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Consumer preference towards fresh water fish product developed by MARDI

(Penerimaan pengguna terhadap produk ikan air tawar yang dibangunkan oleh MARDI)

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Abstract

The study focused on the consumer acceptance towards fresh water fish products developed by MARDI. The products were breaded patin fillet, restructured tilapia fillet, keli kebab and patin tempura. Attributes considered were taste, colour, size and overall acceptability. A total of 935 respondents were involved. The survey revealed that in terms of overall acceptability and taste, breaded patin fillet was most preferred followed by patin tempura, keli kebab and restructured tilapia fillet respectively. This study provided some guidelines on the down streaming processing of fresh water fish.

Introduction

Fish and fishery products contribute important sources of proteins, essential fatty acids, minerals and vitamins to human diet. Supply of pelagic fish is forecast 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 is an increasing 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 convenience products. The hygienically processed fresh water fish products which strictly follow good manufacturing practice (GMP) and hazard analysis at critical control point (HACCP) could be easily accepted worldwide.

Fish products are mostly categorized as convenience food. Convenience food are gaining popularity among Malaysian consumer and consumer worldwide. World total demand for fish and fishery products is projected (at constant relative prices) to expand by 20 million tonnes to 183 million tonnes in 2015 (Vanuccinni 2005). Some of the major factors that influence demand for fish and fish products are increasing population, income distribution, price, urbanization, changes in taste and availability of products in the market.

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: DOF (2006, 2008)

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MARDI station in Kuala Terengganu has developed a number of fresh water fish products. Major focus of the product development in MARDI is to value add the underutilized fresh water fish from aquaculture production. 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 components (Che' Rohani 2010).

MARDI has developed techniques to produce fresh water fish products which have acceptable quality and prolonged shelf life. The technology generator could ensure that these products are of prime quality, but little is known about consumer acceptance. Prior to technology dissemination, MARDI has to make sure that these products are well accepted by the consumers at large. Consumer preference survey would provide valuable information for the planning and development of marketing needs and strategies. Such information is also needed by the entrepreneurs who wish to commercialize the products.

Therefore, the major focus of this paper is to access consumer acceptance towards four types of fresh water fish products namely breaded patin fillet, restructured tilapia fillet, keli kebab and patin tempura. There are substantial variations among the products studied due to different product variants and different types of fish used. Some of these product variants and fish species may have positive or negative influence on consumer preference. Major emphasis was to access relative preference on the basic attributes such as taste, colour, size and overall acceptability on the fresh water fish products mentioned.

Materials and methods

This study used a cross sectional data which has been compiled through survey. Surveys were conducted in Terengganu, Kedah, Johor and Selangor which represented the eastern, northern, central and southern zones of West Malaysia respectively. Data was collected through personal interview and product testing using a structured questionnaire. A number of 935 respondents were involved in the surveys.

The relative preference for each product was accessed using Likert Scaling Method or aggregative scaling method. The preference score was based on Likert 5-point scale. The 5-point scale of 1, 2, 3, 4 and 5 were assigned for five categories of response i.e. do not like at all, do not like, indifferent, like and like very much respectively. Respondents were asked to rate each attribute i.e. colour (Jessica et al. 2008), size (Raziah 1997) and taste and overall acceptability (Rosniyana 2007).

The relative preference index or aggregative scaling method was computed by taking the summation of each respondent's vote for an attribute and divided by the total sum of that particular attribute rating (Raziah 1997). The Likert scaling method was also used to perform univariate and bivariate analysis in accessing consumer preference on products studied based on the four attributes stated (Raziah 1997; Syahrin et al. 2008).

Results and discussion

Preference for fresh water fish product attributes

Majority of the respondents liked (72–83%) breaded patin tempura fillet and patin tempura. Respondents liked the taste (75.6%), size (75%) and colour (76.7%) of breaded patin fillet followed by patin tempura, keli kebab and restructured fillet. About a fraction of the respondents (14–34%) were indifferent in their preference and about 3–33% did not like the attributes of the products (*Table 2*).

Preference index comparison

Among the products studied, breaded patin fillet was the most preferred in terms of taste. Restructured tilapia fillet was the least preferred. On the whole, there was not

Table 2. Consumer preference for selected attributes

	Product	Dislike (%)	Indifferent (%)	Like (%)
Taste	Breaded patin fillet	5.78	18.61	75.61
	Restructured tilapia fillet	34.76	31.02	34.22
	Keli kebab	27.27	26.63	46.10
	Patin tempura	6.95	17.86	75.19
Size	Breaded patin fillet	4.60	20.43	74.97
	Restructured tilapia fillet	14.87	28.66	56.47
	Keli kebab	29.84	27.70	42.46
	Patin tempura	5.03	14.76	80.21
Colour	Breaded patin fillet	3.85	19.47	76.68
	Restructured tilapia fillet	20.75	32.41	46.84
	Keli kebab	32.62	28.24	39.14
	Patin tempura	7.91	19.79	72.30
Overall	Breaded patin fillet	2.57	14.44	82.99
	Restructured tilapia fillet	21.07	34.44	44.49
	Keli kebab	22.35	29.63	48.02
	Patin tempura	4.60	15.08	80.32

Table 3. Preference index (taste) for selected processed fresh water fish products

Fish product	Preference rating					Preference index
	1	2	3	4	5	
Breaded patin fillet	8	92	522	1,564	1,580	0.281
Restructured tilapia fillet	108	582	1,206	1,144	795	0.210
Keli kebab	77	356	747	1,032	865	0.229
Patin tempura	11	108	501	1,500	1,640	0.280

Table 4. Preference index (size) for selected processed fresh water fish products

Fish product (thick x wide x long)	Preference rating					Preference index
	1	2	3	4	5	
Breaded patin fillet (1.0 cm x 3 cm x 4 cm)	7	72	573	1,564	1,550	0.271
Restructured tilapia fillet (2.5 cm x 3 cm x 5 cm)	33	212	804	1,428	855	0.240
Keli kebab (1.0 cm x 2 cm x 3 cm)	82	394	777	1,052	670	0.214
Patin tempura (1.5 cm x 3 cm x 5 cm)	5	84	414	1,664	1,670	0.276

much difference in terms of taste among these products as their preference indexes were ranged between 0.21 (lowest) and 0.28 (highest) (*Table 3*).

As for the size, patin tempura (1.5 cm thick, 3 cm wide and 5 cm long) was the most preferred. The thickness of 1.5 cm was not the same with the rest of the products. *Table 4* shows the preference index (size) for all the products studied.

In terms of colour, the highest preference index was the breaded patin fillet which was bright golden yellow followed by patin tempura which was whitish-yellow (*Table 5*).

Table 5. Preference index (colour) for selected processed fresh water fish products

Fish product	Preference rating					Total score	Preference index
	1	2	3	4	5		
Breaded patin fillet (Bright golden yellow)	3	66	546	1,592	1,595	3,802	0.281
Restructured tilapia fillet (Golden yellow)	53	282	909	1,124	785	3,153	0.233
Keli kebab (Reddish-black)	91	428	792	924	675	2,910	0.215
Patin tempura (Whitish-yellow)	9	130	555	1,540	1,455	3,689	0.272

Table 6. Preference index (overall acceptability) for selected processed fresh water fish products

Fish product	Preference rating					Total score	Preference index
	1	2	3	4	5		
Breaded patin fillet	5	38	405	1,848	1,570	3,866	0.278
Restructured tilapia fillet	51	292	966	1,180	605	3,094	0.222
Keli kebab	57	304	831	1,212	730	3,134	0.225
Patin tempura	9	68	423	1,676	1,660	3,836	0.275

Table 7. Chi-squared test on consumer preference by attributes

Attributes	D.F.	Chi-Square	Probability
Taste	6	700.5035	<0.01
Size	6	474.4134	<0.01
Colour	6	541.2068	<0.01
Overall acceptability	6	620.4126	<0.01

In overall acceptability, respondents preferred the breaded patin fillet subsequently followed by patin tempura, keli kebab and restructured tilapia fillet. Overall acceptability was influenced mostly by taste and colour. The taste and colour of breaded patin fillet were also the most preferred (*Table 6*).

Relationship between preference attributes

Chi-square test was performed to test the null hypothesis that there is no association between consumer preference and the types of products. The hypothesis tested were:

H_o : Consumer preference and types of fresh water fish products are independent

H_1 : Consumer preference and types of fresh water fish products are dependent

Chi-square test was applied after collapsing preference 1 with 2 and 4 with 5, giving a two-way table of 3 by 4 where there are three preference level versus four samples.

Greater differences between expected and observed cell counts would produce a larger Chi-square value. The larger the Chi-squared value, the greater the probability that there was a significant effect of the four fish products on respondent preference. The two variables i.e. consumer preference and types of fresh water fish product were found to be dependent. Chi-squared test showed that the value for all attributes (taste, size, colour and overall acceptability) were high and significant at p <0.01 (*Table 7*). Therefore, there were relationship between level of preference for the four fresh water fish products for all the sensory attributes.

Subsequently, one-way analysis of variance (ANOVA) was carried out to find out whether there were any significant difference on the four product samples for all the attributes i.e. taste, size, colour and overall acceptability. Since the respondents involved (935) were more than sufficient when considering confidence level of 5%

(Snedecor and Cochran 1980), the data was assumed to be normally distributed. The analysis showed that there were significant differences (p <0.01) on the mean of the four products for all the sensory attributes. Thus Duncan Multiple Range Test (DMRT) was performed. It was found out that the sensory responses for taste and size were significantly different (p <0.01) among the four products. In terms of taste, breaded patin fillet and patin tempura had significantly higher preference followed by keli kebab and restructured tilapia fillet. With regard to size, breaded patin fillet and patin tempura had higher preference followed by restructured tilapia fillet and keli kebab. As for colour, breaded patin fillet was significantly higher as compared to the rest. Breaded patin fillet was significantly higher with respect to preference level in terms of all attributes, except for patin tempura as the taste and size were at par with breaded patin fillet. The restructured tilapia fillet and keli kebab were significantly lower in mean value (*Table 8*).

Conclusion

Fresh water fish products were acceptable as 75–83% of the respondents liked the products. There was a significant difference in attributes of these products which have significant effect on the respondents' preference. Obviously the breaded patin fillet was preferred the most by majority (83%) of the respondents, and they preferred the colour and taste of this product. In terms of size, the 1.5 cm thickness as in patin tempura was the most preferred. While for the measurement, the 4 cm long (breaded patin fillet) and the 3 cm wide (patin tempura, breaded patin fillet and restructured tilapia fillet) were the most preferred.

The majority of the respondents preferred these products to be bright golden yellow as in breaded patin or whitish-yellow as in patin tempura, but these colour came from the ingredients i.e. breadcrumb in breaded patin and batter in patin tempura. All attributes including taste could be improved in processed food products through formulation, treatment and controlling the processing and manufacturing factors. This study has provided some important information regarding the acceptance of fresh water fish products developed by MARDI. This information would be useful for researchers and entrepreneurs in developing the fresh water fish industry.

Direction for future research

Consumer preference study is mostly conducted to gather required information regarding products or services. Over the years the methodology for consumer preference study has become sophisticated as researchers are embarking on internet survey and applying contingency valuation method (CVM) and/or conjoint analysis (CA). CVM is a method of estimating

Table 8. Duncan Multiple Range Test on mean value for hedonic score in consumer preference on four attributes of four types of fresh water fish products developed by MARDI

Product	Taste	Size	Colour	Overall acceptability
Breaded patin fillet	2.72873a	2.71348a	2.74880a	2.81942a
Restructured tilapia fillet	2.03692c	2.48315b	2.32343c	2.29936c
Keli kebab	2.21108b	2.19904c	2.14045d	2.30177c
Patin tempura	2.68235a	2.75187a	2.64385b	2.75722b
C.V. (%)	29.95	26.66	28.46	25.75
Mean	2.39696	2.52258	2.45217	2.53028
F Value	270.22	167.31	195.55	222.86
Probability	<0.0001	<0.0001	<0.0001	<0.0001

*Mean followed by a common letter in the same column is in the same category

the value that a person places on goods or services. Survey of individuals is used to elicit their preferences, measured in monetary terms or their willingness to pay (WTP) and preference is evaluated by changing one attribute at a time (Wang and Sun 2003). The statistical analysis of binary or multinomial logit or probit model is usually applied (Henseleit et al. 2007; Haghiri et al. 2009).

On the other hand, CA is a straight forward yet sophisticated approach in determining the true value that consumer places on the attributes of a product. It indicates how a target market segment will behave when faced with a series of purchase choices. CA is widely used in market research because it allows the total utility of a multidimensional product to be decomposed into part-worth utilities for each attribute of the products (Harrison et al. 2002). The method is also able to evaluate the relative importance of each individual attribute of a product and to determine the preferred combination of a product (Harrison et al. 1998). Future research in consumer preference research on products developed by Food Technology Research Centre of MARDI should be based on CVM or CA analysis in order to gain in depth and exhaustive information that would be beneficial to both the researchers and entrepreneurs.

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Abstrak

Kajian ini menumpukan kepada penerimaan pengguna terhadap produk ikan air tawar yang dibangunkan oleh MARDI. Produk yang dimaksudkan ialah filet patin berserdak roti, filet tilapia berstrukturan, kebab ikan keli dan tempura ikan patin. Atribut produk yang diuji ialah rasa, warna, ukuran, dan penerimaan keseluruhan. Seramai 935 responden terlibat dalam kajian ini. Hasil kajian mengenai atribut penerimaan keseluruhan dan rasa menunjukkan filet patin berserdak roti amat digemari oleh responden, diikuti oleh tempura ikan patin, kebab ikan keli dan filet ikan tilapia berstrukturan. Kajian ini memberikan panduan mengenai aktiviti pemprosesan hiliran ikan air tawar.