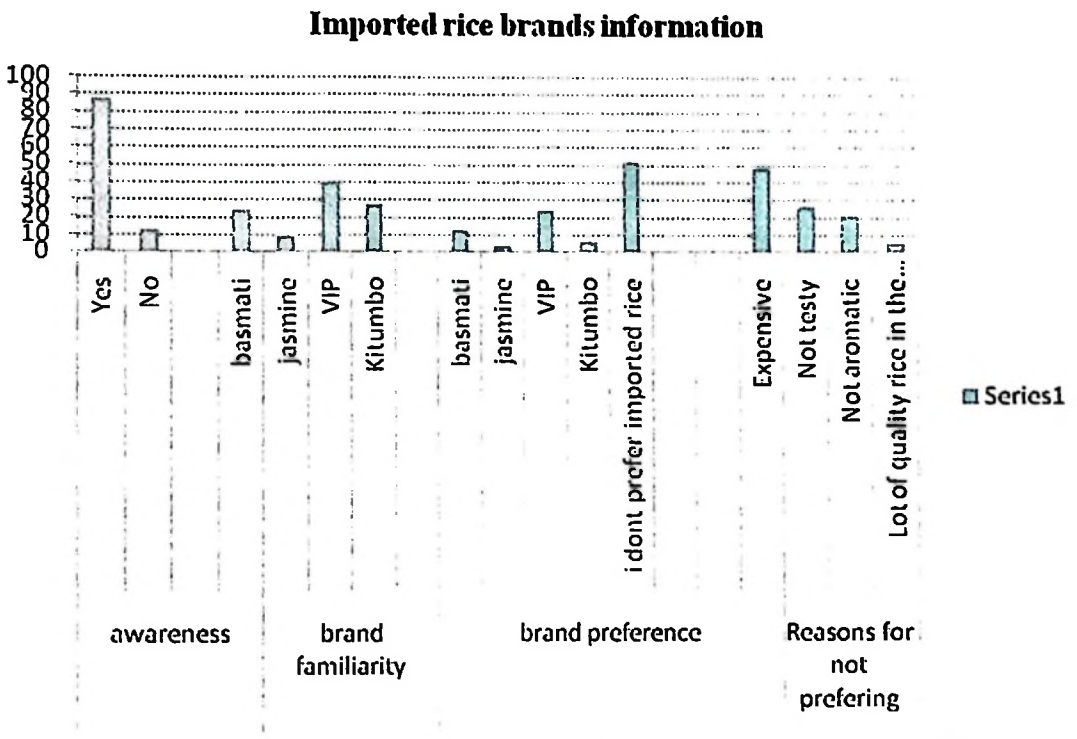

Figure 6: The graph showing imported rice brands information (n=100)

4.5.2 Information on local rice

The results showed the region of origin, associated with aroma of rice and longer grain length is an important selection criteria when purchasing rice. Consumers believe that rice from the region they choose, compose the attribute that they desire, for example, the majority, 43 percent, of respondents select rice based on the area of origin, and among those who select rice based on the region of origin 28 percent prefer rice from Mbeya region, as indicated in Figure 7 below.

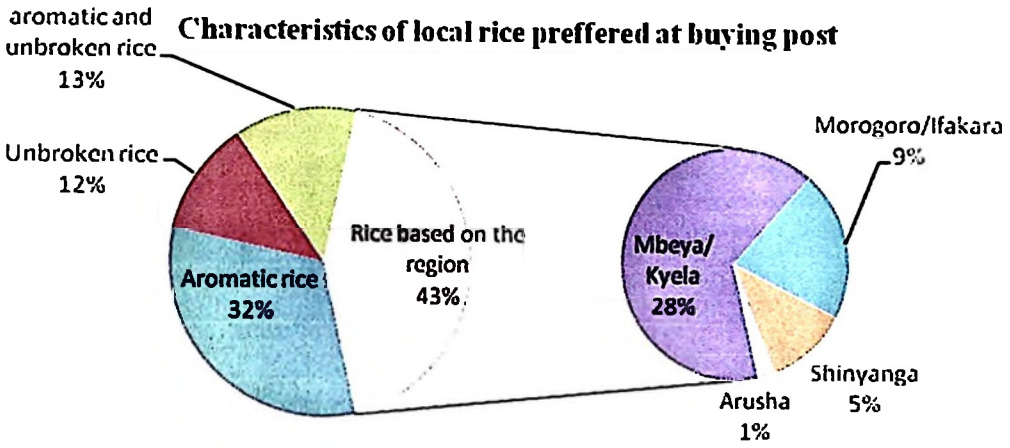

Figure 7: Pie chart showing characteristics of local rice prefered at the buying post

4.5.2.1 Purchasing behavior of consumer on local rice brands.

There were variations in purchasing behavior of consumers surveyed. Table 5 shows the rice purchasing behavior of the consumers that are classified and grouped under; frequency of purchasing and location of purchase. The results of the survey indicated that most of the respondents consumed rice on a daily basis. For instance, 87 percent of consumers consume rice almost every day when at home whereas 41 percent consume rice almost every day away from home. These results justify the high demand for rice in urban market. A total of 43 percent of respondents preferred to purchase rice from open markets and retailers rather than supermarkets (which account only 3 percent). It was due to the location of these stores that were in close proximity to their homes and the availability of various kinds of products which gave them more options and greater choices. Generally respondents select the location of purchase based on affordability (58 percent), availability of different varieties at the same place (12 percent) and convenience (30 percent), as indicated in Appendix 6.

Table 5: Purchasing behavior of consumer on local rice brands

	Category	(%)
Location of rice purchase	Paddy	13
	Kioski	25
	Supermarkets	3
	Millers	16
	Sokoni/open markets	43
Average frequency of eating rice at home	Once a week	10
	Once a month	4
	Almost everyday	87
Average frequency of eating rice away from home	Once a week	40
	Once a month	19
	Almost everyday	41

Source: Author's calculations, 2014

4.5.3 The preference of Individual between Imported and local rice

The results also revealed that 96% of respondents preferred to purchase local rice due to availability of different types of rice rice brands in the market and at retail outlet. For example, one household member responded to this by saying "*I don't have to go to supermarket to purchase local rice when I am in need because they are convenient, I can purchase rice at retail shops near my residence.*" Local rice is also preferred because it is aromatic, tasty and cheaper compared to imported rice brands. Whereas about 1% of respondents preferred to purchase both local rice and imported rice depending on the dish to be prepared, when cooking Biriani, Basmati rice is preferred where as the respondent use local rice for other recipes. These results are similar with those reported by (Takoradi *et al*, 2008; Tokpah, 2010) that, shows quality of rice depends on type of food people prepare for eating. For instance in Ghana, long grain and aromatic rice are used with sauces or to prepare "jolo" or fried rice. Three percent (3%) of respondents remarked that they preferred to purchase imported rice because it's well graded so it saves preparation time.

4.6 Factors Affecting Consumers WTP for Rice Attributes of Uncooked Rice

Multiple linear regressions was used to determine the factors that have influence on consumers WTP for rice attributes and the results are:

4.6.1 Uncooked rice

The relationship of the demographic factors with mean WTP of the respondents was analyzed using multiple linear regressions. The results revealed that income level, marital status, household size, sample type, appearance and overall acceptability of uncooked rice have a significant relationship with the mean WTP. Income level, household size and type of rice to be purchased to a large extent determined the price to be paid. Normally the larger the household, the larger the quantity of rice to be consumed and the less the price respondents are willing to pay as opposed to small households. Income level has positive relationship with WTP, the higher the income levels the higher the WTP. (See table 6 below).

Table 6: Regression estimates on consumers' WTP for uncooked rice

	Unstandardized Coefficients		Standardized Coefficients		
Variables	B	Std. Error	Beta	t	Sig.
Constant	2176.99	112.999		19.266	0.00
Product attributes					
Appearance	19.718	12.489	0.087	1.579	0.115
Aroma	38.02	11.279	0.14	3.371	0.001
Overall acceptability	41.321	16.304	0.152	2.534	0.012
Consumer characteristics					
Sex	-31.786	24.713	-0.051	-1.286	0.199
Nationality	34.203	23.02	0.053	1.486	0.138
Age	14.842	11.344	0.051	1.308	0.192
Education level	-18.146	9.468	-0.078	-1.917	0.056
Marital status	-33.664	10.755	-0.123	-3.13	0.002
Household size	-46.974	16.731	-0.113	-2.808	0.005
Income level	72.739	20.622	0.141	3.527	0.00
R	.748(a)				
R-square	0.559				

a) Dependent Variable: Maximum price consumer willing to pay

4.7 Cooked Rice Samples

The results for cooked rice revealed that taste, overall acceptability, marital status, income level have high significant relationship with mean WTP. Consumers are willing to pay more for a rice brand with the best taste. As in uncooked rice brands results, marital status negatively affect WTP, as individual moved from being single to marriage life the less their WTP for rice. Income levels positively influence WTP. The higher the income level of a consumer the higher the WTP. (See table 7 below).

Table 7: Regression estimates on consumer's WTP for cooked rice

	Unstandardized Coefficients		Standardized Coefficients		
Variables	B	Std. Error	Beta	T	Sig.
Constant	1401.7	151.825		9.232	0
Product attributes					
Appearance	32.764	16.555	0.118	1.979	0.049
Aroma	-13.608	16.246	-0.044	-0.838	0.403
Texture	-18.212	15.158	-0.062	-1.201	0.23
Taste	109.567	16.551	0.381	6.62	0
Overall acceptability	77.52	20.789	0.225	3.729	0
Consumer characteristics					
Sex	14.094	28.842	0.023	0.489	0.625
Nationality	41.429	27.909	0.066	1.484	0.139
Age	-12.017	13.252	-0.042	-0.907	0.365
Education level	-14.496	11.004	-0.064	-1.317	0.189
Marital status	-32.676	13.473	-0.121	-2.425	0.016
Household size	-9.944	19.743	-0.025	-0.504	0.615
Income level	57.718	24.019	0.114	2.403	0.017
R	.585(a)				
R-square	0.342				

a) Dependent Variable: Maximum price consumer willing to pay

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

Consumers' decisions on WTP and purchasing behavior differed greatly in this study. Quality and rice attributes (extrinsic and intrinsic), price, marital status, household size, income level, and convenience, were the determinants that need to be focused on by entrepreneurs in the production and marketing of rice. The majority of the consumers preferred to purchase local rice especially rice from Mbeya over the imported one. Producers as well as distributors need to figure out these situations in order to meet the needs of their consumers.

The most popular brand was sorted rice (Mbeya) due to its aroma and long grains. Rice consumers are loyal to the region of origin of rice, and Mbeya was the most popular region in terms of preference. Uncooked Basmati rice outweighs other rice brands in terms of appearance (grading) not because it is imported but due to the uniform long grains and absence of rice husks and stones. This means sorting and uniformity is a very big criteria for rice business to thrive.

The findings from this study also are useful for the producers and distributors to strengthen their rice brand and to segment their target market. In addition, they should label information on the rice packaging to inform the consumers which cuisine is suitable for each type of rice to avoid them from purchasing the wrong one.

5.2 Recommendations

To increase demand/supply traders at all level should consider packing rice based on the source of origin of rice, pack the rice depending on the food to be prepared. For example, long grain sized rice can be used to prepare biriani and broken grains can be packed to prepare vitumbua and offered at much lower price, moreover the market place should be a convenient place to shop.

Rice value chain improvement: rice production efficiency is partly a result of market efficiency. Producers have limited market power, millers and traders/middlemen decide on prices. In the improved value chain producers should be given power to decide on farm gate price. This will give them incentive to improve quality of rice.

Farmers should get access to good quality seeds, good farm practice for uniform growth and grain size since production of good quality seed start from the pre-harvest practices. This should go hand in hand with extension services to farmers, and also laboratory work by improving grain quality through mixing varieties, breeding of more quality species that will be cheaper to produce and hence decrease in end produce price.

Post harvest handling methods should be improved; this requires the use of efficient modern post harvest technologies thus reduce losses and ensure high quality standards in food production, parboiling is one example of such methods.

5.3 Suggestions for Future Research

Some potential future improvements to the analytical procedures and to our overall understanding of consumer preference include including both consumption and production attributes in the study:

i. This means investigating producer preference for rice grain qualities that is both consumption and production using farm gate price instead of market price, in order to give producers market power and improve rice value chain.

ii. Information on producer's preferences for seeds together with consumer preferences for grain quality this will give a holistic understanding of the Tanzania rice market.

Related studies should expand the research by considering the preference of cities in the country like Dar es Salaam, Mwanza and Mbeya in order to increase the diversity of responses and to determine overall acceptance and WTP, since consumers' behavior varies with location, and larger population is expected to give best results. Nevertheless, this study is crucial as it gave benchmark on Tanzania rice market, preference of consumers and act as advice for entrepreneurs.

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APPENDICES

Appendix 1: Development of Questionnaire

The questionnaire used in this study consisted of three main parts. The first part covered respondent household characteristics and socio-economic status (household size, age, sex, education level/employment status and income level). The second part of the questionnaire covers consumer attitudes towards different rice attributes. The third section consisted of the Contingent valuation (dichotomous choice questions). In here they will be asked whether or not they were willing to pay more than the market price for one or more of the selected attribute. Prices will be increased by 5%, 10%, 15%, and 20% above market price. This will be offered only to those who will show interest in their willingness to pay more of the selected range.

Questionnaire

PART A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF INTERVIEWEE

PERSONAL INFORMATION

1. Questionnaire reference no..... 2. Date of interview.....

3. Respondent no.....

4. Nationality.....

5. Respondent area of residence.....

6. Sex of respondent □ Male □ Female

7. Age **(specify in years)**.....years

8. What is your education level?

a)Primary education □ b)Secondary education; o-level□ ...,a-level... □ c) Higher education □ d)No formal education □ ...e)others (specify).....

9. What is your marital status? a) Married □ b)Single □ c)Divorced/separated □ d) widowed □ e)(specify).....

10. What is your household size?

a) 1-2 b) 2-4 c) 4-6 D)>6

11. What is your occupation?

12. Which range will better describe your income wages per month?

a) > 30,000-120,000Tshs. b) 120,000-400,000 c) 400,000-1,000,000 d) >1,000,000

PART B; INFORMATION ON CONSUMER ATTITUDE TOWARDS DIFFERENT RICE CHARACTERISTIC

13. Within the past 12 months have you purchase rice for own/ family use?

a) Yes □ b) No □ (If yes continue with question 14.below) If no what are the reasons..,

14. Where do you get your regular supply of rice?

a) Farm gate □ b)Open markets around town □ c)Supermarkets □ d)others.....(specify)

15. Give reasons for your choice in 14) above

....., ..., ..., ...

16. What kind of rice are you looking for when at the market?

a) Rice from certain reglon □ b) aromatic rice □ c) Unbroken rice □ d) others... (Specify)

17. If the answer was a) in 16) above, you prefer rice from which region? (If not skip to 18)

a) Mbeya □ b)Morogoro □ c)Shinyanga □ d)others.....(specify)

18. What are the reasons for the choice in 16) above

....., ..., ..., ...

Information on attribute that consumer look for in cooked rice and comparison of imported versus local rice demand.

19 How do you want your cooked rice to be?

a) Palatable □ b) Sticky □ c) aromatic □ d) other..... (Specify)

20 Do you know there is imported rice in the country?

a) Yes □ b) No □ (if yes continue with 21) below, if no skip to 28)

21 Have you ever bought rice that is imported?

a) Yes □ b) No □ (If yes continue with 22 if no skip to)

22 Which brand of imported rice do you prefer?

a) Jasmine □ b) Basmati □ c) others... (Specify)

23 Why did you prefer the brand above?

a) palatable when cooked □ b) aromatic □ c) well graded □ d) easy to cook □ e)others……..(specify)

24 How often do you buy imported rice?

a) Always □ b)Once per month □ c)Once per week □ d)others…(specify)

25 Have you eaten both local and imported rice?

a) Yes □ b) No □

26. Which rice variety do you prefer more?

a) Imported rice □ b) Local rice □

27. What are the reasons for the choice in 26) above?

……,……..,……,……,…..

28. If you knew would you have bought imported rice?

a) Yes □ b) No □

29. What are the reasons for your choice in 27) above? Please mention

a)……b)……c)……..d)……,……e)……..

30. What are other factors that can influence you to buy certain type of rice, please mention a)……..b)……..c)……..d)……..e)……

Appendix 2: Sensory Evolution Form: Uncooked Rice

Descriptive profiling of uncooked rice

Sex.....Age: .....Date.....Time.....Location.....

Please evaluate each of the two (4) coded samples from left to right indicate how much you like or dislike each sample by checking the appropriate sample attribute and indicate your preference (1 – 8) ip`n column against each attribute. Put tick against each

9. Like extremely 8. Like very much 7. Like moderately 6. Like slightly 5. Neither like nor dislike 4. Dislike slightly 3. Dislike moderately 2. Dislike very much 1. Dislike extremely

Attribute	**Sample code**			
Appearance				
Aroma				
Texture				
General Acceptance				
Overall Acceptability				

Comments based on the sample code(s)

.....

.....

.....

.....

.....

Appendix 3: Sensory Evaluation Form: Cooked Rice
Descriptive profiling of cooked Rice

Sex..... Age: .....

Date:.....Time:.....Location:.....

Please evaluate each of the six (6) coded samples from left to right indicate how much you like or dislike each sample by checking the appropriate sample attribute and indicate your preference (1 – 8) in column against each attribute. Put tick against each attribute.

No	Attribute	Rating scale	Sample code			
			947	162	385	463
1	Aroma/Odour Intensity (smell)	1 = Extremely weak (none)				
		2. = Very weak (none)				
		3. = Fairly weak				
		4. = Slightly weak				
		5. = Slightly intense				
		6. = Fairly intense				
		7. = Very intense				
		8. =Extremely intense				
2	Tenderness Eat the sample with light chewing action	1 = Extremely tough				
		2. = Very tough				
		3. = Fairly tough				
		4. = Slightly tough				
		5. = Slightly tender				
		6. = Fairly tender				
		7. = Very tender				
		8. =Extremely tender				
3	Appearance The impression of appearance that you see on the product	1 = Extremely dark				
		2. = Very dark				
		3. = Moderate dark				
		4. = Slightly dark				
		5. = Dark				
		6. = Fairly dark				
		7. = Neither dark				
		8. =Excessive dark				
4	Texture (when chewing rice)	1 = Extremely abundant				
		2. = Very abundant				
		3. = Excessive amount				
		4. = Moderate				
		5. = Slightly abundant				
		6. = Traces				
		7. = Practically none				
		8. = None				
5	Overall acceptability	1 = Dislike extremely				
		2. = Dislike very much				
		3. = Dislike moderate				
		4. = Dislike slightly				
		5. = Like Slightly				
		6. = Like moderate				
		7. = Like very much				
		8. = Like extremely				

Comments based on the sample codes

.....

.....

Appendix 4: WTP questions: these will be asked simultaneous with sensory evaluation based on the sample codes

1. Given the sample codes (A, B, C, and D) above will you be able to pay, the following prices below (***depending on the market price***) in exchange for 1kg. of;-

i. Tshs...../= for sample A, Yes □ No □

ii. Tshs...../= for sample B, Yes □ No □

iii. Tshs...../= for sample C, Yes □ No □

iv. Tshs...../= for sample D, Yes □ No □

2.If the response is Yes in the sample above, I will increase the price by 5%, 10%, 20% (referring the current market price), until a negative response is obtained

3. If the answer is No a discount of 5% will be offered. If the answer is NO a discount of

4. (Answer only if a zero bid was recorded for either question above.) Did you bid zero because you believe that:

_____ The attribute is not worth it.

_____ other reasons for zero bid

Appendix 5: Information on imported rice brands

	Category	Number	%
Awareness	Yes	87	87
	No	13	13
Brand familiarity	Basmati	24	24
	Jasmine	9	9
	VIP	40	40
	Kitumbo	27	27
Brand preference	Basmati	13	13
	Jasmine	4	4
	VIP	24	24
	Kitumbo	6	6
	I dont prefer imported rice	52	52
Reasons for not buying imported rice	Expensive	48	48
	Not testy	26	26
	Not aromatic	21	21
	Lot of quality rice in the country	5	5

Source: Author's calculations, 2014

Appendix 6: Reasons for purchasing rice from mentioned buying post

	Frequency (n=100)	(%)
Variability	12	12
Affordability with quality rice	58	58
Convenience	30	30

Source: Author's calculations, 2014

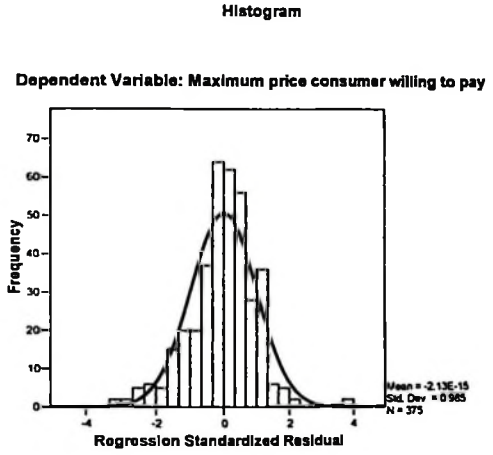
Appendix 7: Means hedonic scares uncooked rice

	Sorted rice (Ifakara)	Unsorted rice (Mbeya)	Sorted Rice (Mbeya)	Basmati
Appearance	1.89	2.92	3.74	4.29
Aroma	2.84	3.66	3.95	3.15
Overall acceptability	2.12	3.25	4.2	4.17

Appendix 8:Means hedonic scores of cooked rice samples

	Sorted rice (Ifakara)	Unsorted rice (Mbeya)	Sorted rice (Mbeya)	Basmati
Appearance	2.75	3.35	3.54	3.43
Aroma	3.3	3.66	3.79	3.13
Texture	3.14	3.4	3.66	3.82
Taste	3.84	3.56	3.88	3.29
Overall acceptability	3.75	3.75	3.98	3.6

Appendix 9: Normal distribution graph for uncooked rice samples



Appendix 10: Normal distribution graph for cooked rice samples