

## Informational Labels on Packaged Rice: An Investigation into the Most Preferred Food Quality Attributes

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### ABSTRACT

This study examines empirically based on the Caswell's Classification on food quality attributes as the analytical framework, 'what attributes of food quality a consumer, in general, wishes to be included in a food label', where the labelled rice was used as the special case. There were 244 households that purchase prepackaged labeled rice regularly. They were interviewed in-depth by means of a face-to-face interview supported by a structured-questionnaire to reveal their preferences for the specific attributes to be used in rice labeling as a mean of providing valid and reliable information to potential buyers. An additive and multiplicative indices were estimated to reflect the relative importance of seven food quality related subsets such as food safety, nutrition, sensory, value, process, text and cues. It was found that those attributes representing food safety was the most preferred to be included (i.e. pesticides residues, heavy metal content) followed by nutrition (i.e. percentage of starch and vitamins) and text (i.e. certification) were valued highly by those households. This implies that food markets can work effectively on promoting the sales of rice by enhancing its quality in terms of proper informational labeling to transform those 'Credence' attributes to 'Search' and/or 'Experience' attributes to which the government can provide regulatory support and the food markets themselves facilitate such a mechanism for the benefit of consumers.

**KEYWORDS:** Caswell's classification, Consumer perceptions, Food quality, Informational labeling

### INTRODUCTION

One of the major and increasing preoccupations of food supply system in almost every country is consumer concern on the quality of food products (Henson and Caswell, 1999), there is no exception for Sri Lanka (Lakni and Jayasinghe-Mudalige, 2009). It is obvious expanding population of consumers require more, valid, relevant and timely information on the quality of products they consume. Increasing attention has been given for food safety and quality assurance by governments in both developed and developing countries', food processing firms, and international trade and standardizing bodies. Food safety has been considered as the most important subset of quality amongst other subsets (Hooker and Caswell, 1998). The more importance given to certain food quality attributes gives rise to the implementation of enhanced quality assurance systems by food companies intentionally apart from the strict food safety and quality standards and regulations put forward by the respective governments to legislate the industry (Buzby, 2003; Caswell, 1998).

Being a vehicle to the decision made by the consumer, labels signal product quality to the consumer. Food label can be specified as any tag, brand, mark, pictorial or any descriptive matter written, printed, stenciled, marked, embossed or impressed on, or attached to a container of food and food labeling includes any written, printed, or graphic matter that is

presented on the label accompanying the food, or is displayed near food for the purpose of promoting its sale (Anon, 1985). In today's world, more than ever, consumers want to know exactly what is in their food; they are turning to food labels to provide this information.

Labels on prepackaged food assist to develop and protect consumer's interests by providing information on various product attributes and nutrition contents of the product so that the consumers can make informed dietary choices. Currently available rice labels in Sri Lankan market are consisted with details like brand name, raw/boiled, *Samba/Nadu*, red/white, size, expiry date, manufactured date and price for the most part.

Due to enormous use of chemical fertilizers and pesticides, in the recent years, there are some claims that rice consumed in Sri Lanka may be contaminated with certain toxic heavy metals including the arsenic. Accumulation of contaminants in rice grains could lead to trace element imbalance in consumers. Not only Sri Lanka is one of the major rice growing countries but also rice is its main staple food (Ileperuma *et al.*, 2012). Rice, being the staple food in Sri Lanka, there is a vital importance in identifying the consumer tendency to gain the knowledge of quality, in the rice which they consume.

In light of this, the specific objective of this study was to investigate the consumer perceptions on descriptive product labels on pre-packaged rice. Further, it explored

consumer preferences on various attributes of rice, and what attributes in particularly that consumers need to appear on these labels.

## METHODOLOGY

### Conceptual Framework

Food economists have developed several conceptual frameworks and theoretical models to ascertain the level of information and quality attributes available to consumers about a food product, in general. According to certain such classifications by, Nelson (1970) and Darby and Karni (1973), food quality attributes can be categorized based on three main categories to clarify how consumers learn about the quality of commodities as they purchase them.

There, the first category is turned to be 'Search' attributes, at which the consumers can determine product quality at the point of purchase by looking at the product, examining and researching it (e.g., price, color). The products that belong to the second category possess 'Experience' attributes, where the consumers are not in a position to determine the product quality unless and/or until they consume it after purchase (e.g., organoleptic qualities). The third category is termed as 'Credence' attributes, where consumers cannot judge the quality of a product even after consumption (e.g. pesticide residues, hormones), and in consequently, it warrants more careful investigations and involvement of many parties *vis-à-vis* consumers, food markets and governments to decide on quality assurance.

Another commonly used classification on food quality attributes in literature is Caswell Classification on food quality attributes. According to the Caswell (1998), the major food quality subsets can be categorized as safety, nutrition, sensory, value, process, text and cues (Table 1).

### Development of Additive and Multiplicative Indices (AI and MI)

Once the food quality attributes were identified, an Additive Index and a

Multiplicative Index were derived for the purpose of quantifying the consumer perceptions on those attributes under each food quality subset in Caswell Classification.

$$AI_i = \sum_{a=1}^s a_{is} \cdot X_s / aX$$

$$MI_i = (a_{i1} \cdot X_1 * a_{i2} \cdot X_2 * \dots * a_{is} \cdot X_s)$$

Here, X represents a set of attributes ( $X = X_1, X_2 \dots X_s$ ) which are considered when purchasing of rice. The decision maker within the firm  $i$  ( $i = 1, 2 \dots n$ ) provided an *integer score* ( $a$ ) on each attribute (i.e.,  $a_{i1}, a_{i2} \dots a_{is}$  on  $X_1, X_2 \dots X_s$ , respectively) using a Likert scale from "extremely consider" to "not consider at all" and "extremely important" to "not at all important". The term  $aX$  represents the maximum potential score that could be obtained by a respondent, was used to normalize the value of the index. The AI and MI were calculated for each bundle of attributes/subset (Table 2) and AI was calculated (Figure 2) for each attribute.

### Data Collection and Analysis

The prepared structured questionnaire was administered with a sample of 300 consumers after selecting the best means and ways to use it with different behavioral patterns. The sample was selected purposively from the urban housing schemes and residential areas located in the Kurunegala, Mawathagama and Wariyapola Divisional Secretariat Divisions in the Kurunegala district during January to March 2016. Out of the sample, only 244 people consumed labeled rice and others were buying unpackaged rice. Priority for 26 attributes regarding purchasing of rice was checked from the sample of 244, by using a Likert scale. The price premium they were willing to pay for an informational label was marked on a scale of price.

First, the Mean value of the price premiums was calculated to get an idea about the consumer willingness to purchase rice containing informational labels.

**Table 1. Food quality attributes based on the Caswell's classification**

Safety	Nutrition	Sensory	Value	Process	Text	Cues
Pesticides residues	Dietary fiber	Type (Samba/Nadu)	Cooking instructions	Processed way (Raw/Boiled)	Manufactured date	Past purchase experience
Heavy metal Pathogens	Starch% Vitamins%	Texture Aroma	Size Serving	Country Milling degree	Expiry date Certification HACCP,ISO	Price Brand name
Purity	Minerals% Proteins%	Color	Keepability (After cooked)			

Source: Lakni and Jayasinghe-Mudalige (2010)

Using the calculated AIs for 26 attributes of food quality, each of them was ranked. Further counting on AI and MI on each bundle of attributes, the most significant subset was selected. Using SPSS package Pearson rank order correlation coefficient was calculated to evaluate the linear association between these two alternative indices. Theoretically, if the value of the coefficient is closer to one, either index can be used to provide an equivalent measure of the relative food quality subset.

**RESULTS AND DISCUSSION**

**Descriptive Statistics**

The socio-economic characteristics of consumers participated to the study are summarized in Table 2. The characteristics of sample infer that the consumers have answered the questions with some good understanding about attributes of product quality. Every effort was made to get an equal number of male and female participants. Majority (80%) of the sample were at least, educated up to GCE Advanced Level (Table 2). Most of them (77.2%) were purchasing rice from super markets.

The mean value of the price premiums given by the consumers for an informational label was Rs. 1.25. Both indices indicated that food safety was the most important quality subset and sensory was the second (Figure 1). AI implied text to be the third important factor for the consumers and MI indicated nutrition as the third (Figure 1). Cues and function were the least considerable factors (Figure 1).

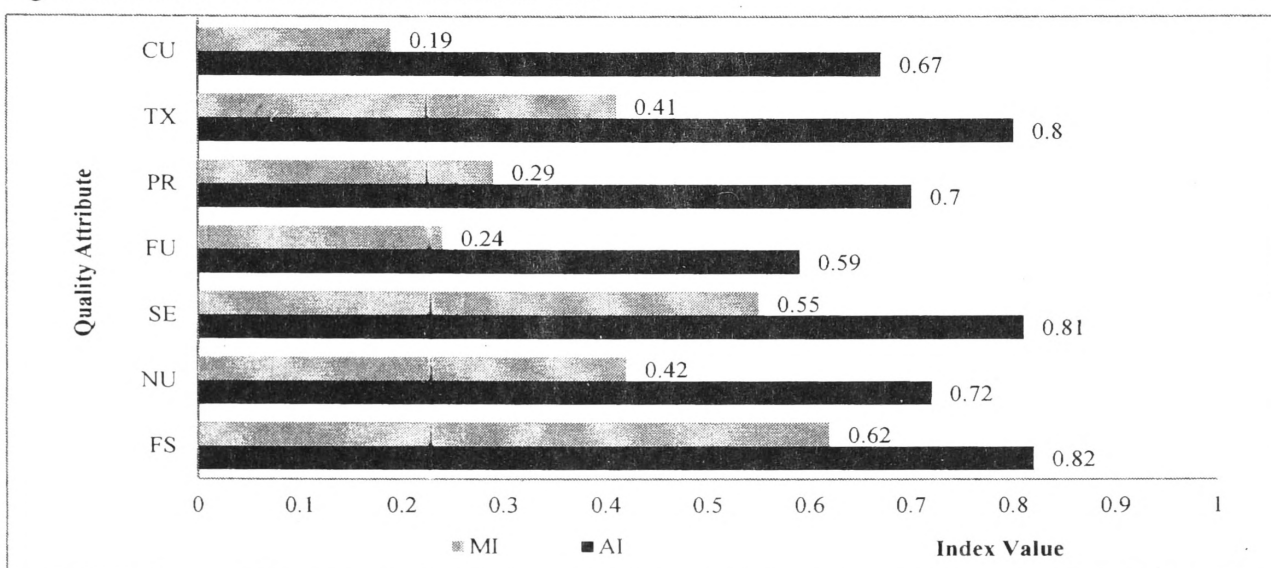
The Pearson Rank Order Correlation Coefficient between AI and MI was 0.869 at the significant level of 0.011. The coefficient was

closer to 1. Therefore, either Multiplicative or Additive Index could be used to rank data.

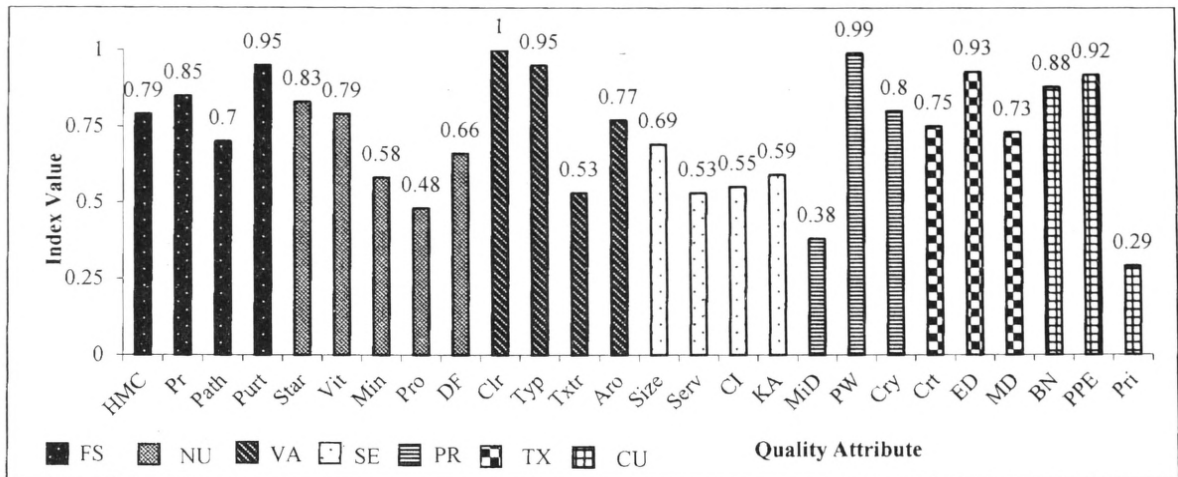
**Table 2. Descriptive Statistics of the sample**

Categories	Sub-categories	Percentage (%)
Gender	Male	48.6
	Female	51.4
Age	18-35 yrs.	18.4
	35-50 yrs.	27.4
	50-60 yrs.	29.0
	60>	25.3
Education	School	02.0
	O/L s	18.0
	A/L s	49.0
	Degree	31.0
Income (Rs)	<30,000	00.3
	30,000-50,000	20.0
	50,000-100,000	52.6
	>100,000	27.0
Marital Status	Married	75.0
	Unmarried	25.0
Place of Purchasing	Open Market	08.2
	Rice Mills.	14.7
	Super Market	77.2

After calculating AIs for each attribute, characteristics which were more than 0.75 were taken into consideration (Figure 2). Colour, processed way (raw/boiled), type (*Samba/Nadu*), purity, past purchase experience, brand name, country and aroma became the most concerned characteristics when purchasing rice, in general (Figure 2). Since colour, processed way, type, purity, expiry date, brand name and country were already on rice labels, they were search attributes in the current condition. Past purchase experience and aroma were attributes which consumer himself experiencing and therefore they were experience attributes.



**Figure 1. Index values of food quality subsets.** FS = food safety, NU = nutrition, SE = sensory, FU = function, PR = process, TX = text, CU = Cu



**Figure 2. Additive Index Values of food quality attributes.** FS-food safety, NU-nutrition, SE-sensory, VA-value, PR-process, TX-text, PP-past purchase experience, HMC-heavy metal content, Pr-pesticides residues, Path-pathogen, Star-starch, Vit-vitamins, Min-minerals, Pro- proteins, DF-dietary fiber, Clr-color, Typ-type, Tstr-texture, Aro-aroma, Serv-serving, CI-cooking instructions, KA -keep ability, MiD-milling degree, PW-processed way, Cry-country, Crt-certification, ED-expiry date, MD- manufactured date, BN-brand name, PPE-past purchase experience, Pri- price

There was an obvious willingness of consumers to get the knowledge of percentage of pesticides residues, starch, vitamins and heavy metal content in the rice they consume, due to the immense consideration for food safety and nutrition. Since these were credence attributes, they should be included on the rice labels for consumers to become aware of the food quality.

Moreover, consumer perception was to appear the certifications for quality (HACCP, ISO 22000; Figure 2). HACCP indicates that no contamination has been occurred during the processing of food. ISO 22000 is given for the food safety management system. Price was the least significant character for the urban consumers when purchasing rice (Figure 2).

Being the staple food, their main consideration was the quality, not the price. Instead of the texture of rice they considered percentage of starch to be important, due to diabetes and obesity. Consumers, who paid more attention for starch percentage, were consuming red rice, boiled rice, *Nadu* rice or rice with all three combinations (red, boiled and *Nadu*). Red rice consumers had the belief that they were gaining more vitamins, especially, Vitamin B. Most of the consumers claimed that even though *Samba* had a favourable texture, they tend to buy *Nadu* since they were more health conscious and thoroughly believed that *Nadu* contains law amount of starch. Their opinion was that raw rice smelled better when cooked, but while boiled rice having a law sugaring capacity. There was a substantial drift towards rice brands which had the title "organic product" since it was the only way for them to be satisfied that they consume non-hazardous

food. Nevertheless, most of them were having doubts whether their staple food was up to their expectations. Hence, informational labels on rice packages have become an urgent necessity.

## CONCLUSIONS

This study investigated the consumer demand for food quality and food safety attributes based on Caswell's classification and assessed the impact of informational labelling on consumer purchasing behaviour.

When purchasing packaged rice, colour, *Samba/Nadu*, raw/boiled, purity, expiry date, past purchase experience, brand name and country are the major factors those were concerned by the urban consumers generally. They prefer percentage of pesticides residues, heavy metal content, percentage of vitamins, starch and certification (HACCP, ISO 22000) to be appeared on the rice labels in addition to the current information. The mean value of price premium they were willing to offer for such label was Rs. 1.25 per 1 kg of rice. Food labelling information is legally regulated and food regulatory authorities are using the information to protect consumers by ensuring provision of clear, honest and correct information to consumers. These authorities are making use of various food labelling regulations and standards available depending on the country's context. In Sri Lanka regulation of food labelling is done by regulations made by the Minister of Health under Section 32 of the Food Act, No.26 of 1980 in consultation with the Food Advisory Committee. The Sri Lankan society has undergone major structural changes due to poverty reduction, growth of the middle class and urbanization that modified their food

preferences in the past few decades. As a result in the current world context, identifying so is vital for food markets as consumers have high expectations that both producers and public policy ensure all food that is sold will be safe to consume.

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