World Applied Sciences Journal 28 (12): 2054-2060, 2013
ISSN 1818-4952

DOI: 10.5829/idosi.wasj.2013.28.12.260

Eliciting Malaysian Consumer Preferences for Marine Fish Attributes by Using Conjoint Analysis

[1]I.A.H.. Ahmad Hanis, [2]S. Jinap, [3]S. Mad Nasir and [4]R. Alias

[1]Institute of Agricultural and Food Policy Studies, Putra Infoport,
Universiti Putra Malaysia, 43400, UPM Serdang, Selangor, Malaysia
[2]Faculty of Food Science and Technology,
Universiti Putra Malaysia, 43400, UPM Serdang, Selangor, Malaysia
[3]Faculty of Agriculture, Universiti Putra Malaysia, 43400,
UPM Serdang, Selangor, Malaysia
[4] Faculty of Economics and Management, Universiti Putra Malaysia,
43400, UPM Serdang, Selangor, Malaysia

Abstract: The study of consumer's preferences, taste and behaviour in the purchase of food products are of great importance for marketing strategy. As the Malaysian per capita income increases, consumers are expected to move to the higher level of their food intake, particularly in terms of attributes offered by food products. For instance, the affluent consumers demand for new food products, better quality, new packaging, more convenience, new delivery systems, safer and more nutritious foods and they are willing to pay for the demanded attributes. This study attempts to investigate the demand and willingness to pay for marine fish attributes by Malaysian consumers, using conjoint analysis. Based on the results from focus group survey, four attributes were chosen; freshness, packaging, location and price. Least squares regression was used to estimate part-worths for the conjoint analysis. The findings suggested that the most important attribute for marine fish was freshness, followed by packaging and location. Consumers were also willing to pay for the demanded attributes. The results found may encourage marketers to adjust their marketing efforts to consider the demanded attributes by consumers.

Key words: Attributes · Conjoint analysis · Consumer Preference · Freshness · Marine Fish · Willingness to Pay

INTRODUCTION

In recent years, there has been an increasing interest in studying the changes in food demand and consumption. The industrial-urban expansion has created new consumers who have relatively more purchasing power, health consciousness and who begin to demand more nutritional values for their food intake. The more affluent the consumers, the greater attention they will pay to quality of food products. This observation is also consistent with the results found earlier by [1], which indicated that Malaysian consumers are moving towards higher value and superior food as the per capita income increases and the level of affluence of Malaysian society rises. Moreover, with an increase in income, consumers will pay greater attention to quality, as well as healthy and safe food product [2].

In general, quality of food products is largely determined by individual preferences. Higher incomes would provide consumers with a freedom to make purchasing decisions based on factors other than meeting basic caloric needs. [3] suggested that consumers' food choices involve lots of factors such as sensory properties of the food itself, environmental, cultural and contextual influences. Several factors such as food-related expectations and attitudes, health claims, price, ethical

Corresponding Author: I.A.H.. Ahmad Hanis, Institute of Agricultural and Food Policy Studies, Putra Infoport, Universiti Putra Malaysia, 43400, UPM Serdang, Selangor, Malaysia.
Tel: +603 8947 1094, Fax: +603 8943 2611.

concerns and mood [4] have been identified as factors that influence consumers' food choice. On the other hand, [5] concluded that food attributes are one of the most important factors that affect consumers' decision-making while purchasing food products.

Having said that, understanding the relative importance of product attributes influencing food choice at the point of sale is important in satisfying consumer preferences and demands. These attributes will contribute, in differing proportions to the overall level of satisfaction derived from purchasing or consuming food products. However, demands for food attributes may vary from one food to another. To date, with respect to the important role of food attributes in influencing consumers' decision while purchasing food, the demand for food attributes have been studied in various countries. However, little is known about the demand for food attributes among consumers in Malaysia, particularly for fish products. This study therefore attempts to elicit the Malaysian consumer preferences for marine fish attributes by using Conjoint Analysis (CA).

MATERIALS AND METHODS

As Malaysian consumers' income increases, the demand for food products might change. The market has turned to a "consumer-oriented market", where preferences and demands for food products might no longer be food in their raw forms. In other words, it can be said that consumers value their food products based on the attributes they contain. Therefore, the study aimed to establish the importance of marine fish attributes that could be directly influenced by producers and retailers. In tandem with that, the study attempts to answer the following research questions:

- What is the most important attribute considered by Malaysian consumers while purchasing marine fish product;
- Which level of attributes constitutes the highest contribution for each attributes;
- What is the most ideal marine fish attributes (or combination of attributes) demanded by Malaysian consumers; and
- How much Malaysian consumers are willing to pay for the demanded attributes?

In order to answer all of the research questions listed, a method called "conjoint analysis" has been chosen. Conjoint analysis is one of the most widely technique used to determine consumers' preferences in marketing research. A number of studies have been performed by using different methods of conjoint analysis (for examples: [6-12]. The conjoint methodology is a decompositional approach to analyze consumer preferences structure. The theoretical framework of this study is based on Lancaster theory of demand where consumers derive utility from the attributes of the goods that satisfy consumer needs and wants. Conjoint analysis model measures consumers' trade-offs value among multi-attribute products or services. The following section will elaborates the steps to conduct conjoint analysis that include establishment of relevant attributes and levels, construction of product profiles, data collection and estimating part-worth utility.

Establishing Relevant Attributes and Level of Attributes: The first task in CA study is to establish the attributes and level of attributes to include in the actual questionnaire. A focus group session was used to identify the demanded attributes for marine fish products. Thirty three adult respondents participated in the focus group session, which are in various age, gender, ethnic and education level.

The advantages of focus group session are it allows interaction between all participants and the researcher and at the same time areas of specific interest can be covered in greater depth. The aim of focus group session was both to establish the factors that influence purchasing of marine fish and to gather information on the most commonly consumed marine fish which is suitable for use in the main CA study. There were six potential attributes (freshness, colour of gill, packaging, size, location and price) that could be selected by consumers. Respondents were asked to rank the six potential attributes based on their preferences. Based on the mean score for each attributes, four attributes were selected as the most four important attributes for marine fish, which are freshness, packaging, location and price. The profile of attributes that used in the study is as depicted in Table 1.

Construction of Marine Fish Profiles: Once the relevant attributes have been established, hypothetical marine fish profiles with different combinations of attributes were constructed. The combinations of attributes contained one level of attributes from each of the four attributes selected (freshness, packaging, location and price). Basically, the study gave rise to 24 possible profiles of marine fish attributes (2 x 2 x 2 x 3). However, it is unrealistic to ask individuals to rate the combination of

Table 1: Potential and Selected Attributes for Marine Fish

Potential Attributes to be Selected	Potential Level of Attributes to be Selected	Selected Attributes based on Focus Group Discussion	Selected Level of Attributes based on Focus Group Discussion
Freshness	Frozen Fresh	Freshness	Frozen Fresh
Colour of gill	Light red Red		
Packaging	Unpacked Packed	Packaging	Unpacked Packed
Size	Small Medium Large		
Location	Wet market Supermarket	Location	Wet market Supermarket
Price	No Increase 10% increase 20% increase 10% increase 20% increase 30% increase 40% increase 50% increase	Price	No Increase

Table 2: Profiles of Marine Fish Evaluated by Respondents

Profile*	Freshness	Packaging	Location	Price
1	Fresh	Packed	Supermarket	No increase
2	Fresh	Unpacked	Wet market	20% increase
3	Frozen	Packed	Supermarket	20% increase
4	Frozen	Unpacked	Supermarket	No increase
5	Frozen	Unpacked	Wet market	No increase

*Combinations of attributes for marine fish to be scored by respondents according to their preferences in the range one to ten (one is the least preferred and ten is the most preferred).

attributes with too many scenarios and it also could be very tiring and time consuming. A fractional factorial design was used to reduce the number of profiles to a manageable size. The total number of profiles of marine fish was successfully reduced to five. The marine fish profiles used is as illustrated in Table 2. Respondents rated the combinations of attributes in the scale of one to ten, with one being not preferred and ten being most preferred according to their preferences.

Data Collection: Throughout this study, 202 respondents from the capital cities of all states in Malaysia were interviewed by using convenience sampling. The target population was adults with the age are more than 18 years old. In terms of sampling, [13] suggested that traditional CA has no sample size requirements and could be utilized for single respondents; where the larger sample size enhances the reliability of the results and allows the researcher to make some generalizations. [14] suggested a minimum sample of 100 respondents in order to provide reliable estimates. For this study, the total number of respondents is considered sufficient enough as it meets the minimum requirement. The CA questions were then presented to respondents where respondents were asked to rate the profiles of marine fish in the range of one to ten (one is the least preferred and ten is the most preferred).

For the purpose of data analysis, researchers used dummy coding as it produces more reliable results (in terms of willingness to pay value) as compared to effect coding [15]. Based on rating score for each profiles, the conjoint analysis procedure calculates the contribution of each attribute to the respondent's preference. The contribution of the attribute level is termed as "part-worth utility". The part worth was estimated using OLS (Ordinary Least Squares) analysis, using Statistical Package for the Social Sciences (SPSS) software.

Table 3: Demographic Profiles of Respondents (%)

Demographic Factors		Percentage (n = 202)
Gender	Male	51.5
	Female	48.5
Group of Age (years old)	18-30	28.2
	31-40	14.4
	41-50	39.6
	51-60	16.8
	> 61	1.0
Range of Income (RM)	< 999	6.9
	1,000 - 1,999	21.8
	2,000 - 2,999	21.8
	3,000 - 3,999	17.8
	4,000 - 4,999	11.4
	> 5,000	20.3
Ethnic	Malay	68.8
	Chinese	11.9
	Indian	7.4
	Bumiputera Sabah and Sarawak	10.9
	Others	1.0
Employment	Government Sector	69.3
	Private Sector	17.3
	Unemployed	5.0
	Retiree	1.0
	Others	7.4
Education	Never Been	
	To School	1.0
	Primary School	3.5
	Secondary School	60.9
	University/ College	34.7

Table 4: Rating Score for Combinations of Marine Fish Attributes

		Percentage											
Profile	Combination of Attributes	1	2	3	4	5	6	7	8	9	10	Mean	Std. Dev.
1	Fresh, Packed, Supermarket and No increase in price.	2.0	3.0	2.0	4.0	8.9	8.9	9.4	19.8	10.4	31.7	7.62	2.38
2	Frozen, Unpacked, Supermarket and No increase in price.	5.4	5.0	6.4	6.9	20.8	10.4	13.4	10.9	8.9	11.9	6.08	2.55
3	Fresh, Unpacked, Wet Market and Price increase 20%.	5.9	6.4	5.0	8.4	20.3	13.9	12.9	14.4	5.0	7.9	5.81	2.43
4	Frozen, Unpacked, Supermarket and No increase in price.	6.9	7.4	5.9	7.9	21.3	13.9	9.9	12.4	7.4	6.9	5.65	2.50
5	Frozen, Packed, Supermarket and Price increase 20%.	13.4	8.9	10.9	9.9	27.7	13.4	7.4	5.0	1.0	2.5	4.48	2.21

RESULTS AND DISCUSSION

Demographic Profiles of Respondents: The distribution of demographic profiles of respondents is as illustrated in Table 4. Of the total respondents, 51.5% were male and 48.5% were female. The age of respondents were grouped into five categories; below 17 years old, 18 to 30 years old, 31-40, 41-50, 51-60 and more than 61 years old. Of these, the highest group according to the age range was 41-50 years old (39.6%), followed by 18-30 years old (28.2%), 51-60 years old (16.8%), 31-40 years old (14.4%) and above 61 years old (1%). Respondents' income was grouped into six categories, below RM1,000, RM1,000-RM1,999, RM2,000-RM2,999, RM3,000-RM3,999, RM4,000-RM4,999 and more than RM5,000. About 6.9% were from below RM1,000, 21.8% from RM1,000-RM1,999, 21.8% from RM2,000-RM2,999, 17.8% from RM3,000-RM3,999, 11.4% from RM4,000-RM4,999 and 20.3% from above RM5,000. The average income of respondents was about RM3,300. As for ethnicity, 68.8% were Malay, 11.9% were Chinese, 7.4% were Indian, 10.9% were Sabah and Sarawak Bumiputera and 1% was from other ethnics. In terms of respondents' employment, the category of employment was divided into five. The categories were; working with the government, private sector, unemployed, retired and others. About 69.3% were working with the government, 17.3% were working in private sector, 5% were unemployed, 1% was

retirees and 7.4% were others. For education level, majority of respondents have at least attended secondary school (60.9%).

Rating Score for Marine Fish Profiles: The study has constructed fifteen hypothetical marine fish profiles with different combinations of attributes deemed important to consumers. In the actual survey, 202 respondents were asked to rate the combination of sub-attributes accordance to their preference, between one to ten. Based on the mean score, we found that the combination of "fresh, packed, sold at supermarket and no increase in price" topped the list of the five marine fish profiles (mean score = 7.62). This is followed by the combination of "frozen, unpacked, sold at supermarket and no increase in price" (mean score = 6.08) and "fresh, unpacked, sold at wet market and price increase 20%" (mean score = 5.81). The distribution of rating score for other marine fish profiles is as shown in Table 4.

Relative Importance of Attribute for Marine Fish: This section presents the conjoint results. Briefly, the method computes the relative importance of scores for each attributes and measures consumers' trade-offs value among multi-attribute products or services. Basically, this section tries to answer the research question number (i), (ii) and (iii).

To answer research question (i), in terms of relative importance of marine fish attribute, we found that freshness topped the list of the major attribute considered by consumers (59.79%) (Table 5). Packaging was ranked second, (22.27%) and location was ranked third (17.94%).

As for research question (ii), on the level of freshness, this study found that frozen marine fish was not preferred as the utility value calculated is -0.5936 (as shown in Table 5). On the other hand, fresh marine fish was preferred (utility value = 0.5936). This result may explain the relatively good correlation between freshness of marine fish and high quality of fish. Unpacked marine fish was also not preferred (utility = -0.2211) compared to packed marine fish (utility = 0.2211). This finding was as expected since packaging helps to protect the quality of the marine fish from touch, shock, as well as protect from contamination which helps reduce bad effects towards health. In addition, consumers preferred buying marine fish at wet markets (utility = 0.1781) compared to supermarkets (utility = -0.1781) even though supermarkets can offer a more pleasant shopping experience. A possible explanation for this might be that supermarket products are often added with chemicals and other preservatives to mass produce and package for longer shelf life, while marine fish being sold at wet market are generally stored for short periods of time and are always expected to be fresh.

Based on results shown in Table 5, the most ideal marine fish attributes (or combination of attributes) preferred by Malaysian consumers is to be fresh, packed and sold at wet market, which answered research question (iii).

Willingness to Pay (WTP) for Marine Fish: From the results of relative importance of attribute for marine fish, it is then possible to conduct further analysis by predicting the WTP for each marine fish attribute demanded, as well as to answer research question (iv). WTP was calculated by using the formula as follows:

$WTP = \beta_0 / -\beta_{price}$, where

β_0 = Coefficients value of non-price attributes,
β_{price}= Coefficients value of price attributes

Table 5: Relative Importance of Attribute for Marine Fish

	Level of Attributes	Coefficients	t-value		
Attributes	(Constant)	6.0842***	35.7539	Utility	Relative Importance (%)
Freshness	Frozen	-	-	-0.5936	59.79
	Fresh	1.4356***	8.4366	0.5936	
Packaging	Unpacked	-	-	-0.2211	22.27
	Packed	0.5347**	2.2217	0.2211	
Location	Wet Market	-	-	0.1781	17.99
	Supermarket	-0.4307*	-1.7897	-0.1781	
Price	Actual Price	-0.0856***	-10.0658	-	-

Std. error = 2.4145, F = 44.0352

Note: Significance levels are denoted by *** for 1%, ** for 5% and * for 10%

Table 6: Willingness to Pay for Marine Fish

Attributes	Level of Attributes	Coefficients	β_0/-β price	WTP* (RM/kg)	Overall WTP* (RM/kg)
Freshness	Frozen	6.0842***	0.7104	13.68	13.76
	Fresh	6.2543***	0.7303	13.84	
Packaging	Unpacked	6.0842***	0.7104	13.68	13.80
	Packed	6.3248**	0.7385	13.91	
Location	Wet Market	6.0842***	0.7104	13.68	13.80
	Supermarket	6.3248*	0.7385	13.91	

Std. error = 2.4145, F = 44.0352, β_0 = 6.0842, Coefficients of price = -0.0856

Note: Significance levels are denoted by *** for 1%, ** for 5% and * for 10%.

WTP* calculated based on the current average price of marine fish; RM8.00/kg.

Table 7: WTP for Combination of Levels of Attributes for Marine Fish

Card	Combination of Levels of Attributes	Average Coefficients	β0/-β price	WTP (RM/kg)
1	Fresh, Packed, Supermarket, No increase in price.	6.3013	5.8861	13.89
2	Frozen, Packed, Supermarket, Price increase 20%.	6.2446	5.8331	13.83
3	Frozen, Unpacked, Supermarket, No increase in price.	6.1644	5.7582	13.76
4	Fresh, Unpacked, Wet Market, Price increase 20%.	6.1409	5.7362	13.74
5	Frozen, Unpacked, Wet Market, No increase in price.	6.0842	5.6832	13.68

Std. error = 2.4185, F = 44.0352, β0 = 6.0842, Coefficients of price = -0.0856

Note: Significance levels are denoted by *** for 1%, ** for 5% and * for 10%.

WTP* calculated based on the current average price of marine fish; RM8.00/kg

The WTP calculated were based on the current average price of marine fish products which was RM8 per kilogram. It may be questioned why RM8/kg was chosen as an indicator of the average price of marine fish. Nevertheless it has to be noted that since there were various types of marine fish, with different sales price. Thus, RM8/kg was considered as an acceptable value.

Based on our calculations, we found that the WTP for freshness attribute was the lowest (RM13.76/kg) in terms of attributes demanded by consumers for marine fish. Consumers were willing to pay more for packaging and location of buying marine fish compared to the freshness of marine fish, RM13.80/kg as illustrated in Table 6. Researchers also found that the highest WTP values for levels of attributes were marine fish that are packed and sold at supermarkets. The WTP for both levels were RM13.91/kg, which means that consumers were willing to pay an additional RM5.91 based on the current average price of marine fish used. The WTP for all the status quo of the levels of attributes (frozen, unpacked and wet market) were the same, which were RM13.68 per kilogram. Although the WTP for freshness was the lowest among the attributes selected for marine fish, in the case of level of freshness, fresh marine fish still conferred higher WTP (WTP = RM13.84/kg) compared to the WTP for frozen marine fish (WTP = RM13.68/kg).

WTP for Combination of Levels of Attributes for Marine Fish: Table 7 shows the WTP for combinations of levels of attributes for marine fish. Basically, the study tested four attributes of marine fish established by focus group discussion. The attributes were freshness, packaging, location of buying and price. The combinations of levels of mentioned attributes enabled the construction of five profiles of marine fish, which needed to be rated by respondents. In terms of WTP for combinations of levels of attributes, as expected, the highest WTP was obtained by the combination of fresh, packed, supermarket and no increase in price; RM13.89/kg. Meanwhile, for marine fish attributed with frozen, packed, supermarket and price increase 20%, the WTP obtained was RM13.83/kg. For another profile of marine fish; frozen, unpacked, supermarket and no increase in price, consumers were willing to pay up to RM13.76/kg. For combination of fresh, unpacked, wet market and price increase 20%, the WTP obtained was RM13.74/kg. Such result suggested those consumers are willing to pay an additional RM5.74 per kilogram for fish with the attributes mentioned. The lowest WTP obtained for combinations of levels of attributes for marine fish was RM13.68/kg; the marine fish profile was frozen, unpacked, wet market and no increase in price.

CONCLUSION

The primary aim of this study was to illustrate the use of CA by means of an application to marine fish. By using CA, it is possible to estimate consumers' willingness to trade off one attribute for another and thus it provides an understanding of why consumers have particular varied preferences. The trade off analysis requires consumers to express preferences by scoring attributes independently,

because in many situations more of an attribute is always better. However, it is not possible for retailers and producers to satisfy such preferences by providing more of every attribute.

Based on the study, researchers found that the most preferred marine fish profile by Malaysian consumers is to be fresh, packed and sold at wet market. If a matching between supply and what consumers really need is desired, this requires a new orientation for the "consumer-oriented" market where marketers have to adjust their marketing efforts to consider the demanded attributes by consumers. Excellent marketing strategies are needed in order to penetrate the "consumer-oriented" market. With increasingly rational buyers faced by abundant choices of product in market, particularly fish products, the marketers can survive only by fine tuning the value delivery process and choosing, providing and communicating the value.

Limitations of the Study: Like any other researches, it is also important to note that the previous conclusion and the results of the study must be considered with some limitations of the study. One is relates to the selection of the attributes for marine fish commodity. The selection of attributes and levels of attributes for marine fish products are difficult to make. In this study, only selected attributes from focus group survey were used. However, it is most likely that there are other attributes of marine fish products that are important to consumers beyond those considered in this study. Also, throughout the study, the effects of the demographic factors on the demand for marine fish attributes were not examined. It is expected that the demand for marine fish attributes may differ in terms of age groups, income or education levels of consumers. Further studies, which take these demographic profiles variables into account, will need to be undertaken.

REFERENCES

1. Mustapha, R.A., A.R.A. Aziz, B.A. Zubaidi and A. Radam, 2001. Demand and Prospects for Food in Malaysia. (eds) Alias Radam and Fatimah Mohd Arshad in Repositioning of the Agriculture Industry in the Next Millennium. Universiti Putra Malaysia Press, pp: 148-159.
2. Henson, S., S. Majowicz, O. Masakure, P. Sockett, A. Jones, R. Hart, D. Carr and L. Knowles, 2006. Consumer Assessment of the Safety of Restaurants: The Role of Inspection Notices and Other Information Cues. Journal of Food Safety, 26(4): 275-301.
3. Furst, T., M. Connors, C.A. Bisogni, J. Sobal and L.W. Falk, 1996. Food Choice: A Conceptual Model of the Process. Appetite, 26(3): 247-266.
4. Prescott, J., O. Young, L. O'Neill, N.J.N. Yau and R. Stevens, 2002. Motives for Food Choice: A Comparison of Consumers from Japan, Taiwan, Malaysia and New Zealand. Food Quality and Preference, 13(7-8): 489-495.
5. Jang, S., J. Ha and C.A. Silkes, 2009. Perceived Attributes of Asian Foods: From the Perspective of the American Customers. International Journal of Hospitality Management, 28(1): 63-70.
6. Quagrainie, K.K., J. Unterschultz and M. Veeman, 1998. Effects of Product Origin and Selected Demographics on Consumer Choice of Red Meats. Canadian Journal of Agricultural Economics, 46(2): 201-219.
7. Campbell, B.L., R.G. Nelson, R.C. Ebel, W.A. Dozier, J.L. Adrian and B.R. Hockema, 2004. Fruits Quality Characteristics that Affect Consumer Preferences for Satsuma Mandarins. HortScience, 39(7): 1664-1669.
8. De Souza, E.A.M., V.P.R Minim, L.A Minim, J.S.R. Coimbra and R.A. Da Rocha, 2007. Modelling Consumer Intention to Purchase Fresh Produce. Journal of Sensory Studies, 22(2): 115-125.
9. Schnettler, B., D. Ruiz, S. Oriana and S. Néstor, 2008. Importance of the Country of Origin in Food Consumption in a Developing Country. Food Quality and Preference, 19(4): 372-382.
10. Koutsimanis, G., K. Getter, B. Behe, J. Harte and E. Almenar, 2012. Influences of Packaging Attributes on Consumer Purchase Decisions for Fresh Produce. Appetite, 59(2): 270-280.
11. Papanagiotou, P., I. Tzimitra-Kalogianni and K. Melfou, 2012. Consumers' Expected Quality and Intention to Purchase High Quality Pork Meat. Meat Science, 93(3): 449-454.
12. Ahmad Hanis, I.A.H, S. Jinap, S. Mad Nasir and R. Alias, 2010. Demand for Food Safety Attributes for Vegetables in Malaysia. Journal of Environment Asia, 3(special issue): 160-167.
13. Hair, J.F. R.E. Anderson, R.L. Tatham and W.C. Black, 1998. Multivariate Data Analysis (5th ed.). New York: Macmillan Publishing Co.
14. Green, P.E. and V. Srivinasan, 1978. Conjoint Analysis in Consumer Research: Issues and Outlook. The Journal of Consumer Research, 5: 103-123.
15. Bakti, H. and A.K. Mohd Zaini, 2013. The Effects of Coding on the Analysis of Consumer Choices of Public Parks. World Applied Sciences Journal, 22(4): 500-505.