

Assessing the Perceptions of Consumers Towards the Performance of Food System: The Case of Bakery Food Processing Sector in Sri Lanka

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ABSTRACT

This study evaluates consumer perceptions on the performance of bakery food production sector in Sri Lanka through the development of an index called the Food Related Welfare Index (FRWI). The FRWI weights in particular the impacts of a number of factors, including food safety, convenience, choice, cost, taste, health and nutrition, behavior of food companies, where food comes from, and ethical issues associated with food companies on the decision of consumers towards purchasing of the bakery food products. The FRWI was characterized by two components, namely the MPS and MIS. The multi-item scales developed by Henson and Traill were used with these nine factors to develop the theoretical framework. A consumer survey was conducted at the Atthanagalla pradesiya saba in the Gampaha district in Sri Lanka to collect data over the period of July to August in 2006. The Multi-Item Summated Scale techniques were employed to analyze the data, where the contribution of individual construct to the index was ranked based on a number of socio economic characteristics, including gender, level of education, income and area of living (i.e. rural vs. urban). The results suggest that convenience, choice, safety and where food comes from (i.e. place of food production) are the key factors having a greater impact on consumer food-related welfare.

KEY WORDS: Bakery food, Consumer food-related welfare, Food system, Perceptions

INTRODUCTION

Food system is a complex set of processes which include on-farm production; food processing; the storing, distributing, and marketing of foods; consumer decisions relating to food purchases; preparation; waste disposal and recycling as well as the impacts of all of these on human health and nutrition, communities, the economy, and environment (David *et al.*, 1999).

An open food system will enrich the lives and improve the living standard of all citizens, as well as make food more available at an affordable cost to those who have in past been left out of the food chain. Governments should encourage voluntary industry initiative to promote best practices, hygienic production, and environmentally sustainable food products and production techniques. Lower cost, greater availability, and increased diversity of foods will promote direct benefits to consumers through improved nutrition and augmented disposable income (Anon, 1998).

The consumers' expectation is that, every one who is involved in food production, processing and sale has a role in ensuring that the food that reaches the table will not be a hazard to human health. The government of Sri Lanka has imposed food legislations to regulate food industry in Sri Lanka. Particularly, the Sri Lanka Standard Institution has introduced standard for bakery products such as standard for bakers' yeast, wheat flour, breads and cakes.

Science and technological advances in processing, storage and distribution are growing importance in modern food industry. So food composition information is critical to meet consumers' needs. The consumer demand for information is most intense in North America and

Europe, but needs are universal, regardless of geographical area, regulatory jurisdictions, level of economic development or stage of industry growth (Pervis, 2006).

Perceptions of consumers towards the performance of food system are very difficult to measure. Consumers clearly consider price, quality, and sensory-based attributes such as flavor and color. Tastes and preferences for different foods are based on how consumers view the bundle of attributes that each food possesses when consumers are making their food purchase decisions. Particularly, consumers are reluctant to buy food produced using biotechnology such as genetic engineering. For example, some biotech foods or crops have been genetically engineered to resist pests. In addition to food safety concerns, some consumers have expressed concerns about the uncertain long-term impact of biotech foods on the environment, particularly the consequences of cross pollination, the impact on ecosystems, and the development of pesticide resistance by certain pests from using some of the bioengineered plant pesticides. As well some consumers consider farm worker safety concerns and environmental concerns (e.g., pesticide use) when deciding whether to buy organic or conventionally grown products (Buzby, 2000). Today consumers are generally more alert about nutrition and more conscious of health matter than ten years ago (Purvis, 2006). Consumers in USA and UK are more concern about food safety, nutrition and taste (Henson and Traill, 2000).

Economists have attempted to measure the impact of food safety, on consumer food-related welfare. Gardial (1996) examined product level customer satisfaction and explored a range of qualitative and quantitative methods to identify and

assess customer satisfaction with the product itself. Gaski and Etzel (1986) took the four basic elements of the marketing mix and attempted to estimate consumer satisfaction with each of these and also their relative importance in arriving at an overall index of consumer sentiment to marketing. Henson and Traill (2000) introduced a reliable and valid multi-item summated scale to measure simultaneous impacts of nine factors influencing consumer food-related welfare.

The processed food industry plays an important role in the national economy. The total contribution of the food and processed food industry to the value of industrial production was around 18.8 percent in the year 2000 (Rajapaksha and Ganegoda, 2003). Bakery and confectionary is one of the most important sectors in processed food industry. According to the report of food processing industry in Asia and the Pacific (1990), two to three large bakeries in the country used electronically operated mixtures for dough manufacturing and the value of gross output as a percent of food manufacture was 4.2 percent. Now there are more technological advances in the bakery food production sector in Sri Lanka and it still operates within the informal sector consisting of a multitude of micro and small organizations.

This survey aims to find out the consumer attitudes on the performance of bakery food production sector giving more concern on cake manufacturing industry, and to find out the areas of bakery food system that having more impact on consumer food-related welfare through the development of an index called FRWI.

METHODS

This section explains the theoretical framework used to measure consumer attitudes towards the food-related welfare. The multi-item scales developed by Henson and Traill were used to develop the theoretical framework. The study was developed to hypothesize that the issues related to food-related welfare associated with number of socio economics characteristics including gender, level of education (i.e. primary (Iry), secondary (IIry), and tertiary (IIIry)), income (i.e. <7500, 7500-15000, and >15000), and area of living (i.e. rural and urban). The FRWI was developed to reflect consumer perceptions on performance of food system.

Food-Related Welfare Index Concept

The FRWI developed in this study is similar to the index developed by Henson and Traill (2003). This index consists of a range of factors that influence the consumers' welfare deriving from food including 1) food safety; 2) convenience; 3) health and nutrition; 4) taste; 5) cost; 6) behavior of food companies; 7) choice; 8) where food comes from; and 9) ethical issues associated with food companies. This index captures both the relative importance of each factor on overall consumer food-related welfare and

the performance of food system at given time with respect to each aspect of the food system. So the index of consumer food-related welfare is the weighted sum of two separate scales, namely: 1) Mean Performance Score (MPS) and 2) Mean Importance Score (MIS).

Mean Importance Score for a particular construct demonstrate the relative influence of that construct on food-related welfare. Respondents were asked to score on each factor in terms of its influence on the total satisfaction they derived from food. For this purpose a five-point "Likert Scale" was used. The scores provided by respondents (R) from a sample of "n" respondents (i.e. R = 1, 2...n) for each construct were summated to obtain an Aggregate Importance Score (AIS). This Aggregate Importance Score for each construct (AIS1 to AIS9) was subsequently divided by "n" to obtain the Mean Importance Scores for each construct.

$$MIS = AIS / n \quad (1)$$

Mean Performance Score evaluates the performance of food system with respect to each construct. The fundamental notion is that the construct or latent variable of interest manifests itself in a number of measurable items that may thus be considered to be indicators of construct. The latent variable/construct is thus regarded as a cause of the item score; that is the strength or quantity of the latent variable is presumed to cause a set of items to take on a certain value (Henson and Traill, 2003).

The multi-item summated scaling technique was used to derive the MPS. Each construct consisted of seven attitudinal statements as indicators for each construct. A validation item was included for each construct to assist in the assessment of validity. Respondents were asked to score on the statements using seven-point "Likert Scale" from 'strongly agree' (7) to 'strongly disagree' (1). Some statements were reversed scored to prevent an 'agreement bias'.

The next step is to select the set of indicators that most accurately reflect variation in the construct they stand for. As the first step in this process, reliability of scale was tested using "Cronbach alpha". The alpha values above 0.7 generally accepted as demonstrating that the scale is internally consistent or reliable (Henson and Traill, 2000). For multidimensional and orthogonal data such as here alpha exceeding 0.5 is considered sufficient.

The second step is to measure unidimensionality of selected items for each construct by using principle axis factoring. While there is no rigorous criteria that can be applied to assess when factor loading are significant, it is suggested that a minimum value of around 0.30 to 0.35 indicate that an item load into a factor (Henson and Traill, 2000). Having derived reliable measure of each construct, the remaining indicators were used to develop MPS for each construct for each consumer. This value was used to assess construct validity.

The third step is to confirm their construct validity. It is extent to which a measure “behaves” the way that the construct it is hypothesized to measure should behave with respect to established measure of other constructs.

Multi-Trait Multi-Method (MTMM) matrix was used to measure construct validity. The MTMM matrix reports the correlation between different construct and their validation item. Having derived reliable and valid measure of each construct the remaining items were used to develop MPS.

$$MPS = APS / l * n \quad (2)$$

Where,

APS = the summated value of remaining items

l = number of remaining items

n = number of respondents

The derived Mean Importance Score and Mean Performance Score for each construct were used to derive the weighted FRWI.

$$FRWI_i = MIS_i * MPS_i \quad (3)$$

Where,

FRWI_i = weighted index of consumer food-related welfare with respect to *i*th construct

MIS_i = Mean Importance Score for *i*th construct

MPS_i = Mean Performance Score for *i*th construct

Data collection was carried out during July to August in year 2006. This was carried out in the Gampaha district. The sample size was 300 and they were randomly selected consumers in urban and rural areas of Atthanagalla pradesiya saba.

RESULTS AND DISCUSSION

This section summarizes the descriptive statistics of the data and outcome of the empirical analysis.

Derivation of MIS and MPS

Table 1 presents the MPS, MIS and their rank by gender and location. For all consumers, convenience and food safety were the most important factors influencing on food-related welfare. The factors: taste, choice, and cost were the other important areas next to convenience and food safety. Health and nutrition and behavior of food companies were not most important with regard to bakery products. Ethical issues associated with food and area of food production were the least important factors. Perception of the performance of food system with respect to each of the nine construct were similar among urban and rural people as well as between male and female. Location of food production and convenience were the highly performing areas though location of food production was not much important for food-related welfare. Choice was the next well performed sector in both rural and urban areas and for both male and females. Though safety, taste, and cost were juggled to more importance for food-related welfare, the performance of these construct were low.

Figure 1 presents the MIS and MPS for each construct for the sample. Generally, safety and convenience were the most important areas of bakery food production sector. As well, choice, cost and taste also were more important. Generally performance of food system was high with respect to convenience and location of food production and choice was the next somewhat highly performing area. The cost was an important issue, though performance of food system with regard to cost was very law.

Table 1 - Mean Importance Score (MIS), Mean Performance Score (MPS) and their rank (R) based on gender and location:

Construct	Gender								Location							
	Male				Female				Urban				Rural			
	MIS	R	MPS	R	MIS	R	MPS	R	MIS	R	MPS	R	MIS	R	MPS	R
1.Safety	4.4	2	3.8	4	4.7	2	3.6	4	4.6	1	4.3	4	4.6	2	3.2	5
2.Convenience	4.7	1	5.8	2	4.8	1	5.8	2	4.6	1	5.7	1	4.8	1	5.9	2
3.Health and nutrition	3.3	6	3.2	7	4.1	6	3.0	7	4.0	6	3.9	7	3.5	6	2.8	7
4.Cost	4.0	5	1.8	9	4.2	5	1.7	9	4.1	5	2.0	9	4.1	5	1.6	9
5.Taste	4.1	3	3.6	5	4.4	3	3.5	5	4.5	3	4.2	5	4.2	4	3.0	6
6.Ethical issues	1.0	9	3.5	6	1.1	9	3.4	6	1.1	9	3.5	6	1.0	9	3.4	4
7.Choice	4.1	4	4.7	3	4.4	3	4.8	3	4.3	4	4.8	3	4.3	3	4.8	3
8.Behavior of food companies	3.3	7	2.4	8	3.7	7	2.3	8	3.9	7	2.5	8	3.3	7	2.2	8
9.Where food comes from	2.1	8	5.9	1	2.2	8	5.9	1	3.2	8	5.7	2	1.3	8	6.1	1

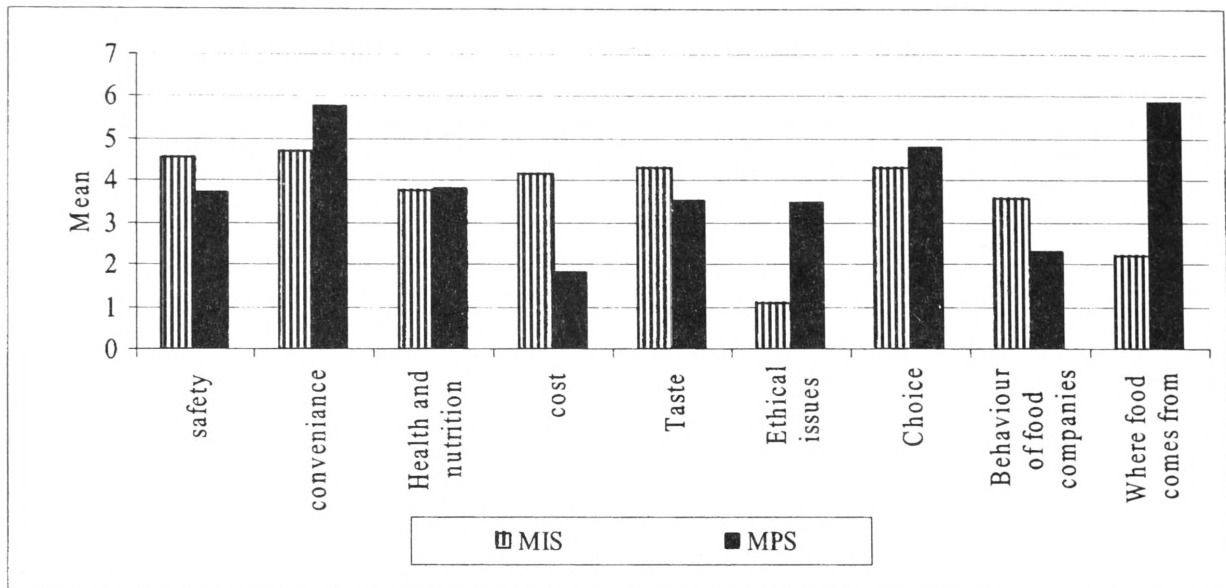


Figure 1 - Mean Importance Score (MIS) and Mean Performance Score (MPS) for food-related welfare constructs:

Scale Purification and Validation Statistics

Table 2 reports reliability and related descriptive statistics for the sample. After pruning of the scale by testing the level of reliability, the constructs including safety, health and nutrition and taste had an alpha value exceeding 0.6 and other remaining six scales had an alpha value exceeding 0.5 or around 0.5. For all the scales, all seven items did not perform well. Only one scale, the health and nutrition construct had five items with satisfactory alpha values. Scales related to safety, ethical issues, choice, and where food comes from had four better performing items. Other remaining scales had only three better performing items.

Table 2 - Scale reliability and descriptive statistics for sample:

Scale	Number of Items	Cronbach Alpha	Mean Scale Score
1.Safety	4	0.651	3.71
2.Convenience	3	0.555	5.80
3.Health and nutrition	5	0.665	3.84
4.Cost	3	0.564	1.79
5.Taste	3	0.635	3.53
6.Ethical issues	4	0.500	3.46
7.Choice	4	0.530	4.78
8.Behavior of food companies	3	0.500	2.32
9.Where food comes from	4	0.500	5.89

Unidimensionality was tested for all purified items in each scale using principle axis factoring. All items in each purified scale loaded into a single factor having loadings exceeding 0.3. The Multi-Trait Multi-Method matrix was used to measure validity of each scale. The correlation coefficients for the corresponding multi-item scale and validity item were high compared to correlation coefficients for the non corresponding multi-item scale and validity item. So derived multi-item scales were valid measure of respective constructs.

Derivation of Consumer FRWI

Derived Mean Importance Score (MIS) and Mean Performance Score (MPS) were used to derive food-related welfare index (FRWI). The value of the welfare index indicates relative impact of each issue of a food system on consumer food-related welfare.

Table 3 presents the FRWI by location and gender, indicating the ranking of index. Regardless of gender and the area of living, convenience was the strongest issue that affects to the consumer food-related welfare in bakery food products. Especially impact of convenience was high on rural people than urban people. Choice, safety, taste and place of food production (i.e. where food comes from) were the other areas of food system that affect more on consumer food-related welfare regardless of area of living and gender. The impact of place of food production was high for urban people than rural people. Health and nutrition and behaviour of food companies did not show more effect on consumer food-related welfare. The factors: cost and ethical issues related to food production were the areas of bakery food system that had least impact on consumer food-related welfare regardless of gender and area of living.

Table 3 - Contribution of individual construct to weighted FRWI by gender and location:

Construct	Gender				Location			
	Male		Female		Urban		Rural	
	WI	R	WI	R	WI	R	WI	R
1.Safety	14	3	14	3	14	2	13	3
2.Convenience	22	1	21	1	18	1	25	1
3.Health and nutrition	8.8	6	9.6	6	9.7	5	8.9	5
4.Cost	6.2	8	5.5	8	6.0	8	5.8	8
5.Taste	11	4	12	4	13	4	11	4
6.Ethical issues	3.0	9	2.9	9	2.7	9	3.1	9
7.Choice	16	2	16	2	15	2	18	2
8.Behavior of food companies	6.5	7	6.7	7	6.9	7	6.4	7
9.Where food comes from	10	5	10	5	13	6	7.2	6

Table 4 presents the FRWI by level of education indicating the ranking of the index. There was a slight increase in contribution of factors such as health and nutrition and safety on food-related welfare when increasing the level of education.

Table 4 - Contribution of individual construct to weighted FRWI by level of education:

Construct	Education					
	Iry		IIry		IIIry	
	WI	R	WI	R	WI	R
1.Safety	13.7	3	14.3	3	14.3	3
2.Convenience	24.2	1	20.4	1	19.1	1
3.Health and nutrition	9.1	5	10.1	6	10.1	6
4.Cost	6.3	8	5.3	8	5.3	8
5.Taste	11.9	4	13.3	4	13.3	4
6.Ethical issues	3.0	9	2.6	9	2.6	9
7.Choice	16.9	2	15.4	2	15.4	2
8.Behavior of food companies	6.4	7	6.7	7	6.7	7
9.Where food comes from	8.5	6	13.1	5	13.1	5

Table 5 presents the FRWI by level of income indicating the ranking of the index. The location of food production had somewhat high impact on high income groups than low income groups. But the contribution of cost of purchasing of bakery products to the consumer food-related welfare did not show any different among income groups.

Table 5 - Contribution of individual construct to weighted FRWI by level of income:

Construct	Income					
	<7500		>7500		>15000	
	WI	R	WI	R	WI	R
1.Safety	13.7	3	13.5	3	13.5	3
2.Convenience	23.4	1	21.5	1	20.8	1
3.Health and nutrition	9.1	5	9.4	6	9.5	6
4.Cost	6.3	7	5.9	8	5.3	8
5.Taste	12.5	4	12.0	4	12.2	4
6.Ethical issues	3.1	9	2.9	9	2.8	9
7.Choice	17.0	2	16.5	2	16.7	2
8.Behavior of food companies	6.1	8	7.1	7	7.2	7
9.Where food comes from	8.7	6	11.2	5	12.1	5

CONCLUSIONS AND POLICY IMPLICATIONS

This study develops an index to measure consumer food-related welfare in bakery food system using multi-item summated scaling technique. The result suggests that convenience, choice, safety and taste have more impact on consumer food-related welfare. The factors: Cost, ethical issues related to food production and behaviour of food companies show low contribution to the consumer food-related welfare.

This information may be important for food manufacturers in bakery industry to assess whether they have targeted at important areas of food system and it may help to compete with other competitors. As well government can use this information to give priorities for most important areas of food system in policy making.

This study has some limitations. It was carried out using scale developed to measure food-related welfare in a whole food system in UK and US. So there may be other issues other than these nine constructs that affect on consumer food-related welfare of bakery food production sector in Sri Lanka. As well there may be new items that can be included into scales of each constructs. So this study further can be carried out by developing a new scale specific to bakery food production sector. As well the importance of each construct was measured using a single statement. As further improvement a multi-item summated scale can be developed to measure importance of each construct.

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