Assessing consumer purchasing decision for breaded patin fillet
(Penilaian keputusan untuk membeli filet ikan patin berserdak roti)

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Abstract

The study focused on assessing consumers' purchase decision for breaded patin fillet developed by MARDI. The mean value of the consumer purchase decision was derived from the dichotomous choice model and finally the marginal effects on purchasing decision of demographic and socio-economic variables were derived from logit regression analysis technique. It was revealed that 7.8% of the northern zone consumers were likely to purchase the product as compared to consumers in the Klang valley and 14% of the senior respondents with the age of 58 and above were less likely to purchase the product reviewed.

Introduction

Lifestyle changes and increasing health awareness have resulted in an emerging trend towards healthy food consumption (Quah and Tan 2010). Consumers are opting for products that are fortified with additional functions and benefits such as reduced fat and sugar, high protein content or fortified with vitamins and minerals. At the same time demand for convenience foods is also growing due to increasing number of women participating in the work force and they have less time preparing meals at home. Convenience food category includes ready meal products which require minimum preparation prior to serving in the form of chilled, frozen or in air tight containers (canned, bottled or in retort pouch). In Malaysia, the value growth of ready meal was 4% in 2010 reaching RM105 million (Euromonitor 2010). Processed fish products can be categorized as convenience food in the form of either chilled or frozen.

World total demand for fish and fishery products is projected (at constant relative prices) to expand by 20 million tonnes to 183 million tonnes by 2015. Fish and fishery products contribute important sources of proteins, essential fatty acids, minerals and vitamins to human diet. Supply of pelagic fish is forecasted to have very low growth and prospect for production of other marine fish is also pessimistic.

The potential for increased supply is good for freshwater, crustaceans and molluscs mainly due to the contribution of aquaculture production (Vanuccinni 2005). In recent years, there has been an increased production of fresh water fish in Malaysia (*Table 1*). The common species reared are keli, tilapia and patin. Apart from being sold fresh for table consumption, these species can also be processed into convenient

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Table 1. Production of fresh water fish in Malaysia

Year	Quantity (tonnes)	Value (RM)
2003	49,946.61	332,027.78
2004	55,556.60	255,082.76
2005	62,006.61	293,296.53
2006	61,652.48	292,337.04
2007	70,064.27	344,620.54

Source: Fishery Department Malaysia 2006, 2008

products. The hygienically processed fresh water fish products which strictly follow good manufacturing practice (GMP) and hazard analysis at critical control point (HACCP) can be easily accepted worldwide.

The market size for fishery products in 2010 was 2,696 tonnes, valued at RM79.6 million. The volume and value compounding average growth rate (CAGR) for the period between 2005 and 2010 were 5.4% and 5.3% respectively (*Table 2*).

The forecast sales of frozen processed fishery products in 2015 will be 3,283 tonnes valued at RM94.7 million (*Table 3*). Frozen processed fish and seafood are predicted to be the fastest-growing product over a forecasted period up to 2015 (Euromonitor 2010).

In previous years, supermarkets and hypermarkets were the major distribution channels for frozen fishery products, followed by grocery retailers. Supermarkets and hypermarkets became major distributors because they were equipped with chilling and freezing facilities needed to store and display the products (*Table 4*).

Types of frozen seafood products available in the market is depicted in *Table 5*. Fish balls was the largest contributor of frozen processed fish and seafood segment accounting for 24% of total sales value in 2010. Other popular types of frozen processed fish/seafood included breaded fish fillets, fish cakes, cuttlefish balls and crabsticks (Euromonitor 2010).

Apart from products available in the market, research agencies and universities as well as manufacturing firms are continuously undertaking product development and improvement including testing of new source of raw materials. MARDI station in Kuala Terengganu has developed a number of processed fresh water fish products. Major focus of the product development in MARDI is to add value to the underutilized fresh water fish from aquaculture production (Rashilah 2010).

In the development of value-added fishery products, the quality and functional properties of the main raw material (i.e. fish muscle) and other ingredients have to be considered in terms of intrinsic properties and technological interactions with other food ingredients (Che Rohani 2010). Consumer preference study should be undertaken to ensure the products could be accepted by the consumer at large. The study would provide valuable information for the planning and development of marketing needs and strategies in commercializing the products. Other vital information such as product attributes, psychological determinants and demographic data influencing purchasing decision could also be gathered from consumer study. This paper focuses on identifying consumers' demographic profiles which influences the purchasing decision for breaded patin fillet developed by MARDI.

Description of the product reviewed

Freshwater fish like patin is popular among local consumers who enjoy freshwater fish but there are also consumers who do not like the fish because of its association with the muddy flavour. Simple water depuration process was introduced to eradicate the unfavourable smell. The depuration process of 8 hours was sufficient to leach out the unfavourable compounds which were responsible for such off-flavour (Che Rohani 2009).

The breaded patin fillet used both batter and bread crumbs. The correct batter formulation and processing parameters were critical in this product development. The types of starches and food hydrocolloids used in the batter formulation would

Table 2. Sales of frozen processed fish and seafood, Volume and value (2005 – 2010)

	2005	2006	2007	2008	2009	2010
Tonnes	2,077	2,191	2,318	2,457	2,568	2,696
RM million	61.5	64.6	68.2	72.6	75.5	79.6

Source: Euromonitor (2010)

Table 3. Forecast sales of frozen processed fish and seafood: Volume and value (2010 – 2015)

	2010	2011	2012	2013	2014	2015
Tonnes	2,696	2,817	2,939	3,056	3,172	3,283
RM million	79.6	82.8	86	89	91.9	94.7

Source: Euromonitor (2010)

Table 4. Sales of frozen processed food by distribution channel in percentage (2005 – 2010)

	2005	2006	2007	2008	2009	2010
Supermarkets/hypermarkets	85.5	86.0	86.5	86.5	86.5	87.0
Small grocery retailers	12.5	12.0	11.5	11.5	11.5	11.0
Other grocery retailers	1.9	1.9	1.9	1.9	1.9	1.9
Non-store retailing	0.1	0.1	0.1	0.1	0.1	0.1

Source: Euromonitor (2010)

Table 5. Frozen processed fish/seafood by type: Percentage value breakdown (2005 – 2010)

	2005	2006	2007	2008	2009	2010
Breaded fish fillets	20	21	20	21	21	21.5
Crabsticks	9	10	10	10.5	11	11
Cuttlefish balls	14	13.5	12	12	12	12
Fish cakes	19	18.5	16	16	16	15.5
Fish balls	26	26.5	25	24	23.5	23.5
Others	12	10.5	17	16.5	16.5	16.5

Source: Euromonitor (2010)

produce significant effect on the crispiness of the end product and freeze-thaw stability during storage. The product was formulated from local starches to contain less fat and more than 50% real fillet coated with a light spicy batter and light textured breadcrumbs.

The fish was then processed into skinless and boneless fillets, portioned into desired size and coated with a special formulated batter to reduce oil pick-up during frying. The battered fillets were then coated with Japanese style breadcrumbs before being flash-fried at 200 °C for 20 seconds to partially cook the product. The product was blast frozen, packed into HDPE trays, shrink wrapped and kept frozen at –20 °C. The product has to be refried at 170 °C for 3 minutes or baked at 200 °C for 5 minutes before serving. At –20 °C, the shelf life of the product would last for 12 months.

Literature review
Studies on consumer acceptance with regard to purchasing decision have received relatively widespread attention in Malaysian literature, while at the international front, the subject has been comprehensively and exhaustively discussed. The subject that has been widely studied in this area is on organic food which is pesticide free and can be considered as healthy food (Wang

and Sun 2003; Dettmann and Dimitri 2007; Haghiri 2009; Quah and Tan 2010).

Studies on consumer acceptance have been correlated to sociodemographic and attitudinal factors (Gunduz and Baygramoglu 2011). Factors such as ethnic group (Hartman Group 2006), age (Haghiri 2009), education (Curtis et al. 2007), gender (Quagrainie 2006), price (Yue et al. 2006), number of household (Cerna 2009) and income (Yue and Tong 2009).

Model development

The regression model to predict consumers'purchase decision (PD):

$PD_{FWFP} = \beta_0 + \beta_1\,gen + \beta_2\,race + \beta_3$ hsehold $+ \beta_4\,children + \beta_5\,south + \beta_6\,north + \beta_7\,e.coast + \beta_8\,highedu + \beta_9\,marital + \beta_{10}$ income $+ \beta_{11}\,age1 + \beta_{1\,2}\,age2$

Independent variables

The model regressors in this study were sociodemographic variables as depicted in *Table 6*. Variable name gen for gender and race for ethnic group were presented in the form of categorical variables. Variable household for number of household or family size and income were continuous type of variables. Children was a categorical variable indicating whether there were children in a respondent's family, coded as 1 if there were any and 0 otherwise. Variables south for southern zone, north for northern zone and east coast for east coast zone were categorical in nature indicating areas where the respondents lived. Marital status was also categorical type of variable, coded 1 for married and 0 for single. Variable age was treated as categorical data, with age1 for respondents below 58 years old and age 2 for those above 58 years of age. Both variables were actually originated from continuous data i.e. the actual age of the respondent which has been categorised into younger generation (18 – 56) and senior citizens (58 and above) with reference age group of children and adolescence of below 17 years old.

The dependent variable was the respondents' answers on their purchase intent. Their answers were in dichotomous form of Yes and No, which was later on recorded as 1 for Yes and 0 for No. Data from survey was gathered and recorded in input table. Prior to the logistic regression analysis, some data has been recorded into categorical type whilst some continuous remained as they were. Data were analysed using SAS version 9.1.

Logistic regression

In the logistic regression analysis, the dependent variable is a dichotomous-choice response question. In the dichotomous-

Table 6. Variable name and description

Variable name	Description
PD_{FWFP}	1 if respondent is willing to purchase the product
gen	1 if the respondent is male and 0 otherwise
race	1 if the respondent is Malay and 0 otherwise
hsehold	Number of household or family size.
children	1 if there is children in the family and 0 otherwise
south	1 if the respondent is in the south, 0 otherwise
north	1 if the respondent is in the north, 0 otherwise
e.coast	1 if the respondent is in the east coast region, 0 otherwise
highedu	1 if the respondent has tertiary education and 0 otherwise
marital	1 if the respondent is married, 0 otherwise
income	Monthly income of the respondent in RM
age1	1 if the respondent is between 18 and 58 years old, 0 otherwise
age2	1 if the respondent is 58 years old and above, 0 otherwise

choice response question, when a respondent is willing to purchase the product reviewed, then the dependent variable value for him or her should be 1 or 0 otherwise. Thus the dependent variable was categorical in nature. The independent variables or the regressors can take the form of either categorical or continuous. The use of logit analysis was appropriate in this study as its specifications allowed for monotonic transformations to guarantee that predictions or probabilities lie in the unit interval (Quah and Tan 2010).

The logit model is characterised as:

$$\text{Log} (P/(1-P)) = \beta_0 + \beta_1 X_1 + \text{.........} \beta_n X_n + \varepsilon$$

where P is the probability of the respondent to purchase the product reviewed. β is the coefficient estimates of Xs which are the explanatory variables that could influence the probability of purchasing and ε is stochastic disturbance term. Log P/(1-P) is the ratio of the probability that a respondent purchases the product to the probability that he or she does not. It can be considered as the odds of the respondents' purchase decision. In this study, the effect of demographic variables will be explained in terms of marginal effect instead of odds, which would be easier to explain. Marginal effect measures the impact of a unit change in each of the regressor or independent variables on the probability of respondents' purchase decision (Haghiri 2009).

The respondents

A total of 766 respondents took part in the survey which was executed in the northern, southern, east coast regions and the Klang valley. Survey was done in supermarkets and hypermarkets complexes and the respondents were the shoppers of these outlet channels. The respondents were selected by chance and independent from each other. It could be considered that they were randomly selected. The demographic data of the respondents is depicted in *Table 7*.

Majority of the respondents (59%) were willing to purchase the product

Table 7. Respondents demographic data (%)

Purchase decision	
Yes	58.75
No	41.25
Gender	
Male	47.51
Female	52.49
Age	
less than 20 years of age	8.99
20 – 39 years of age	59.40
40 – 57 years of age	26.98
58 and above	4.63
Ethnic group	
Malay	80.58
Indian	4.33
Chinese	13.65
Others	1.44
Household income	
RM 1,000 and below	30.65
RM 1,001 – RM 3,000	42.11
RM 3,001 – RM 5,000	15.79
RM 5,001 and above	11.45
Education	
School	49.47
Tertiary Education	50.53
Marital status	
Single	35.74
Married	64.26
Household number	
1 – 5 persons	66.96
6 – 10 persons	32.17
11 persons and above	0.87

reviewed. The percentage of females (52%) was slightly higher than the percentage of the male respondents (48 %). Majority of the respondents were in the age group of 20 – 39 years old. The Malay respondents consisted of 81% of the total respondents. Majority of the respondents were in the household income category of RM1,001 to RM3,000 (42%). About 67% of the household comprised 5 persons and below. Most respondents were married (64%) with 51% of them having tertiary education.

Results and discussion

The results of the logit analysis i.e. coefficients' estimates influencing respondents' purchase decision for the product reviewed and their corresponding marginal effect are presented in *Table 8*.

The likelihood ratio (LR) statistic test was used to test the null hypothesis that all slope coefficients were zero. The calculated chi-squared statistics was 22.83 ($p < 0.05$), which showed that at least one slope coefficient was significantly different from zero and the null hypothesis was rejected with 95% confidence. This meant that at least one of the explanatory variables were significant in explaining consumers' stated purchase decision. Goodness of fit of the model calibration measured how well the model described the response variables. It indicated how close values predicted by the model were to the observed values.

The measure of model fitness statistic i.e. –2 Log Likelihood Ratio for intercept only was 1275.51 and for both the intercept and covariates was 1252.68 ($p < 0.01$) which indicated good fitness of the model.

The variable north was statistically significant at the 5% level and had positive sign (*Table 8*). This indicated that 7.8% of the northern consumers were likely to purchase the product as compared to consumers in the Klang valley. Variable age2 was the variable for senior citizens who were 58 years old and above. The age2 was statistically significant at 1% level and had a negative sign. This indicated that about 14% of the senior respondents were less likely to purchase the product reviewed as compared to younger respondents who were less than 58 years old.

This study revealed interesting findings indicating that 7.8% more of the northern consumers would be likely to purchase the breaded tilapia fillet developed by MARDI, holding everything else constant. Authors can conclude that consumers at the north zone liked the product better as compared to consumers in the Klang Valley. This could be due to the fact that northerners were so used to consuming fresh water fish that was abundantly available from inland sources. Another interesting finding was that 14% of the older respondents were less likely to purchase the product, *Ceterus peribus*. All other independent variables were not significant in influencing the consumers' purchase decision.

Conclusion and marketing implications
The market for frozen fish products was steadily increasing with a compounded annual growth rate of about 5% from the 2005 to 2010. The subsector is becoming more dynamic offering new product variants every year. Supply of pelagic fish is decreasing due to decreasing landing and overfishing activities while the production of fresh water fish can always be steeped up. The production technology of fresh water fish products has been established and ready

Table 8. Estimated coefficients of the logistic regression

Variable name	Estimate	Standard error	Marginal effect
constant	–0.8912	0.2282	0.0
gen	–0.0378	0.0827	–0.0107724
race	0.1155	0.1246	0.0329039
hsehold	0.0345	0.0530	0.0098199
children	0.0093	0.1079	0.0026395
south	–0.0100	0.1243	–0.0028562
north	0.2749	0.1188	0.0783246**
w.coast	0.1271	0.1216	0.0362168
highedu	–0.0797	0.0910	–0.0227077
marital	–0.0527	0.1217	–0.0150120
income	0.0738	0.1089	0.0210342
age1	–0.0794	0.1195	–0.0226344
age2	–0.4878	0.1815	–0.1389828***

***Significant at 1%; **Significant at 5%

to be adopted by the entrepreneurs. On the whole, consumers accepted the product favourably, only that the senior consumers were not in favour to purchase the product as compared to younger respondents. Northern consumers appreciated the product so much that 7.8% of them were likely to purchase this product as compared to consumers in the Klang valley. These findings are useful for entreprenuers in developing strategic marketing planning.

Suggested future study
Purchase decision based on ethnic segmentation (the various ethnic groups, Malays, Chinese, Indians and others) and residential areas (rural or urban) are suggested research areas for future study. Detailed information on consumers' behaviour in relation to factors such as ethnic and residential location are beneficial in marketing consumer products. Price is also another important factor in determining purchasing. The price that consumers are willing to pay is another interesting research area for future study.

Acknowledgement
The authors wish to acknowledge everyone who has contributed significantly in one way or another to this study.

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Abstrak

Kajian ini bertumpu kepada penentuan hubung kait antara faktor demografi dengan keputusan untuk membeli filet ikan patin berserdak roti yang telah dibangunkan oleh MARDI. Data dikumpulkan melalui survei pengguna menggunakan model pilihan dichotomous. Kesan marginal yang diperoleh daripada analisis regresi logit menunjukkan bahawa 7.8% pengguna di zon utara akan membeli produk dikaji berbanding dengan pengguna di Lembah Klang. Ini menunjukkan pengguna di utara lebih menggemari produk dikaji. Sebanyak 14% daripada responden yang berumur 58 tahun ke atas memberikan kesan negatif terhadap pembelian yang bermaksud mereka tidak akan membeli produk tersebut, iaitu *Ceterus peribus*.