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### Malaysian Consumers' Demand for Quality Attributes of Imported Rice

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#### ABSTRACT

**Background:** Growing per capital income, life style changes and better standard of living has led to changes in Malaysian consumers' food choices. Consumers have become more empowered and demand for higher quality food. As a result, rice importation has increased to supply consumers with quality varieties not available locally. The analysis of demand for the attributes of these imported varieties takes on particular importance due to increasing cost of importation and subsequent attempts for local production of some of the imported varieties. **Objective:** The present study was aimed at investigating consumers' demand for the quality attributes of imported rice varieties now apparent in the market **Results:** It was found that texture is the most important attribute, followed by grain size, taste, aroma and colour is the least important. It was also found that consumers are willing to pay for all attributes except colour that gives a negative utility. **Conclusion:** The result shows a possible internal substitution and increase demand for higher quality rice. Even though consumers are price sensitive, they still prefer quality and are willing to pay for better quality rice.

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#### INTRODUCTION

In Malaysia, rice is not just a staple food but synonymous with food itself. It is the most important source of calorie intake for majority of Malaysians (Abdullahi *et al.*, 2011). Rice production has increased over the years, however, the country still import rice. About 30-40% of domestic rice demand is imported annually not only to suffice shortfall in supply but to meet the taste of consumers for quality varieties not produced locally (Bernas, 2015). Recently, spending on importation has become a marked concern as the country's rising per capital income stimulates increase in the demand and consumption of imported quality rice rather than quantity proportionally which consequently led to increased importation to satisfy consumers taste. In response, the government is investing effort to restrict importation through the introduction of hybrids with attributes similar to some of the imported varieties (Abidin *et al.*, 2012).

Malaysian market is deluged with various types of imported rice varieties such as jasmine, basmati, normal white rice, glutinous rice, parboiled and brown rice from different countries such as Thailand, Vietnam, India, Pakistan and USA at varying prices (Jamal *et al.*, 2013). The existence of this wide variety of imported rice available to consumers was

the background context to this study, which inquired in to consumers' demand for rice attributes such as texture, taste, aroma, colour and grain size. The mythological approach allowed us to analyze the importance of these attributes to Malaysian consumers and subsequently, the overall utility that each of these attributes provides. Since the introduction of new varieties involves more cost and effort, it is equally important to know what consumers are willingness to pay for the improved varieties and what price they are unwilling to pay.

Consumer preference for rice varies from county to country. However, consumers are always concerned about quality and price when they make purchase (Diako *et al.*, 2010). Akpokodje *et al.* (2003) reported that Nigerian consumers preferred imported rice due to its cleanliness, swelling capacity, availability and grain shape over the local rice due to the odor and foreign material present in the local rice, although the local rice is also preferred by some consumers due to its taste and low price. Suwannaporn *et al.* (2008) look at consumer preferences and buying criteria for rice in Thailand export markets, he found out that long grain rice is most preferred by all nationalities (Americans, Europeans, Australian/new Zealanders, south Asia and the Middle East) except the Japanese/Korean whose preference is for the short grain rice,

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Chinese/Taiwanese prefer both the long and short grain and about one third of the American also prefer the short grain. He also reported that European consumers prefers long grain, well milled rice with strong aroma, while long grain rice with no scent is preferred in the Middle East. Azabagaoglu *et al.* (2009) analyze consumer preference to different rice varieties in turkey, he found out that consumer have priority for attributes such as long grain, freshness, cleanliness, palatability and flavour of the rice grain. Walissinghe *et al.* (2012) conducted a research on consumer preferences for quality attributes of rice in Sri Lanka, he concluded that White colour, purity and type (samba) are the most significant attributes for consumers. Fiamohe *et al.* (2013) also look at consumer purchasing criteria for types of rice in Togo and concluded that consumers are willing to pay for whiteness, minimum breakage, aroma and conservation after cooking

## MATERIALS AND METHODS

### Data sources:

The data are collected from a survey conducted in early 2015 consisting of 500 Malaysian rice consumers mostly responsible for their household food purchases. The sample population is related to the Klan valley area of Malaysia where proportionate individuals were interviewed in both the urban and the suburban areas.

The design was a systematic random sampling used to select every first three supermarket and hypermarket in each area and every 10<sup>th</sup> person who enters each of the selected supermarket and hypermarket was interviewed. The criterion used, adopted due to the fact that imported rice brands are widely available at the supermarkets and hypermarkets and consumers from all walk of life shop there. In cases of refusal, the next person was assumed the 10<sup>th</sup> person and interviewed.

### Conjoint analysis:

The study employs conjoint analysis (CA). It is a technique used to explore consumers' product preferences based on the important attributes that defines the product. The model allows alternative product concept to be described as a series of specific

levels of a common set of attributes (Ness & Gerhardy, 1994). The aim of CA is to identify attribute combinations most preferred by the consumers and to establish their relative importance based on their contribution to total satisfaction (utility). Since its introduction to marketing research 1971 (Green and Rao, 1971), it has become an important marketing technique with many application in marketing research projects (Rao, 2014). Conjoint analysis has been applied to a range of food products; eggs (Ness & Gerhardy, 1994), fruit and vegetable (Van der pol *et al.*, 1996) honey (Murphy *et al.*, 2000), organic rice (Ara, 2003), farm house cheese (Murphy *et al.*, 2004), genetically modified tofu (Jan *et al.*, 2007), beef products (Mennecke *et al.*, 2007), rice (Walisinghe & Gunaratne, 2012), beef and broiler (Hanis *et al.*, 2013)

Central to conjoint analysis is consumers' trade off among attribute level combinations when choosing among alternative products, according to Ness and Gerhardy (1994), Van Der Pol *et al.* (1996) and Mesías *et al.* (2011), the main assumption of CA are as follows

1. Every product can be delineated as a set of attributes
2. Products of the same set of common attributes can be delineated as a set of different attribute levels
3. Consumers evaluate a product when making purchase decision based on the value attached to the different attributes
4. The total utility consumer derives from a product is the sum of utility contributed by each attribute level (part-worth utility)

The first step in the research design is to determine the relevant attributes and specify their possible levels (Hair *et al.*, 2009). These attributes should be communicable and actionable from R&D viewpoint (Rao, 2014). In the present study, attributes and levels were determined from a prior group discussion session and information was collected on the most commonly consumed imported rice varieties which are feasible for the given attributes and after which appropriate levels were determined, these attributes and levels are listed in Table 1.

**Table 1:** Attributes of imported rice and their levels.

Attribute	levels
1. Texture	Sticky Non-sticky
2. Taste	Plain taste Tasteful
3. Aroma	Non-aromatic Aromatic
4. Colour	White Creamy white
5. Grain size	Short Medium Long
6. Price	No increase 5% increase 10% increase

Having specified the attributes and their levels, hypothetical scenarios with different combination of attributes was generated and presented to the respondents. The study gave rise to 144 possible

combinations ( $2 \times 2 \times 2 \times 2 \times 3 \times 3$ ). This number needs to be reduced to a manageable size as it will be unrealistic to ask respondents to indicate their preferences for so many profiles. Fractional factorial

design, using SPSS conjoint was used to reduce the scenarios to 12 while also controlling for unrealistic profiles such as profiles with more desirable

attributes offered at low price level. Table 2 present an example of one of the profiles presented to the respondents.

**Table 2:** Example of final card presented to consumer.

Card 8
Non-sticky
Tasteful
Aromatic
Creamy white
Short
10% increase

Consumers were asked to rate the profiles according to their preferences for the combination of levels that defined each profile. The study utilizes verbal description with a rating scale anchored from one to ten with one being "least preferred" and ten being "most preferred" respectively

The model was estimated using ordinary least square regression, this model provides the opportunity of establishing the relative importance of the attributes and their respective part-worth utilities. The combination of the desired attribute level yielded the ideal product most preferred by the consumers. In establishing the relative importance of the various attributes, relationship was specified between attributes and utility using the linear additive model. The model assumed part-worth of each attribute level to be independent and total utility is the sum of attributes level part-worths. The linear additive model is specified as:

$$U = \beta_0 + \beta_1 \text{ Texture} + \beta_2 \text{ Taste} + \beta_3 \text{ Aroma} + \beta_4 \text{ Colour} + \beta_5 \text{ Grain size} + \beta_6 \text{ Price}$$

Where U is the utility or preference score for a rice variety with a given level of each attributes; Texture takes on a value of 1 for sticky, 2 for non-sticky; Taste takes on the value of 1 for plain taste, 2 for tasteful; Aroma takes on a value of 1 for non-aromatic and a value of 2 for aromatic; Colour pertains to the appearance of the rice grain (1 for white and 2 for creamy white); Grain size indicates whether the rice is short, medium or long (1 if short, 2 if medium and 3 if long) and price represents the three price levels used (no increase in current price, 5% increase in current and 10% increase in current price). The parameters  $\beta_0$  to  $\beta_6$  are coefficients of the model to be estimated.

#### **Willingness to pay:**

Willingness to pay pertain to the economic viability of the ideal product. The demanded rice needs to be economically viable and thus, tradeoff will have to be made between quality and price. That is, the aim of estimating willingness to pay is to determine the maximum value of money that an individual is willing to give to equalize utility (Galawat *et al.*, 2010)

The inclusion of cost as an attribute in a conjoint study allows for estimation of the willingness to pay of all other attributes included in the study. It

indicates how much consumers are willing to pay for a unit increase in each attribute. It is calculated by dividing the coefficient value of each non-price attribute by the coefficient value of price attribute. For this study, willingness to pay was estimated for four attributes- texture, taste, aroma and grain size

## **RESULTS AND DISCUSSION**

#### **Profiles of respondents:**

The distribution of demographic profile of respondents is shown in Table 3. The total sample comprises 39.1% male and 60.9% female. The age of respondents were grouped into five categories; below 25 years old, 26 to 35 years old, 36-45, 46-55, and more than 56 years old. About 18.6% were below 25 years old, 27.8% from 26-35 years old, 25.4% from 36-45, 17.6% from 45-55 with about 10.6% above 51 years old. Respondents' range of income was grouped into five, below RM2000, RM2000-RM3000, RM3001-RM4000, RM4001-RM5000 and more than RM5000. About 28.7% were from below RM2000, 18.6% from RM2000-RM3000, 15.6% from RM3001-RM4000, 12.2% from RM4001-RM5000 and 25.6% were above RM5000. In terms of ethnic, 59.8% were Malay, 22.0% were Chinese, 14.0% were Indian, and 4.2% were from other ethnics. For respondents' occupation, the categories of occupation were divided into five categories. The categories were; the government sector, private sector, self-employed, unemployed, retired and others. 37.9% were working with the government, 34.2% were from private sector, 13.6% were self-employed, 8.6% were unemployed, 1.5% was retirees and 4.6% were others. Respondent's education level was categorized primary school, secondary school and tertiary. About 4.4% have attended primary school, 20.8% have attended secondary school and 74.8 % have tertiary education.

#### **Importance of rice attributes:**

From the rating response indicated by respondents to the hypothetical profiles, part-worths of each of the profile was estimated both individually and as an aggregate for all consumers. Table 4 presents the aggregate results of the entire sample consisting of the path-worths of the different levels of attributes and their corresponding signs. The sign

of the part-worth scores indicates the direction in which the attributes influence the preferences. A positive part-worth score signifies higher influence of that attribute on the overall preference or utility score and vice versa. Texture (31.50 per cent) is the most important attribute, followed by grain size

(30.84 per cent), taste (17.10 per cent), aroma (14.77 per cent) and colour (5.83 per cent). Texture and grain size was more than twice as important compared to aroma and more than 5 times as important compared to colour.

**Table 3:** Profile of respondents.

	Demographic factors	Percentage (n = 500)
Gender	Male	39.1
	Female	60.9
Age (years old)	Below 25	18.6
	26-35	27.8
	36-45	25.4
	46-55	17.6
	Above 56	10.6
Income (RM)	Below 2000	28.7
	2000 - 3000	18.0
	3001 - 4000	15.6
	4001 - 5000	12.2
	Above 5000	25.6
Ethnic	Malay	59.8
	Chinese	22.0
	Indian	14.0
	Others	4.2
Employment	Government sector	37.9
	Private sector	34.2
	Self-employee	13.6
	Retired	1.5
	Unemployed	8.3
	Others	4.6
Education	Primary	4.4
	Secondary	20.8
	Tertiary	74.8

Within each attributes, the utilities of each level was also investigated. For example, with grain size, the most utility was obtained from a rice variety with long grain ( $U = 0.533$ ), whereas the utility of a medium grain rice was lower ( $U = 0.488$ ) but higher than a small grain rice ( $U = -1.021$ ). The remaining utilities can be read from table 4 below. The negative sign of price suggest that the higher the price of rice

the lower the preference score. That is, the higher the price, the greater reduction to total utility. This shows that consumers in this survey are price conscious as coefficient of actual price is negative which indicates a reduction in utility with increase in price level. This consistence with previous studies (Hanis *et al.*, 2012; Mesías *et al.*, 2011)

**Table 4:** Part-worth of levels and relative importance of attributes.

Attribute	Level	Part-worth	Relative importance (%)
Texture	Sticky	-1.043	31.50
	Non-sticky	1.043	
Taste	Plain taste	-0.565	17.10
	Tasteful	0.565	
Aroma	Non-aromatic	-0.489	14.77
	Aromatic	0.489	
Colour	White	0.193	5.83
	Creamy white	-0.193	
Grain size	Short	-1.021	30.84
	Medium	0.488	
	Long	0.533	
Price	Actual price	-0.112	-

(sig. 0.000).

#### **Willingness to pay:**

The result of the willingness to pay displayed in Table 5 was calculated based on the average price of imported rice RM3.5 per kilogram. Based on the result, texture has the highest willingness to pay as consumers are willingness to pay extra Rm2.17 per kg for an increase in quality (for instance from sticky to non-stick), Rm1.18 per unit increase in taste,

Rm1.02 per unit increase in aroma and Rm2.13 per unit increase in grain size. The willingness to pay for colour was not estimated as it provides negative utility (utility reduces from white to creamy white). This is consistent with Mesías *et al.*, 2011 as it is viewed unreasonable to estimate economic value for attributes with negative utility.

**Table 5:** Consumers' willingness to pay.

Attribute	$\beta_0/\beta$ price	WTP (RM/kg)
Texture	0.6212	2.17 (5.67)
Taste	0.3365	1.18 (4.68)
Aroma	0.2912	1.02 (4.52)
Colour	<sup>-b</sup>	<sup>-b</sup>
Grain size	0.6081	2.13 (5.63)

<sup>b</sup> since colour provides a negative utility, it will unreasonable to calculate its economic value

### Conclusions:

The conjoint analysis for the overall 500 consumers, found that the ideal rice variety had the following attributes: a non-sticky texture, tasteful, aromatic, white and long grain. Texture and grain size were felt to be the most important product attributes for the overall 500 consumers, followed by taste of the rice, aroma of the rice and then colour (white preferred over creamy white). There was a considerable variation in utility between the attributes, the two attribute levels that provided the highest positive utility were non-sticky texture ( $U = 1.043$ ) and long grain rice ( $U = 1.021$ ) followed by tasteful ( $U = 0.565$ ), aromatic ( $U = 0.488$ ) and the least is creamy white colour which gives a negative utility ( $U = -0.193$ ). The coefficient of actual price was negative implying that consumers in the survey are price sensitive.

The inclusion of price allowed for the estimation of willingness to pay [26]. Consumers are willing to pay Rm2.17 extra per kilogram for a unit increase in texture, Rm1.18 per unit increase in taste, Rm1.02 per unit increase in aroma and Rm2.13 per unit increase in grain size. Since colour provides negative utility, it would make no sense to calculate the economic value of its attribute. The result shows a possible internal substitution and increase demand for higher quality rice. Even though consumers are price sensitive, they still prefer quality and are willing to pay for improved quality rice.

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