

Consumer acceptance and preference towards frozen smoked fish developed by MARDI

(Penerimaan pengguna terhadap ikan salai sejuk beku yang dibangunkan oleh MARDI)

Nur Fazliana Md Noh*, Rashilah Mohamad*, Rozhan Abu Dardak* and Che Rohani Awang**

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Abstract

A study was carried out to determine consumer acceptance and preference towards frozen smoked dory and African catfish developed by MARDI. A total of 145 respondents from several continents including South East Asia, South Central Asia and Northern Africa were involved in this study. During the survey, respondents were asked to taste two different smoked fishes and answer a structured questionnaire. The respondents were asked about their acceptance and preferences towards the product attributes that include colour, physical appearance, taste and overall acceptability. This study revealed that the decisions on buying the products and product acceptability were not interrelated. Majority of the respondents preferred the smoked African catfish rather than the smoked dory. As a conclusion, the technology of smoked fish developed by MARDI is well accepted by consumers, thus has the potential to be commercialised.

Introduction

Smoking of fish is one of the oldest methods of fish preservation. The steps involve in the preparation of smoked fish are salting (bath or injection of liquid brine or dry salt mixture), cold smoking, cooling, packaging (vacuum or modified) and storage. In Europe, during the Middle Ages, various types of heavily smoked and salted foods were preserved and consumed during winter time. Back then, smoke-curing of fish is a reliable method of preservation for long-term storage since fresh fish could not be transported any distance from the port of landing unless they were preserved. However, in recent times, fish are preserved

frozen, and some are smoked for the unique smoked taste and flavour.

Smoked fish is quite popular or favoured in many African countries such as Ghana, Mali and Gambia. They normally smoked fresh water fish such as tilapia, catfish, Nile perch, and other types of fresh water fish. These fishes are smoked to a very low moisture content, thus can be stored for a long term. Therefore, this study aimed to identify the smoked fish market in UAE as well as to understand the consumer perceptions, preferences and willingness to buy smoked fish developed by MARDI.

MARDI has successfully developed technology for processing frozen smoked

*Economic and Technology Management Research Centre, MARDI Headquarters, Serdang, P.O. Box 12301, 50774 Kuala Lumpur

**Technology Development and Promotion Centre, MARDI Headquarters, Serdang, P.O. Box 12301, 50774 Kuala Lumpur

E-mail: fazliana@mardi.gov.my

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fish under the TechnoFund grant. These smoked fish products are targeted mainly for both the export and domestic markets. Ace Front Industries Pte. Ltd. is the company responsible for the commercialisation of these products. This company has already marketed their fresh water fish in Dubai and is well accepted. To ensure successful venture overseas, it is important to determine consumer acceptance and perceptions of the products internationally. It is also crucial to find out the product preferences, attributes and acceptability that influence potential customers to purchase the products.

SEAFEX, Dubai

The Middle East and African Seafood Exhibition (SEAFEX) was held in Dubai and organised by Dubai World Trade Centre (Organisers of Gulfood). SEAFEX is the Middle East biggest showcase and international trade fair for seafood industry. There were more than 90 exhibitors from 20 countries including Malaysia participated in this showcase. Ace Front Industries Sdn. Bhd. collaborated with MARDI participated in this exhibition to promote the smoked fish (i.e. smoked dory and smoked African catfish) developed by MARDI. It was an excellent opportunity to expand business networking and promoting Malaysian food products in global markets. It was reported that more than 6 million tonnes of food products were imported by UAE in 2010, and the business transactions during SEAFEX was estimated to exceed USD100 million.

Methodology

Consumer acceptance test

A total of 145 respondents who were visitors or exhibitors at the SEAFEX from many countries worldwide participated in the survey. Respondents were randomly selected and voluntarily participated in the survey. The survey questionnaire was divided into two parts: sensory evaluations and demographic questions.

They were given two types of frozen smoked fish (smoked dory and smoked African catfish). The respondents were asked to evaluate each sample for the attributes that include colour, taste, physical appearance and overall acceptability. Score for attributes was based on the 5 point Likert Scale being 1 = Strongly dislike, 2 = Dislike, 3 = Indifference, 4 = Like and 5 = Strongly like.

Statistical analysis

Survey data was analysed using SPSS version 16. The analyses involved were frequency, relative preference index or aggregative scaling method, correlation coefficient, analysis of variance (ANOVA) and eta squared.

The relative preference index or aggregative scaling method was calculated by taking the sum of the votes for an attribute of each respondent and divided by the total sum of that particular attribute rating (Raziah 1997). A Pearson product moment correlation coefficient was computed to assess the relationships between the product acceptable and the decisions whether or not to buy the product by respondents.

ANOVA provides a statistical used to analyse the differences between group means and their associated procedures. If the means are equal, the products in question are not significantly different from each other, which also indicate that the attributes of the products being compared are also not significantly different from each other in terms of consumer preference of an attribute.

Eta squared (η^2) is a measure of effect size for use in ANOVA and it is an estimate of the strength of association between two or more variables, knowing the magnitude of an effect allows us to ascertain the practical significance of statistical significance. Eta squared reading indicates whether the difference between attributes of the products observed were consistent enough to determine the important of the product attributes considered by respondent.

Results and discussion

The majority of the respondents were male (73.1%) and the rest were female (26.9%). The respondents came from several continents, 59.31% from Middle and Western East continents (Abu Dhabi, Dubai, Turkey and Saudi Arabia), 26.9% from South Central Asia (India, Iran and

Iraq), 8.97% from Northern Africa (Egypt, Sudan and Tunisia), 2.76% from Eastern Europe and 2.07% from Eastern Asia (China) (Table 1).

Preference index is an aggregate scaling of the respondent’s scores on each attribute. In comparing the preferences between the two products, Table 2 shows that frozen smoked African catfish (0.556) was preferred to frozen smoked dory (0.44) in terms of colour. Frozen smoked African catfish was reddish-black and frozen smoked dory was yellowish-brown. As for physical appearance, frozen smoked African catfish obtained higher score of 0.53 as compared to frozen smoked dory which obtained preference index of 0.47. In terms of taste, frozen smoked African catfish (0.54) was also preferred over frozen smoked dory (0.46). Frozen smoked African catfish was less salty than frozen smoked dory. Based on respondent comments, 70% of them suggested the need to reduce the salinity of the fish. For the overall acceptability, frozen smoked African catfish preference index was higher (0.55) as compared to frozen smoked dory (0.45)

Correlation analysis is shown in Table 3. Usually in consumer acceptance study, there is positive relationship between acceptability of a product and willingness to buy. In this study for frozen smoked dory, there was significant moderate positive relationship between product acceptability and willingness to buy

Table 1. Respondent by country (n = 145)

	Freq	%
Abu Dhabi	39	26.9
Dubai	21	14.5
India	20	13.8
Iran	11	7.6
Sudan	7	4.8
Turkey	7	4.8
Iraq	6	4.1
Saudi Arabia	5	3.4
Philippines	4	2.8
China	3	2.1
Egypt	3	2.1
Syria	3	2.1
Tunisia	3	2.1
Europe	3	2.1
Singapore	2	1.4
Sri Lanka	2	1.4
Vietnam	2	1.4
Jordan	2	1.4
Indonesia	1	0.7
Russia	1	0.7
Total	145	100

Table 2. Preference index for frozen smoked fish

Attributes	Fish product	Preference rating					Preference index
		1	2	3	4	5	
Colour	Smoked dory	0	94	192	112	30	0.444
	Smoked African catfish	0	0	153	344	40	0.556
Physical appearance	Smoked dory	0	38	210	200	30	0.468
	Smoked African catfish	0	0	132	372	40	0.532
Taste	Smoked dory	0	38	174	240	40	0.463
	Smoked African catfish	0	0	63	452	55	0.537
Overall acceptability	Smoked dory	0	38	240	152	40	0.454
	Smoked African catfish	0	0	69	456	40	0.546

Table 3. Correlation on product acceptability and willingness to buy smoked dory and smoked African catfish

		Smoked dory		Smoked African catfish	
		Product acceptability	Willingness to buy	Product acceptability	Willingness to buy
Product acceptability	Pearson correlation	1	0.325**	1	0.283**
	Sig. (2-tailed)		0.001		0.001
	N	145	145	145	145
Willingness to buy	Pearson correlation	0.325**	1	0.283**	1
	Sig. (2-tailed)	0.001		0.001	
	N	145	145	145	145

(frozen smoked dory), $r = 0.325$, $n = 145$, $p = 0.001$. The coefficient of determination was $r^2 = 0.10$, meaning that only 10% of variability noted in product acceptability could be accounted in decision on buying the frozen smoked dory.

As for the frozen smoked African catfish, there was significant but rather weak relationship between product acceptability and willingness to buy, $r = 0.283$, $n = 145$, $p = 0.001$. The coefficient of determination, $r^2 = 0.07$, meaning that only 7% variability noted in product acceptability could be accounted in decision on buying the product. The correlation of both products were very significant at 1% significant level ($p < 0.001$).

ANOVA results show that the means of all attributes of both products were significantly different from each other ($p < 0.001$). (Table 4). Since the test statistic is much larger than the critical value, we reject the null hypothesis of equal population means and conclude that there is (statistically) significant difference among the respondents in terms of products acceptability based on the attributes. The value of η^2 is greater than 0.14 (Cohen's standard) indicates the importance of an attribute's practical value. As for frozen smoked dory, all attributes except colour were important in determining respondents preference as all the η^2 were greater than 0.14. From this, we can conclude that attribute for colour does not affect products

Table 4. ANOVA results for products acceptability based on attributes

Attributes	Frozen smoked dory	Frozen smoked African catfish
Colour	F = 9.47	F = 6.58
	($p < 0.001$)	($p < 0.001$)
	$\eta^2 = 0.062$	$\eta^2 = 0.040$
Physical appearance	F = 72.15	F = 8.16
	($p < 0.001$)	($p < 0.001$)
	$\eta^2 = 0.335$	$\eta^2 = 0.154$
Taste	F = 121.153	F = 18.378
	($p < 0.001$)	($p < 0.001$)
	$\eta^2 = 0.459$	$\eta^2 = 0.414$
Overall acceptability	F = 90.163	F = 18.09
	($p < 0.001$)	($p < 0.001$)
	$\eta^2 = 0.389$	$\eta^2 = 0.412$

acceptability for frozen smoked dory. Meanwhile as for frozen smoked African catfish, taste and overall acceptability were the most important attributes in influencing preferences.

Summary and conclusion

The study conducted in Dubai showed that both frozen smoked fish products were well accepted by the respondents from several continents. Frozen smoked African catfish was most preferred as compared to frozen smoked dory. Except for African countries, these products are relatively new in other countries. The attribute taste is the most weighted in influencing consumer preference. The correlation results also

indicated that the product acceptance did not influence purchasing intent, but further communication and business promotion can be induced. Capturing the international consumer attributes preference of the products was crucial in developing and improving products for global market.

Bibliography

- Allyn, P. and Brown, J.D. (2007). Statistics corner. Questions and answers about language testing statistics: Sample size and power
- Becker, L.A. (2000). Effect Size (ES). Retrieved from [http://www.core.ecu.edu/](http://www.uccs.edu/~faculty/lbecker/Cohen, J. (1988). Statistical power analysis for the behavioral sciences, 2nd Edition. Hillsdale, NJ: Erlbaum.</p><p>Hedges, L.V. (1981). Distribution theory for Glass's estimator of effect size and related estimators. <i>Journal of Educational Statistics</i> 6(2): 107 – 128</p><p>Morgan, G.A., Leech, N.L., Gloeckner, G.W. and Barrett, K.C. (2004). <i>SPSS for Introductory Statistics: Use and Interpretation</i>, 2nd Edition. Mahwah, NJ: Lawrence Erlbaum Associates</p><p>Ott, L. (1977). <i>An introduction to statistical methods and data analysis</i>. Duxbury Press</p><p>Rashilah, M., Normah A.M., Zairy Z.A and Rawaida R. (2010). Consumer preference towards fresh water fish product developed by MARDI. <i>Economic and Technology Management Review</i> 5: 71 – 77</p><p>Raziah, M.L. (1997). Preference of local consumers towards startfruit for fresh consumption. Makalah sesekala, MARDI</p><p>Wuensch, K.L. (2010) Standardized effect size estimation: why and how? Retrieved from <a href=)

Abstrak

Kajian ini dijalankan bagi menentukan penerimaan pengguna terhadap ikan keli Afrika salai sejuk beku dan ikan patin sejuk beku yang dibangunkan oleh MARDI. Sebanyak 145 responden dari beberapa benua termasuk Asia Tenggara, Asia Tengah dan Afrika Selatan telah terlibat dalam kajian ini. Responden diminta untuk menilai rasa bagi kedua-dua jenis ikan salai sejuk beku dan menjawab soalan dalam soal selidik berstruktur. Responden ditanya mengenai penerimaan dan pilihan mereka terhadap atribut produk iaitu dari segi warna, bentuk fizikal, rasa dan penerimaan keseluruhan. Hasil kajian mendapati keputusan untuk membeli produk dan penerimaan produk adalah tidak saling bergantung. Walaupun kedua-dua produk ini diterima dengan baik, majoriti responden lebih menggemari ikan keli Afrika salai daripada ikan patin. Kesimpulannya, teknologi ikan salai sejuk beku yang dibangunkan oleh MARDI diterima baik oleh pengguna, serta berpotensi untuk dikomersialkan.