Journal of Agribusiness Marketing • Vol. 3 (2010): 1-19

ESSENTIAL QUALITY ATTRIBUTES IN FRESH PRODUCE PURCHASE BY MALAYSIAN CONSUMERS

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ABSTRACT

Product attribute is one of the most important criteria in consumers' purchase decision making. This study examines consumers' perceptions on the essential quality attributes of fresh produce. For this purpose, 1,562 usable responses were analysed. Findings show that quality product attributes such as absence of defect, absence of blemishes, ripeness, freshness, absence of pesticides, absence of preservatives, nutritional value and cleanliness are consistently rated as important for both fruits and vegetables.

Keywords: Purchasing behaviour, fresh produce, product attributes, Malaysia

INTRODUCTION

We are witnessing the growth of food consumption all over the world, including in the rapidly developing Asian countries. In major cities of Asia, food consumption has expanded and diversified drastically. This trend is mainly attributed to high population growth, considerable enhancement of household income, and drastic changes in lifestyle due to rapid urbanisation (Ishida et al., 2003). Products such as fresh produce, especially fruits and vegetables are seeing an increase in demand to meet the needs and preference of the consumers. In the Malaysian Third National Agricultural Policy, it is predicted that per capita consumption of fruits and vegetables will increase by 1.8% per annum, for the 1998-2010 period (Ministry of Agriculture Malaysia, 1999). Based on the increase in consumption and production, the Malaysian Government has now placed high priority on the vegetable industry in its National Agricultural Policy. While there is an increasing percentage of fresh produce from local producers, there has also been an increase of imported fresh produce. The demand for fresh produce has been steadily increasing and this indicates the potential for production and marketing of fresh produce in Malaysia.

Fresh produce is associated frequently with commodity, however, the latest trend in consumer behaviour indicates the need for changes in how fresh produce is distributed to final users. Due to the dynamic nature of consumers who are now more educated and possess higher disposable income, there is an increasing demand for convenience, safety and health among urban dwellers.

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The study by Reardon et al. (2003) concluded that there is a need for assurance of various product attributes in order to meet customers' demands. Findings from many developing countries have shown that supermarkets are becoming a popular retail outlet. According to Reardon et al. (2003), these supermarkets are demanding expansion of product choices, attribute consistency over transactions, year-round availability and especially the standard for quality and safety of food products. Ruben et al. (2007) also found that more and more supermarkets in Asia are demanding growers to improve product attributes such as quality, safety and freshness.

Govindasamy et al. (1997) found that freshness, taste/flavour, cleanliness, health value and absence of pesticides were among the most important characteristics of fresh produce, whereas locally grown fresh produce and the country of origin were among the least important characteristics.

Quality judgements are largely influenced by product itself (Silayoi & Speece, 2004). For example, consumers may ascertain product quality by screening product appearance. Some consumers will assume that the product is of high quality if the package is of high quality. *Vice versa*, if the consumers have negative information on the product package, then they will transfer low quality perception to the product itself.

Fatimah et al. (2007) reported that the market demand for tropical fruits is encouraging, in particular at the regional and international levels. In many developing economies, the improvement in economic well-being is being translated into a higher demand for healthier and more convenient products such as fruits, processed fruits and nut products, ready-to-serve and ultra-fresh fruits, canned products and juices. Although fruits and vegetables now claim a significant share of world agricultural trade, there seems to be minimal research on the global patterns and dynamics of this trade (Huang, 2004). The category "fruits and vegetables" encompasses a great variety of commodities, each with its own characteristics and institutions.

With the emergence of more modern retail outlets, consumers have more and better choices in terms of where to make a purchase. Since retailers compete in terms of product assortment strategy, the quality of products available in retail outlets has also improved. If the produce is available but the attributes do not meet consumers' preference, the produce will be rotten. For example, according to Cadilhon et al. (2003), it is important for the growers to reduce the usage of chemicals in order to ensure higher food safety standard as part of essential product attributes.

The understanding of consumer purchase behaviour with regards to fresh produce is important because this information will help producers grow the most demanded produce and retailers can carry and promote products more effectively.

This study is designed to quantify empirically consumer perceptions on the importance of product attributes, with the view to gain a better understanding of factors influencing consumer's purchasing behaviour in Malaysia. Specifically, this study investigates what

the consumer perception on the four important product attributes (quality, value-added, price, and country of origin) for fruits and vegetables are. However, for this paper, the researchers discussed only the quality attributes in influencing the purchase of fresh produce.

LITERATURE REVIEW

Food purchasing is increasingly characterised by higher levels of involvement with extensive evaluations of goods on numerous attributes. Previous research conducted by Abbot (1999) revealed that product attributes such as "natural", "healthy" and "absence of harmful substances" are considered the most important food product attributes. Product "freshness", "quality", "taste" and "health" are also found to be the main motivations of consumers to choose fresh fruit and vegetables.

Product attributes are those features of a product meeting consumer needs. The term 'characteristics' is mainly used in the food science literature, whereas the term attributes is more prominent in the consumer behaviour literature, although sometimes both terms are used interchangeably in the literature. At the point of purchase, consumers need quality indicators or quality cues to be able to evaluate the quality of a product. A quality cue is defined as all informational stimuli available to the consumer prior to consumption (Steenkamp & van Trijp, 1996). These quality cues or indicators can be either intrinsic or extrinsic. While intrinsic cues are part of the physical product, extrinsic cues are only related to the physical product. Espejel et al. (2007) in their study on the role of intrinsic and extrinsic quality attributes on consumer behaviour for traditional food products, stated that intrinsic attributes include colour, marbling and fat content and that of the well-known extrinsic quality cues are country of origin, brand name, price and store name.

Abbot (1999) defined the term quality as the degree of excellence of a product or its suitability for a particular use. She described quality as a human construct comprising many properties and characteristics. According to her, the quality of produce encompasses sensory properties (appearance, texture, taste and aroma), nutritive values, chemical constituents, mechanical properties, functional properties and defects. Since fruits and vegetables are perishable, the quality of fruit and vegetable changes as these products are passed along the distribution chain. On the other hand, the perspective of handlers or consumers depends on their position in this distribution chain as well as their personal tastes (Schewfelt, 1998). It is well-documented that product attributes have different influence on different types of consumers. Blackwell et al. (2006) referred the attributes that are the most important to consumers as salient attributes. These salient attributes such as choice criteria, become determinant attributes when they directly influence buyer's choice.

Opara's (2000) definition of the quality of agricultural products is quite comprehensive in that it includes all of the attributes, characteristics, and features of a product that the buyer, purchaser, consumer, or user expects. Szybillo and Jacoby (1974) stated that attributes

may be classified into those that are intrinsic or extrinsic to the product, and those that are revealed or hidden to the buyer. Intrinsic attributes are defined as those inherent in the product, such as taste or colour of an apple, which, if changed, would result in a change to the product itself. On the other hand, extrinsic attributes are defined as those that are independent of the product, such as price or brand.

Among the most studied attributes of agricultural produce are food safety, nutrition, value, package and production process. These attributes are later broken down into specific quality attributes such as taste, appearance, size under the attribute value or physical; pesticide, food additives under food safety attributes; and vitamins and minerals under nutrition attributes. Caswell (2000) developed a table, listing five quality attributes of organic and conventionally produced food products (Table 1).

Table 1: Quality Attributes

Quality Attribute	Examples
Food safety attributes	Food borne pathogens Heavy metals Pesticide residues Food additives Naturally occurring toxins Veterinary residues
Nutrition attributes	Fat Calories Fibre Sodium Vitamins Minerals
Value attributes	Purity Compositional integrity Size Appearance Taste Convenience of preparation
Package attributes	Package materials Labelling Other information provided
Production process attributes	Animal welfare Genetic modification Environmental impact Pesticide use Worker safety

Source: Adopted from Caswell, J.A. (2000).

A study by Cunningham (2002) found that Canadian consumers rank taste (93%), nutrition and health (89%), ease of preparation (68%), preparation time (66%), and price (62) as key considerations. Another study conducted by Demeritt (2002) concluded that respondents rated health/nutrition (66%), taste (38%), food safety (30%), environment (26%), availability (16%), price (16%), appearance (12%) and family (11%) as factors that influenced organic choices. Groff et al. (1993) found that key factors affecting consumer preferences were freshness, healthiness, flavour, nutrition, safety, appearance, price, environmental effect, certification, where it is grown, and brand. In a study by The Packer (2001), it was concluded that 65% of respondents were concerned about chemical residues on fresh produce. Taste was the main food quality attribute that affected consumer's preference. In another study, Wolf (2002) found that attributes that were very desirable or extremely desirable to consumers included fresh looking, fresh tasting, high quality, seedless, good value, reasonably priced, "healthy for me", high nutrition, looks sweet, free of insects, sale priced, and free of pesticides.

Another product attribute is brand. Some fresh produce are branded and consumers may perceive these brands to be of value. Some examples of fresh produce brands are Dole and Sunkist from the US and Malaysia's Best from Malaysia. However, brands are relatively uncommon with fresh fruits and vegetables, compared to most grocery products. In his study of Australia fresh fruits and vegetables, Pearson (2003) concluded that most fresh fruits and vegetables are unbranded.

Findings of a study by Brunso and Grunert (1998) have shown that consumers are found to be different in terms of their eating lifestyle and ways of shopping. The French and British respondents rated importance of product information and price criterion close to each other compared with the Danish. In a different study, Shim et al. (2001) developed a fruit-specific lifestyle segment, comprising: fruit opinion leadership, safety conscious, external information seeking, quality/novelty seeking, aesthetic orientation, open market advocate, price consciousness, homemaker use, eclectic fruit use, egocentric/origin orientation, consumer ethnocentric orientation, and gift-giving orientation. Findings of this study show that customers can be grouped according to how they consume fresh produce. For example, there is a group of customers who find that the purchase and consumption of fresh produce is something special and thus treat it differently from the group of customers who purchase and consume fresh produce on a daily basis.

MATERIALS AND METHODS

The instrument for the study is in the form of a structured questionnaire. The instrument was set in Bahasa Malaysia and English, using back-to-back translation. The questionnaire used in this study has been adapted from questions developed in other similar studies. Consumer behaviour is measured by respondents' perception of product attributes' importance when purchasing fresh produce. The essentials of product attributes importance are divided into four: quality, value-added, country of origin and price.

Quality attributes are represented by colour, absence of defects, absence of blemishes, freshness, ripeness, sweetness, nutritional values, flavours, absence of pesticides, absence of preservative, cleanliness and naturally ripened. Value-added attributes comprise four items: cleaned, pre-cut, ready to cook, ready to eat, labelling and organically grown. Country of origin attributes comprises two items: country of origin and locally grown. Price attributes include availability of promotion, price bargaining, and reasonable price.

The review of literature has revealed several studies on quality of products from various perspectives. This has included Demeritt (2002) and Groff et al. (1993) who focused on factors that influenced choice of organic product as well as Caswell (2000) who focused on organics and conventionally produced food products. However, we have found that only Govindasamy et al. (1997) conducted a similar research focusing on specific quality attributes of fresh produce. Therefore, this study adopted the quality attributes from Govindasamy et al. (1997).

Based on Govindasamy et al. (1997) and Shim et al. (2001), 32 statements of product attributes for fruits and 33 statements for vegetables were developed. To avoid middle scale answers, respondents were asked to rank on an ordered scale of 1 to 4, 1 being very unimportant and 4 very important. This scale was used because it examined how strongly the respondents agree or disagree with statements developed in the questionnaire. In the last section, demographic, eleven questions were asked about respondents' background. Screening questions such as "Have you purchased any kinds of fruits/vegetables in the past two months?" and "Are you a local resident?" were used to select respondents; those who did not fulfil the screening requirement of the questions were dropped from the study. A pilot study was conducted before the actual survey.

Respondents were contacted through door-to-door survey and store-intercept. To determine the sample size, several factors have been taken into consideration. These include statistical requirement, time constraint, financial capability and data collection method. After considering these factors, it was determined that a sample of 1,850 respondents would allow the appropriate analysis to be undertaken. In addition, Malhotra (2007) and Tull and Hawkins (1990) suggest that a typical range of sample size for consumer research is 1,000-2,500.

Purposive sampling method was used to select the respondents. Klang Valley and six capital cities were selected to represent urban areas of Malaysia, namely Northern zone, Souhtern zone, Central zone, Eastern zone, Sabah and Sarawak. The cities were: Klang Valley, Johor Bahru, Kuantan, Pulau Pinang, Alor Star, Kota Kinabalu and Kuching. Three hundred and fifty respondents each were selected from bigger cities such as Penang, Johor Bahru and Klang Valley. Two hundred respondents each were selected from Alor Star, Kuantan, Kota Kinabalu and Kuching. The number of respondents was based on the quota that was set by the researchers. Samples were selected from residential areas or home of different types (terraced houses, apartments and bungalows) with various types of food/grocery retail outlets available (hypermarkets, department stores, supermarkets,

sundry shops, wet markets, mobile outlets and street sales). Respondents were also chosen to resemble the various demographic dimensions (age, education, gender, household size, household income, occupation and state). A total of 1,562 usable responses was analysed. For the purpose of this paper, we only reported results of one of the product attributes, i.e. the quality attribute.

RESULTS AND DISCUSSION

Statistical software SPSS Version 14 was used for data analysis. The main focus of the statistical analysis in this study was to determine the product attributes' importance in purchasing fresh produce. In the current study, 1,562 respondents were included in the analysis which satisfies the requirement for parametric statistics. Based on the objectives of the study, descriptive analysis was employed. The reliability test of the instrument used in this study received acceptable reliability level of alpha coefficients (above 0.6).

Purchase of Fresh Produce

In the questionnaire, we listed seven types of fruits. However, respondents were asked to choose only one fruit to refer to when answering the questionnaire. This was because we wanted to analyse the quality attributes of a particular type of fruits at a time. We also listed four attributes (quality, value-added, price, country of origin). However, for this paper, we have reported only the quality attributes. Data on the type of fresh produce purchased by respondents was analysed descriptively.

From 1,562 respondents, 235 or 15.0% of respondents chose papaya, 361 or 22.4% chose banana, 60 or 3.8% chose pitaya (dragon fruit), 364 or 22.4% chose watermelon, 167 or 10.7% chose honeydew, 284 or 18.2% chose mango, and 91 or 5.8% of respondents selected pineapple as the fruit that they refer to when answering the questions on product attributes (Figure 1).

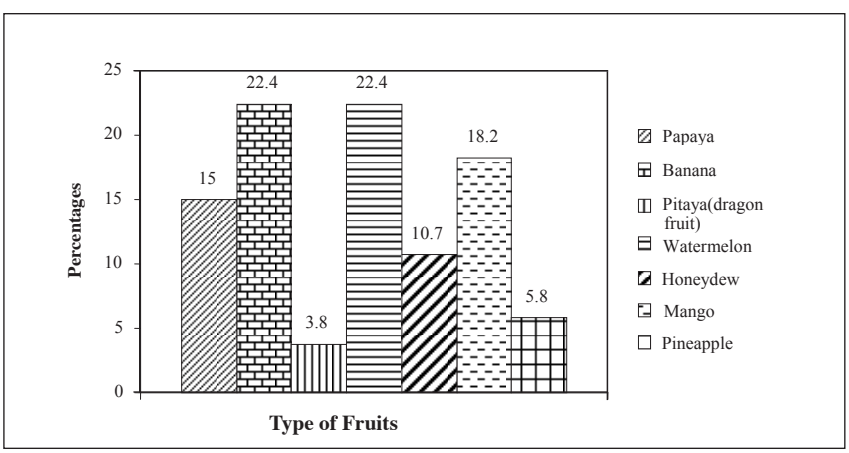

Figure 1: Respondents' Choice of Fruits

Product Attributes (Quality Attributes) for Fruit (Watermelon and Banana)

The findings reported in this paper show only the quality attributes for two types of fruits. The objective of the analysis is to identify specific factor for specific type of fruit. The researchers compare only the top two fruits chosen by the respondents as a basis for answering the questionnaire. The fruits are watermelon and banana. Therefore, the attributes chosen by respondents refer to the attributes of that specific fruit (watermelon or banana) only. Responses by those respondents who answer the questionnaire based on other type of fruits such as papaya, pitaya and others are not shown in this paper.

A total of 364 respondents answered the questionnaire based on their chosen fruit, i.e. watermelon. In terms of quality attributes for watermelon, not even 30 percent of the respondents consider sourness as an important attribute. More than 90% of respondents who answered for watermelon indicated that these quality attributes are important when they are purchasing watermelon. The quality attributes are: absence of defects, absence of blemishes, freshness, ripeness, sweetness, nutritional values, flavours, absence of pesticides, absence of preservative, cleanliness and naturally ripened. Between 70 to 90 percent of respondents have stated that size, weight, shape, colour, succulence and juiciness are important quality of watermelon (refer to Table 2).

Table 2: Product Attributes (Quality Attributes) for Fruit (Watermelon)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total All
	n	%	n	%	%	n	%	N	%	%	N
Size	9	2.5	48	13.2	**15.7**	218	59.9	89	24.5	**84.4**	**364**
Weight	10	2.7	87	23.9	**26.6**	194	53.3	73	20.1	**73.4**	**364**
Shape	7	1.9	50	13.7	**15.6**	219	60.2	88	24.2	**84.4**	**364**
Colour	3	0.8	47	12.9	**13.7**	205	56.3	109	29.9	**86.2**	**364**
Gloss	30	8.2	119	32.7	**40.9**	142	39	73	20.1	**59.1**	**364**
Absence of defect	3	0.8	8	2.2	**3**	114	31.3	239	65.7	**97.0**	**364**
Absence of blemishes	3	0.8	13	3.6	**4.4**	111	30.5	237	65.1	**95.6**	**364**
Succulence	23	6.3	49	13.5	**19.8**	179	49.2	113	31	**80.2**	**364**
Crispness	41	11.3	111	30.5	**41.8**	135	37.1	77	21.2	**58.3**	**364**
Juiciness	3	0.8	60	16.5	**17.3**	157	43.1	144	39.6	**82.7**	**364**
Freshness	3	0.8	7	1.9	**2.7**	130	35.7	224	61.5	**97.2**	**364**
Ripeness	0	0	10	2.7	**2.7**	157	43.1	197	54.1	**97.2**	**364**
Sweetness	4	1.1	9	2.5	**3.6**	134	36.8	217	59.6	**96.4**	**364**
Sourness	139	38.2	120	33	**71.2**	67	18.4	38	10.4	**28.8**	**364**
Aroma	66	18.1	89	24.5	**42.6**	135	37.1	74	20.3	**57.4**	**364**
Flavours	6	1.6	8	2.2	**3.8**	157	43.1	193	53	**96.1**	**364**
Nutritional value	1	0.3	14	3.8	**4.1**	132	36.3	217	59.6	**95.9**	**364**
Absence of pesticides	1	0.3	19	5.2	**5.5**	111	30.5	233	64	**94.5**	**364**
Absence of preservative	2	0.5	16	4.4	**4.9**	117	32.1	229	62.9	**95.0**	**364**
Cleanliness	3	0.8	9	2.5	**3.3**	104	28.6	248	68.1	**96.7**	**364**
Naturally ripened	2	0.5	8	2.2	**2.7**	131	36	223	61.3	**97.3**	**364**

A total of 316 respondents referred to banana when answering the questionnaire. More than 90% of respondents indicated that these quality attributes are important when buying banana: colour, absence of defect, absence of blemishes, freshness, ripeness, sweetness, flavours, nutritional value, absence of pesticides, absence of preservatives, cleanliness and naturally ripened. Between 70 to 90 percent of respondents have stated that size and shape are important when purchasing banana (refer to Table 3).

Table 3: Product Attributes (Quality Attributes) for Fruit (Banana)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total All
	n	%	n	%	%	n	%	n	%	%	N
Size	14	3.9	61	16.9	**20.8**	198	54.8	88	24.4	**79.2**	**316**
Weight	19	5.3	125	34.6	**39.9**	175	48.5	42	11.6	**60.1**	**316**
Shape	8	2.2	51	14.1	**16.3**	221	61.2	81	22.4	**83.6**	**316**
Colour	0	0	27	7.5	**7.5**	187	51.8	147	40.7	**92.5**	**316**
Gloss	31	8.6	98	27.1	**35.7**	155	42.9	77	21.3	**64.2**	**316**
Absence of defect	2	0.6	3	0.8	**1.4**	102	28.3	254	70.4	**98.7**	**316**
Absence of blemishes	3	0.8	6	1.7	**2.5**	104	28.8	248	68.7	**97.5**	**316**
Succulence	115	31.9	109	30.2	**62.1**	95	26.3	42	11.6	**37.9**	**316**
Crispness	128	35.5	139	38.5	**74**	65	18	29	8	**26.0**	**316**
Juiciness	93	25.8	125	34.6	**60.4**	87	24.1	56	15.5	**39.6**	**316**
Freshness	4	1.1	8	2.2	**3.3**	126	34.9	223	61.8	**96.7**	**316**
Ripeness	2	0.6	8	2.2	**2.8**	131	36.3	220	60.9	**97.2**	**316**
Sweetness	11	3	17	4.7	**7.7**	114	31.6	219	60.7	**92.3**	**316**
Sourness	170	47.1	101	28	**75.1**	57	15.8	33	9.1	**24.9**	**316**
Aroma	108	29.9	52	14.4	**44.3**	129	35.7	72	19.9	**55.6**	**316**
Flavours	8	2.2	10	2.8	**5**	119	33	224	62	**95.0**	**316**
Nutritional value	4	1.1	11	3	**4.1**	107	29.6	239	66.2	**95.8**	**316**
Absence of pesticides	3	0.8	15	4.2	**5**	80	22.2	263	72.9	**95.1**	**316**
Absence of preservative	4	1.1	16	4.4	**5.5**	96	26.6	245	67.9	**94.5**	**316**
Cleanliness	3	0.8	8	2.2	**3**	95	26.3	255	70.6	**96.9**	**316**
Naturally ripened	3	0.8	13	3.6	**4.4**	100	27.7	245	67.9	**95.6**	**316**

Product Attributes (Quality Attributes) for Leafy Vegetables (Mustard and Cabbage)

In the questionnaire, we listed four types of leafy vegetables (mustard, spinach, cabbage and convolvulus). However, respondents were asked to choose only one leafy vegetable to refer to when answering the questionnaire. This was to enable us to analyse product attribute according to specific produce. We also listed four attributes (quality, value-added, price, country of origin). However, for this paper, we have reported only the quality attributes. This is because we wanted to analyse the quality attributes of a particular type of leafy vegetable at a time. Data on the type of fresh produce purchased by respondents was analysed descriptively.

The findings reported in this paper have shown only the quality attributes for two types of leafy vegetables. The objective of the analysis is to identify specific factor for specific

type of vegetables. Therefore, the attributes chosen by respondents refer to the attributes of that specific vegetable (mustard or cabbage) only. Responses by those respondents who answered the questionnaire based on other type of leafy vegetables such as convolvulus and spinach are not shown in this article.

From 1,562 respondents, 518 or 33.5% of respondents chose mustard, 301 or 19.3% chose spinach, 397 or 25.4% chose cabbage and 346 or 22.2% respondents selected convolvulus when answering the questions on product attributes (refer to Figure 2).

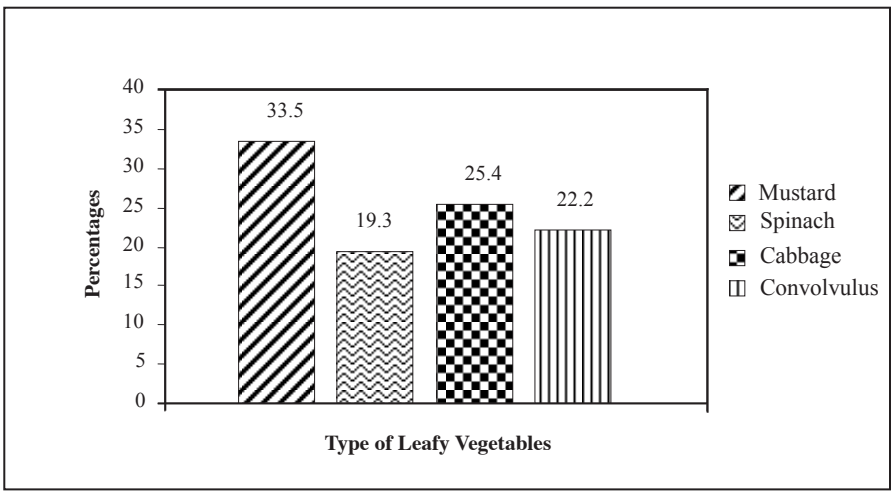

Figure 2: Respondents' Choice of Leafy Vegetables

From the 1,562 respondents, a total of 316 respondents answered the questionnaire based on their chosen leafy vegetable (mustard). More than 90% of respondents stated that the following quality attributes are important for mustard: colour, absence of defect, absence of blemishes, freshness, ripeness, flavour, nutritional value, absence of pesticides, absence of preservatives, cleanliness and naturally ripened. Between 70 to 90 percent have also indicated that shape is also important (refer to Table 4).

Table 4: Product Attributes (Quality Attributes) for Leafy Vegetable (Mustard)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total All
	n	%	N	%	%	n	%	n	%	%	N
Size	15	2.9	117	22.6	**25.5**	231	44.6	155	29.9	**74.5**	**518**
Weight	19	3.7	192	37.1	**40.8**	223	43.1	84	16.2	**59.3**	**518**
Shape	11	2.1	86	16.6	**18.7**	274	52.9	147	28.4	**81.3**	**518**
Colour	5	1	27	5.2	**6.2**	277	53.5	209	40.3	**93.8**	**518**
Gloss	37	7.1	150	29	**36.1**	185	35.7	146	28.2	**63.9**	**518**
Absence of defect	1	0.2	25	4.8	**5**	165	31.9	327	63.1	**95.0**	**518**
Absence of blemishes	5	1	24	4.6	**5.6**	172	33.2	317	61.2	**94.4**	**518**
Succulence	144	27.8	159	30.7	**58.5**	153	29.5	62	12	**41.5**	**518**

Table 4 (Continued)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total All
	n	%	N	%	%	n	%	n	%	%	N
Juiciness	156	30.1	198	38.2	**68.3**	101	19.5	63	12.2	**31.7**	**518**
Freshness	6	1.2	9	1.7	**2.9**	167	32.2	336	64.9	**97.1**	**518**
Ripeness	9	1.7	26	5	**6.7**	197	38	286	55.2	**93.2**	**518**
Sweetness	145	28	133	25.7	**53.7**	143	27.6	97	18.7	**46.3**	**518**
Sourness	204	39.4	197	38	**77.4**	81	15.6	36	6.9	**22.5**	**518**
Bitterness	185	35.7	184	35.5	**71.2**	105	20.3	44	8.5	**28.8**	**518**
Aroma	133	25.7	133	25.7	**51.4**	171	33	81	15.6	**48.6**	**518**
Flavours	10	1.9	27	5.2	**7.1**	224	43.2	257	49.6	**92.8**	**518**
Nutritional value	3	0.6	17	3.3	**3.9**	176	34	322	62.2	**96.2**	**518**
Absence of pesticides	1	0.2	27	5.2	**5.4**	140	27	350	67.6	**94.6**	**518**
Absence of preservative	3	0.6	29	5.6	**6.2**	133	25.7	353	68.1	**93.8**	**518**
Cleanliness	1	0.2	11	2.1	**2.3**	157	30.3	349	67.4	**97.7**	**518**
Naturally ripened	7	1.4	18	3.5	**4.9**	167	32.2	326	62.9	**95.1**	**518**

From 1,562 respondents, a total of 397 respondents answered the questionnaire based on their chosen leafy vegetable (cabbage). For cabbage, more than 90% of respondents stated that the quality attributes that are important include: colour, absence of defect, absence of blemishes, freshness, ripeness, flavour, nutritional value, absence of pesticides, absence of preservatives, cleanliness and naturally ripened. Between 70 to 90 percent of the respondents indicated that size and shape are also important (refer to Table 5).

Table 5: Product Attributes (Quality Attributes) for Leafy Vegetable (Cabbage)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total All
	n	%	N	%	%	n	%	n	%	%	N
Size	3	0.8	58	14.6	**15.4**	234	58.9	102	25.7	**84.6**	**397**
Weight	8	2	116	29.2	**31.2**	194	48.9	79	19.9	**68.8**	**397**
Shape	3	0.8	57	14.4	**15.2**	245	61.7	92	23.2	**84.9**	**397**
Colour	5	1.3	30	7.6	**8.9**	264	66.5	98	24.7	**91.2**	**397**
Gloss	43	10.8	121	30.5	**41.3**	162	40.8	71	17.9	**58.7**	**397**
Absence of defect	1	0.3	14	3.5	**3.8**	123	31	259	65.2	**96.2**	**397**
Absence of blemishes	1	0.3	16	4	**4.3**	121	30.5	259	65.2	**95.7**	**397**
Succulence	59	14.9	127	32	**46.9**	150	37.8	61	15.4	**53.2**	**397**
Crispness	46	11.6	99	24.9	**36.5**	175	44.1	77	19.4	**63.5**	**397**
Juiciness	67	16.9	141	35.5	**52.4**	131	33	58	14.6	**47.6**	**397**
Freshness	2	0.5	9	2.3	**2.8**	173	43.6	213	53.7	**97.3**	**397**
Ripeness	4	1	18	4.5	**5.5**	195	49.1	180	45.3	**94.4**	**397**
Sweetness	49	12.3	128	32.2	**44.5**	138	34.8	82	20.7	**55.5**	**397**
Sourness	102	25.7	184	46.3	**72**	81	20.4	30	7.6	**28.0**	**397**
Bitterness	101	25.4	164	41.3	**66.7**	96	24.2	36	9.1	**33.3**	**397**
Aroma	39	9.8	147	37	**46.8**	142	35.8	69	17.4	**53.2**	**397**
Flavours	6	1.5	25	6.3	**7.8**	214	53.9	152	38.3	**92.2**	**397**

Table 5 (Continued)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total All
	n	%	N	%	%	n	%	n	%	%	N
Absence of pesticides	4	1	15	3.8	**4.8**	129	32.5	249	62.7	**95.2**	**397**
Absence of preservative	4	1	13	3.3	**4.3**	134	33.8	246	62	**95.8**	**397**
Cleanliness	1	0.3	8	2	**2.3**	140	35.3	248	62.5	**97.8**	**397**
Naturally ripened	5	1.3	14	3.5	**4.8**	152	38.3	226	56.9	**95.2**	**397**

Product Attributes (Quality Attributes) for Non-leafy Vegetables (Tomato and Long Bean)

In the questionnaire, we listed thirteen types of non-leafy vegetables (lady's finger, capsicum, tomato, long bean, sweet potato, egg plant, chilly, loofah, long bean, cucumber, pumpkin, sweet corn and french bean). However, respondents were asked to choose only one non-leafy vegetable to refer to when answering the questionnaire. We have also listed four product attributes (quality, value-added, price and country of origin). For the purpose of this paper, we have reported only the quality attributes. This is because we wanted to analyse the quality attributes of a particular type of non-leafy vegetables at a time. Data on the type of fresh produce purchased by respondents was analysed descriptively.

The findings reported in this paper have shown only the quality attributes for two types of non-leafy vegetables. The objective of the analysis is to identify specific factor for specific type of non-leafy vegetables. Therefore, the attributes chosen by respondents refer to the attributes of that specific non-leafy vegetable (tomato or long bean) only. Responses by those respondents who answered the questionnaire based on other type of non-leafy vegetables such as sweet potato, capsicum, pumpkin, etc. are not shown in this paper.

For non-leafy vegetables, respondents were asked to choose only one out of 13 types of non-leafy vegetables. From the total of 1,562 responses, the respondents' choices are as follows: 172 or 11% chose lady's finger, 13 or 0.8% chose capsicum, 59 or 3.8% chose egg plant, 103 or 6.6% chose long bean/plant, 81 or 5.2% chose pumpkin, 134 or 8.6% chose sweet corn, 298 or 19.1% chose tomato, 161 or 10.3% chose chilli, 168 or 10.8% chose cucumber, 192 or 12.3% chose long bean, 94 or 6.0% chose French bean, 37 or 2.4% chose sweet potato and 49 or 3.1% chose loofah (refer to Figure 3).

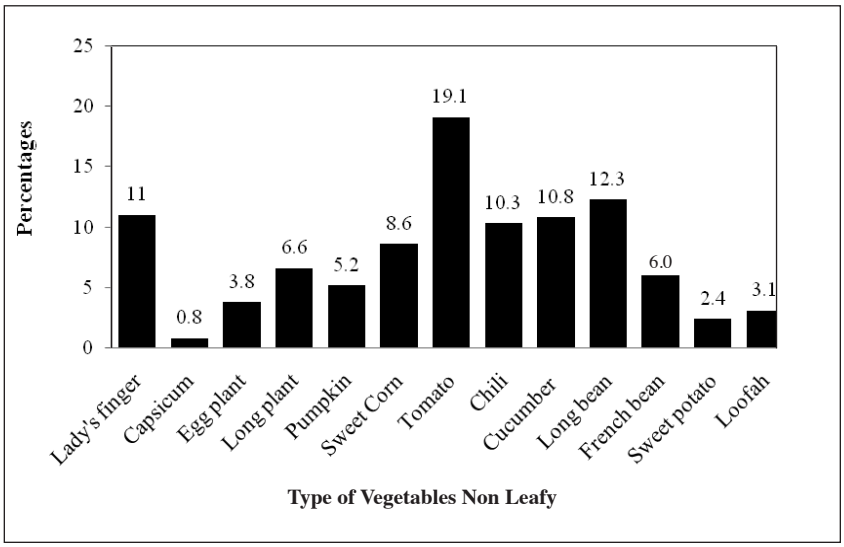

Figure 3: Respondents' Choice of Non Leafy Vegetables

For the purpose of this paper, the researchers have compared only the top two non-leafy vegetables chosen by the respondents as a basis for answering the questionnaire. The non-leafy vegetables are tomato and long bean.

Out of a total of 298 respondents who answered for tomato, more than 90% of respondents indicated that shape, colour, absence of defect, absence of blemishes, freshness, ripeness, flavour, nutritional values, absence of pesticides, absence of preservative, cleanliness and naturally ripened are important. Between 70 to 90 percent of respondents indicated that size and gloss are also important (refer to Table 6).

Table 6: Product Attributes (Quality Attributes) for Non-leafy Vegetable (Tomato)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total
	n	%	n	%	%	n	%	n	%	%	N
Size	6	2	40	13.4	**15.4**	182	61.1	70	23.5	**84.6**	**298**
Weight	9	3	111	37.2	**40.2**	121	40.6	57	19.1	**59.7**	**298**
Shape	2	0.7	25	8.4	**9.1**	186	62.4	85	28.5	**90.9**	**298**
Colour	3	1	14	4.7	**5.7**	183	61.4	98	32.9	**94.3**	**298**
Gloss	8	2.7	46	15.4	**18.1**	154	51.7	90	30.2	**81.9**	**298**
Absence of defect	0	0	6	2	**2**	101	33.9	191	64.1	**98.0**	**298**
Absence of blemishes	0	0	8	2.7	**2.7**	97	32.6	193	64.8	**97.4**	**298**
Succulence	28	9.4	64	21.5	**30.9**	143	48	63	21.1	**69.1**	**298**

Table 6 (Continued)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total
	n	%	n	%	%	n	%	n	%	%	N
Juiciness	32	10.7	94	31.5	**42.2**	110	36.9	62	20.8	**57.7**	**298**
Freshness	1	0.3	4	1.3	**1.6**	138	46.3	155	52	**98.3**	**298**
Ripeness	0	0	10	3.4	**3.4**	135	45.3	153	51.3	**96.6**	**298**
Sweetness	20	6.7	99	33.2	**39.9**	95	31.9	84	28.2	**60.1**	**298**
Sourness	31	10.4	69	23.2	**33.6**	141	47.3	57	19.1	**66.4**	**298**
Bitterness	96	32.2	112	37.6	**69.8**	55	18.5	35	11.7	**30.2**	**298**
Aroma	54	18.1	75	25.2	**43.3**	106	35.6	63	21.1	**56.7**	**298**
Flavours	0	0	12	4	**4**	158	53	128	43	**96.0**	**298**
Nutritional value	1	0.3	4	1.3	**1.6**	140	47	153	51.3	**98.3**	**298**
Absence of pesticides	5	1.7	7	2.3	**4**	111	37.2	175	58.7	**95.9**	**298**
Absence of preservative	4	1.3	8	2.7	**4**	115	38.6	171	57.4	**96.0**	**298**
Cleanliness	2	0.7	7	2.3	**3**	126	42.3	163	54.7	**97.0**	**298**
Naturally ripened	1	0.3	13	4.4	**4.7**	137	46	147	49.3	**95.3**	**298**

As for long bean, out of a total 192 respondents, more than 90% of respondents who have chosen long bean says that colour, absence of defect, absence of blemishes, freshness, ripeness, flavour, nutritional values, absence of pesticides, absence of preservative, cleanliness and naturally ripened are important. Between 70 to 90 percent of respondents have indicated that size and shape are also important (refer to Table 7).

Table 7: Product Attributes (Quality Attributes) for Non-leafy Vegetable (Long Bean)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total
	n	%	n	%	%	n	%	n	%	%	N
Size	5	2.6	33	17.2	**19.8**	103	53.6	51	26.6	**80.2**	**192**
Weight	3	1.6	70	36.5	**38.1**	84	43.8	35	18.2	**62.0**	**192**
Shape	3	1.6	33	17.2	**18.8**	105	54.7	51	26.6	**81.3**	**192**
Colour	0	0	13	6.8	**6.8**	105	54.7	74	38.5	**93.2**	**192**
Gloss	19	9.9	64	33.3	**43.2**	74	38.5	35	18.2	**56.7**	**192**
Absence of defect	1	0.5	4	2.1	**2.6**	64	33.3	123	64.1	**97.4**	**192**
Absence of blemishes	1	0.5	5	2.6	**3.1**	61	31.8	125	65.1	**96.9**	**192**
Succulence	74	38.5	55	28.6	**67.1**	44	22.9	19	9.9	**32.8**	**192**
Crispness	63	32.8	36	18.8	**51.6**	55	28.6	38	19.8	**48.4**	**192**
Juiciness	78	40.6	52	27.1	**67.7**	33	17.2	29	15.1	**32.3**	**192**
Freshness	2	1	4	2.1	**3.1**	67	34.9	119	62	**96.9**	**192**
Ripeness	2	1	9	4.7	**5.7**	77	40.1	104	54.2	**94.3**	**192**
Sweetness	71	37	44	22.9	**59.9**	41	21.4	36	18.8	**40.2**	**192**
Sourness	93	48.4	54	28.1	**76.5**	23	12	22	11.5	**23.5**	**192**
Bitterness	88	45.8	55	28.6	**74.4**	31	16.1	18	9.4	**25.5**	**192**
Aroma	68	35.4	50	26	**61.4**	44	22.9	30	15.6	**38.5**	**192**
Flavours	4	2.1	9	4.7	**6.8**	74	38.5	105	54.7	**93.2**	**192**
Nutritional value	1	0.5	8	4.2	**4.7**	70	36.5	113	58.9	**95.4**	**192**

Table 7 (Continued)

Quality	Very Unimportant		Unimportant		Total	Important		Very Important		Total	Total
	n	%	n	%	%	n	%	n	%	%	N
Absence of preservative	0	0	13	6.8	**6.8**	48	25	131	68.2	**93.2**	**192**
Cleanliness	1	0.5	4	2.1	**2.6**	60	31.3	127	66.1	**97.4**	**192**
Naturally ripened	0	0	8	4.2	**4.2**	61	31.8	123	64.1	**95.9**	**192**

Estimated Spending on Fruits and Vegetables

For the estimated spending on fresh produce, the following figures refer to all the seven types of fruits, four types of leafy vegetables and thirteen types of non-leafy vegetables. A total of 1,562 responses was analysed in this study. In terms of the purchase of fruits, 41.5% of respondents reported that they spend more than RM30 in a month. About 18% indicated that they spend between RM16-RM20 per month. Another 12.5 % of respondents spend between RM11-RM15, about 10% of respondents reported that they spend between RM21-RM25 and RM26-RM30 respectively. Only 6.9% of respondents indicated that they spend less than RM10 for fruits in a month (refer to Figure 4).

In terms of the purchase of vegetables, the response is as follows: 44.5% of respondents spend more than RM30 in a month, 13.6% of respondents spend RM16-RM20 per month, 12.2 % of respondents spend RM21-RM25, about 12% of respondents spend between RM26-RM30, 10.2% of respondents spend between RM11-RM15 and only 7.6% of respondents indicated that they spend less than RM10 for vegetables in a month (refer to Figure 4).

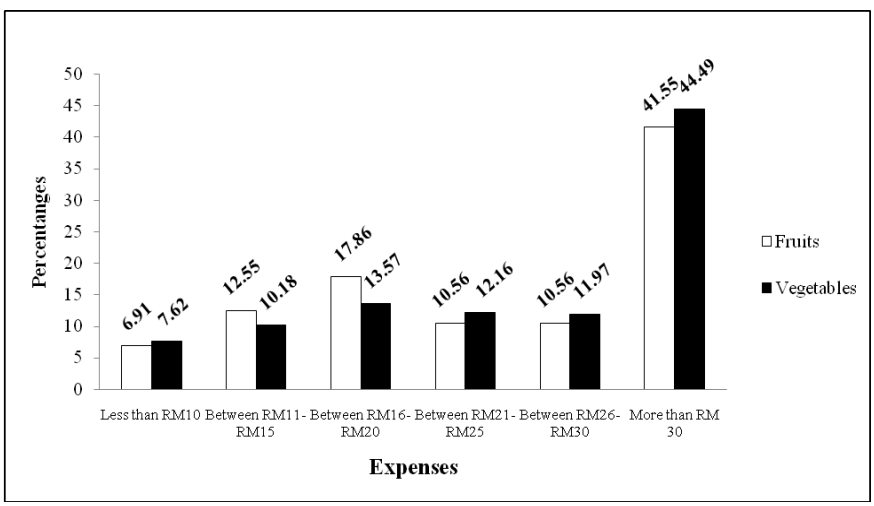

Figure 4: Expenses on Fruits and Vegetables in a Month

CONCLUSIONS

In general, the bigger issues surrounding the market for fruits and vegetables in Malaysia require the understanding of quality requirements of the local markets. The researchers are of the opinion that there is a need to develop a market understanding of which fruits and vegetables are the priority to the consumers. By doing so, it may lead to a competitive advantage for the farmers in Malaysia. This study has not looked into many other types of fruits (e.g. jackfruit and star fruit) and vegetables (e.g. mushrooms and herbs) which seem to be promising in the near future. We believe that some local fruits and vegetables that are available throughout the year have vast potential in the market. Thus, it is vital that the production of Malaysian fruits and vegetables be based upon objective quality criteria of the fresh produce. This includes the need to improve both on the yields and post-harvest management, and also the distribution channels to market in local and export markets.

In order for suppliers to gain support from retailers, farmers need to realise that quality of fresh produce is a very important attribute that is always required by customers. The research findings concluded that quality is an important product attribute for fresh produce shoppers in Malaysia. Quality attributes that are consistently rated as important for both fruits and vegetables include absence of defect, absence of blemishes, ripeness, freshness, absence of pesticides, absence of preservatives, nutritional value, and cleanliness.

As for the consumption of fresh produce, results showed that almost half of the respondents spend more than RM30 in a month. This may indicate a moderate to high consumption of fresh produce among consumers. Importantly, this creates opportunity for those involved in marketing fresh produce to promote the purchase of both vegetables and fruits. Positioning strategies require the identification of target customers and strategies that cater to the needs of that particular target market. For both producers and retailers, understanding consumers' needs, wants, and preferences on the selection of fresh produce can make or break a sale.

For future research, certain consumer demographic characteristics such as age and household income as important criteria on the behaviour of certain groups of consumers should be analysed.

Acknowledgement

The authors gratefully acknowledge the financial support from the Federal Agricultural Marketing Authority (FAMA). We would also like to thank the participating organisations and individuals for their support.

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