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DEVELOPMENT OF CANNED FISH IN TOMATO SAUCE ENRICHED WITH FISH OIL: IV. Consumer Testing

PENGEMBANGAN PRODUK IKAN KALENG BERMEDIUM SAUS TOMAT YANG DIPERKAYA DENGAN MINYAK IKAN: IV. Uji Konsumen

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ABSTRACT : *Final stage in the product development is to carry out consumer test in order to assess the product acceptability. The consumer testing of the canned fish with disguised fish oil was participated by 402 consumers from Jakarta, Tangerang, Semarang, Sragen and Lumajang, in which 142 of them are either housewife or person being responsible for shopping. Results showed that the product had a good prospect, where only 18.1% of respondents disliked the products. Around 62% of respondents intended to purchase the developed canned fish, if the product is available in the market. Respondent experience in consuming canned fish product was significantly affected buying intention, in which experienced respondents were more interested to buy the product than unexperienced respondents.*

ABSTRAK: Tahap terakhir dari pengembangan produk adalah melakukan uji konsumen untuk memperkirakan penerimaan konsumen terhadap produk yang telah dikembangkan. Uji konsumen untuk ikan kaleng yang diperkaya dengan minyak ikan melibatkan 402 responden dari Jakarta, Tangerang, Semarang, Sragen dan Lumajang. Dari sejumlah responden tersebut, 142 orang diantaranya adalah ibu rumah tangga atau orang yang bertanggung jawab belanja untuk keperluan rumah tangga. Hasil penelitian memperlihatkan bahwa produk ikan kaleng yang telah dikembangkan melalui serangkaian penelitian ini mempunyai prospek yang baik, karena hanya 18,1% responden yang tidak menyukai produk tersebut. Disamping itu sekitar 62% respondent sangat berminat untuk membeli ikan kaleng tersebut jika telah tersedia di pasaran. Pengalaman responden di dalam mengkonsumsi ikan kaleng sangat mempengaruhi minat konsumen untuk membeli peroduk ikan kaleng yang telah dikembangkan, yaitu responden yang telah mengkonsumsi ikan kaleng lebih mempunyai minat untuk membelinya.

1. INTRODUCTION

The consumer survey indicated that the canned fish product being developed had good prospects in the Indonesian market, where approximately 80% of respondents intend buying the product (Irianto et al, 1993). During the development study, the sensory panel results suggested that the product was organoleptically acceptable (Irianto et al, 1994). In the development process the product must now be exposed to a wider evaluation, involving

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much more consumer, where more reliable information about the suitability of the product could be ascertained.

Measuring consumer response to products is considered as a critical part of the development process, so now major emphasis is given to this activity. Acceptance testing will indicate whether the product can be marketed, or improvement is needed (Dethmers, 1981).

The most practical approach to predicting consumer acceptance is through the use of sensory panels. Sensory evaluation provide the consumer with a basis for a judgemental value of acceptance or rejection (Ellis, 1970). The consumer may not have the level of skill for a specialized sensory taste; but, the consumer can provide information not obtainable, in an unbiased form, from the trained panellists; for example, preference, purchase intent, and so forth. All participants are important and have something to contribute (Stone, 1988).

In this study, home placement tests were used as more questions could be asked and information could be obtained regarding the product and consumer attitudes toward product price, package label, etc; since the respondents are given enough time to answer the questionnaire.

2. METHODOLOGY

2.1. Canned Fish Processing

The canned fish was processed, using the method described by Irianto et al (1994) by employing sterilization at 121.1°C for 50 minutes. The product was processed at full capacity of pilot plant steamer for pre-cooking and retort (188 cans). The tomato sauce formula used was 18.16% tomato paste, 45.10% water, 27.25% fish oil, 1.43% salt, 3.00% sugar, 1.90% shallot, 1.90% garlic and 0.95% vinegar.

2.2. Consumer testing

Consumer testing of the developed canned fish was undertaken using the home placement test method in five cities in Java.

Three copies of the product testing questionnaire were given to each family, and one of the questionnaires was designed for the housewife or the person in charge of shopping and/or determining the daily family menu.

The samples were given to 158 families including 40 families in Jakarta, 30 families in Tangerang (West-Java), 37 families in Semarang (Central-Java), 26 families in Sragen (Central-Java) and 25 families in Lumajang (East-Java). The families were given freedom to organise their own testing by following directions on the questionnaire. The questionnare was designed as simply as possible by using a simple 5-scale hedonic method in "just right" form, so it could be completed by respondents who were able to read and write. The questionnaire prepared for the housewife or a person responsible for shopping and/or preparing the daily family menu included some supplementary questions.

Both types of questionnaires, in number, were returned as listed:

City	Family (number)	Housewife (number)	Total questionnaire (number)
Tangerang	30	30	81
Jakarta	37	36	104
Semarang	34	32	93
Sragen	26	23	60
Lumajang	24	22	64
Return rate	**95.6%**	**90.5%**	**84.4%**

3. RESULTS AND DISCUSSION

3.1. Proximate composition and fatty acid profile of developed canned fish

Results of proximate and fatty acid profile analysis can be seen in table 1. The fat content of the product was relatively high, this means that the purpose to recover lost oil and increase the fat content of the canned fish in this study was achieved. Meanwhile, the proportion of omega-3 fatty acids in the product were high, particularly for EPA and DHA.

3.2. Product acceptability during consumer testing

3.2.1. Overall results for canned fish characteristics and acceptability

The frequencies of the "just right" score for each sensory characteristic of the developed canned fish product are shown in Table 2.

More than half of the respondents said that the texture of the fish flesh and bone softness was "just right", while a small number of respondents commented that the texture of fish flesh and bone was too hard. About 30% of respondents thought that the sauce colour was bright red, while 54% said that the sauce colour was "just right". Only 9% of respondents indicated that the sauce colour was dark red.

In terms of the taste of both fish flesh and sauce, over 50% of respondents said that the sourness, saltiness and spiciness of both fish flesh and tomato sauce medium were "just right", while approximately 20-35% of respondents commented that the fish flesh and tomato sauce lacked of sour, salt and spice taste. Only a minority of respondent thought that the product was very fishy. The respondents saying that the fish flesh was slightly fishy, "just right" and slightly non-fishy were 39%, 32% and 14% respectively. Respondents commenting that the tomato sauce medium was slightly fishy, just right and slightly non-fishy were 47%, 24% and 14% respectively. Most of the respondents said that the mouth feel of the tomato sauce medium was slightly oily (45%) and "just right" (31%).

With regard to overall acceptability of the canned fish product, a minority of respondents (18%) did not like the developed product. Approximately 38% of respondents liked the product, while approximately 45% neither liked nor disliked.

Table 1. Proximate composition and fatty acid profile of the developed canned fish
Tabel 1. Komposisi proksimat dan profil asam lemak ikan kaleng yang dikembangkan.

Parameters *(Parameter)*	Whole canned fish *(Ikan kaleng utuh)*
Proximate Composition:	
Moisture (%)	68.2
Protein (%)	14.6
Fat (%)	10.1
Carbohydrate (% by difference)	4.4
Ash (%)	2.7
Fatty Acids Profile (% fatty acids)	
Saturated fatty acids	33.2
Monounsaturated fatty acids	40.7
Polyunsaturated fatty acids	26.1
Omega-3 fatty acids	22.8
EPA	7.6
DHA	9.9

3.2.2. Acceptability of developed canned fish

The level of acceptability of the canned fish product in terms of demographic characteristics is shown in Table 3.

Respondents from Tangerang, Semarang and Lumajang showed a similar response to the acceptability of the developed product. Most respondents (47-57%) said that they neither liked nor disliked the product. Respondents who did not like the product were less than 15%, while 62% of the respondents from Sragen liked the product and 10% disliked the product. Jakarta showed a high number of respondents (48%) who did not like the product, while only 20% liked the product.

The survey results showed that the acceptability of the developed canned fish was independent of sex. The product was more acceptable to the consumer under 40 years of age than the consumer over 40 years.

In terms of respondent career, all career groups showed a lower percentage of respondent who did not like the product. The respondents who liked the product were mostly private sector workers, government officials and housewives, but less for pupil and college/university students. Only a minority of consumers from each family income bracket did not like the product. Therefore, consumers from all family income brackets showed as potential consumers.

When considering the total number of consumers, the results showed that the consumer accepted the developed canned fish product. The mean score of overall acceptability is 3.26, or close to "like slightly" category.

Table 2. Canned fish characteristics and acceptability in consumer testing
Tabel 2. Karakteristik ikan kaleng dan penerimaannya selama uji konsumen.

Parameter *(Parameter)*	Score *(Skor)*									
	5		4		3		2		1	
	N	%*)	N	%	N	%	N	%	N	%
FISH										
Texture[a)]	50	13.4	56	13.6	267	66.4	25	6.3	0	0
Bone softness[a)]	99	24.6	73	18.1	208	51.7	22	5.6	0	0
Sourness[b)]	6	1.5	66	16.4	223	55.5	86	21.4	21	5.2
Saltiness[b)]	12	3.0	73	18.1	224	55.8	84	20.9	9	2.2
Spiciness[b)]	5	1.2	18	4.5	235	58.4	131	32.7	13	3.2
Fishiness[b)]	42	10.4	157	39.0	127	31.6	55	13.8	21	5.2
TOMATO SAUCE										
Colour[c)]	9	2.2	115	28.6	218	54.2	49	12.3	11	2.7
Mouthfeel[d)]	60	14.9	181	45.0	123	30.6	28	7.0	10	2.5
Sourness[b)]	8	2.0	54	13.4	214	53.2	110	27.4	16	4.0
Saltiness[b)]	15	3.7	66	16.4	202	50.3	109	27.1	10	2.5
Spiciness[b)]	3	0.7	25	6.2	216	53.8	144	35.8	14	3.5
Fishiness[b)]	30	7.5	189	47.0	98	24.4	58	14.4	27	6.7
CANNED FISH										
Overall acceptability[e)]	40	10.0	109	27.1	180	44.8	62	15.4	11	2.7

Note:

*) row percentage
a) score 5 very soft, 4 slightly soft, 3 just right, 2 slightly tough, 1 very tough
b) score 5 very strong, 4 slightly strong, 3 just right, 2 slightly lacking, 1 very lacking
c) score 5 very bright red, 4 slightly bright red, 3 just right, 2 slightly dark red, 1 very dark red
d) score 5 very oily, 4 slightly oily, 3 just right, 2 slightly non-oily, 1 very non-oily
e) score 5 like very much, 4 like slightly, 3 neither like nor dislike, 2 dislike slightly, 1 dislike very much

Table 3. Acceptability of developed canned fish product in consumer test by demographic characteristics

Tabel 3. Penerimaan konsumen terhadap produk ikan kaleng yang dikembangkan berdasarkan karakteristik demografi responden.

Demographic characteristics *(Karakteristik demografi)*	Score (Skor)									
	5		4		3		2		1	
	N	%*)	N	%	N	%	N	%	N	%
Location:										
Tangerang	1	1.2	24	29.6	46	56.8	8	9.9	2	2.5
Jakarta	2	1.9	19	18.3	43	41.3	33	31.7	7	6.7
Semarang	9	9.7	27	29.0	44	47.3	11	11.8	2	2.2
Sragen	15	25.0	22	36.7	17	28.3	6	10.0	0	0
Lumajang	13	20.3	17	26.6	30	46.9	4	6.2	0	0
Sex:										
Male	11	7.1	49	31.8	71	46.1	22	14.3	1	0.6
Female	29	11.7	60	24.2	109	43.9	40	16.2	10	4.0
Age group (years):										
15 - 20	10	20.8	12	25.0	21	43.8	5	10.4	0	0
21 - 30	13	6.9	50	26.5	86	45.5	35	18.5	5	2.6
31 - 40	7	8.3	33	39.3	33	39.3	9	10.7	2	2.4
41 - 50	5	10.9	9	19.6	24	52.2	6	13.0	2	4.3
> 50	5	14.3	5	14.3	16	45.7	7	20.0	2	5.7
Career:										
Student (pupil - tertiary)	9	13.8	10	15.4	35	53.8	10	15.4	1	1.6
Private sector	13	6.8	59	31.1	87	45.8	27	14.2	4	2.1
Government official	6	13.7	14	31.8	17	38.6	7	15.9	0	0
Housewife/ family helper	12	11.7	26	25.2	41	39.8	18	17.5	6	5.8
Family income (xRp.1000.-):										
< 150	9	18.0	18	36.0	16	32.0	7	14.0	0	0
150 - 299	18	16.4	24	21.8	49	44.5	18	16.4	1	0.9
300 - 500	6	5.9	28	27.5	54	52.9	12	11.8	2	1.9
> 500	7	5.0	39	27.9	61	43.6	25	17.8	8	5.7

Note:

*) row percentage

5. like very much, 4 like slightly, 3 neither like nor dislike, 2 dislike slightly, 1 dislike very much

3.2.3. Consumer buying trend of developed canned fish

The survey results of the buying trends in terms of demographic characteristics are shown in Table 4. More than 70% of respondents from Tangerang, Sragen and Lumajang intended to buy the developed product, and about 56% of respondents from Semarang indicated likewise. However more than 55% of respondents from Jakarta did not intend to buy the product.

Table 4. Buying trend of developed canned fish in consumer testing by demographic characteristic

Tabel 4. Keinginan membeli konsumen terhadap ikan kaleng yang dikembangkan berdasarkan karakteristik demografi responden

Demographic Characteristics *(Karakteristik demografi)*	Buying intention *(Keinginan membeli)*			
	Yes (Ya)		No (Tidak)	
	N	%*)	N	%
Location:				
Tangerang	21	70.0	9	30.0
Jakarta	16	44.4	20	55.6
Semarang	18	56.3	14	43.7
Sragen	17	73.9	6	26.1
Lumajang	17	77.3	5	22.7
Age (years):				
15 - 30	35	55.6	28	44.4
31 - 40	29	72.5	11	27.5
41 - 50	14	63.6	8	36.4
> 50	11	61.1	7	38.9
Career:				
Private sector worker	39	62.9	23	37.1
Government official	9	56.3	7	43.7
Housewife/ family helper	41	63.1	34	36.9
Family income (xRp.1000.-):				
<150	8	44.4	10	55.6
150 - 299	25	62.5	15	37.5
300 - 500	26	72.2	10	27.8
>500	30	61.2	19	38.8

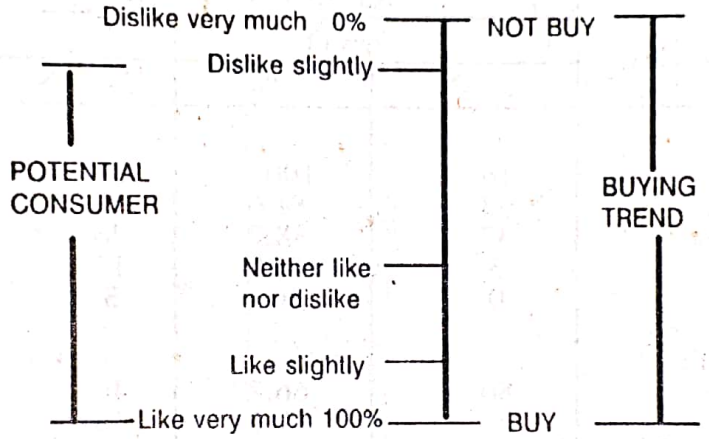
Note: *) row percentage

Respondents from all age groups showed a promising response to the developed product, where 55-73% of respondents from each age group intended to buy the developed product. Respondent careers did not significantly affect the buying trend, since more respondents from each career group wanted to buy the product than respondents not intending to buy the product.

Family income affected the buying trend. Mostly the respondents from middle and high income brackets planned to purchase the product. Approximately 56% of respondents from low income group decided not to buy the product.

Table 5 shows the buying trend according to respondent opinion about product acceptability and respondent experiences in buying canned fish. All respondents who liked the product very much wanted to buy the product. On the other hand, all respondents who did not like the product very much did not intend to purchase. The respondents commenting "like slightly" and "neither like nor dislike" were approximately 85% and 59% respectively, planned to buy the product. Approximately 15% of respondents who "did not like the product slightly" decided to buy the product.

The projected buying trend of the product in terms of the product acceptability can be described as follows:



Potential consumers are expected from below the "dislike slightly" area. The percentage of consumers who are willing to buy the product increased from the top to the bottom . This study showed that the buying trend of the prospective consumer commenting "dislike very much" and "like very much" to the product was 0% and 100% respectively. Some respondents commented that they did not intend to buy the product because canned fish was normally expensive. They preferred to consume fresh fish which is relatively cheap and easy to purchase. Actually, these respondents liked the developed product.

For the respondents who have consumed present existing canned fish products, canned fish in tomato sauce and canned sardine products, more than 65% of them want to buy the product. More than 55% of respondents who have not consumed canned fish in tomato sauce and canned sardine intend to buy the developed canned fish product. However about 61% of respondents who have not bought any canned fish products decided not to buy this product. This seems that consumer experience in eating a similar product was important in influencing buying intention. The consumers, who have consumed similar products, gave more promising response to the product than the consumers who have not consumed similar products.

Response to buying criterion, retail outlets, label information and selling price of the product are shown in Table 6. A majority of consumers agreed that the major reason for purchasing the developed product was convenience: the product is easy to store and serve. Only 28% and 17% of consumers considered buying the product because of its nutritional value and health benefit respectively. Convenience products are found in more variety in large cities such as Jakarta and Semarang, providing more choice and product competitiveness. This may have affected the buying trend of the consumer to the developed product. The prospective consumers were found more in small cities (Tangerang, Sragen and Lumajang) than in large cities (Jakarta and Semarang).

Table 5. Buying trend of developed canned fish according to consumer testing acceptability and consumer experience in buying canned fish products

Tabel 5. Keinginan membeli konsumen terhadap ikan kaleng yang dikembangkan berdasarkan penerimaan konsumen terhadap produk dan pengalaman konsumen di dalam membeli produk ikan kaleng

Information (Informasi)	Buying intention *(Keinginan membeli)*			
	Yes (Ya)		No (Tidak)	
	N	%*)	N	%
Acceptability:				
Like very much	16	100	0	0
Like slightly	33	84.6	6	15.4
Neither like nor dislike	37	58.7	26	41.3
Dislike slightly	3	15.0	17	85.0
Dislike very much	0	0	5	100
Consume canned fish:				
Yes	80	66.7	40	33.3
No	9	39.1	14	60.9
Consume canned fish in tomato sauce:				
Yes	45	66.2	21	31.8
No	44	57.1	33	42.9
Consume canned sardine:				
Yes	34	69.4	15	30.6
No	55	58.5	39	41.5

Note: *) row percentage

Most of the respondents (55%) suggested selling the product in supermarkets while others suggesting selling the product in retail shops and food shops 26% and 24% respectively. A majority of respondents said that all information mentioned on the label, as shown on Appendix 1, had to be retained. Some respondents suggested adding an expiry date, "no added monosodium glutamate" and "100% halal" meaning that the product could be consumed by moslem.

Half of the respondents thought that the product should be sold at price between Rp. 500-800.

Table 6. Buying criterion, retail outlet, label information and price of product suggested by consumer testing

Tabel 6. Kriteria pembelian, tempat penjualan, informasi pada label dan harga produk yang disarankan oleh konsumen

Information (Informasi)	Consumer (Konsumen)	
	Number (Jumlah)	%*)
Buying criterion**		
Family preference	9	10.1
Convenience	65	73.0
Like to eat	8	9.0
Nutritional value	25	28.1
Reasonable price	15	16.9
Health benefits	15	16.9
Retail outlets**		
Supermarket	49	55.1
Retail shop	23	25.8
Food shop	21	23.6
Local market	3	3.4
Information on label**		
Brand	8	9.0
Ingredients	9	10.1
Composition	17	19.1
Name and address of factory	8	9.0
Product superiority	14	15.7
Net weight	11	12.3
All above	57	64.0
Price (Rp.)		
< 500	9	10.1
500 - 650	30	32.7
651 - 800	20	22.5
801 - 1000	16	18.0
> 1000	5	5.6

Note: *) Based on the respondents intending to buy the product

**) One respondent could give more than one answer

4. CONCLUSIONS

Consumer product testing showed that the canned fish enriched with disguised fish oil has good prospects in the Indonesian market. Most of the consumers participating in the testing liked the product and most of them intend to buy. Most prospective consumers suggested retention of the superiority claimed by this product, as stated on the label.

Meanwhile, the use of sensory evaluation during the development process of this product in the laboratory seemed very useful. This is reflected in the results of consumer testing. The developed canned fish product processed using condition and formula selected through the sensory evaluation is proved to be accepted by most consumers and this revealed the usefulness of sensory evaluation to bridge laboratory trials and consumer desirability.

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Appendix 1. Information on the label of the developed canned fish product distributed during consumer testing

Lampiran 1. Informasi pada label produk ikan kaleng yang dikembangkan dan didistreibusikan selama uji konsumen

"OMEGITA" Sardine in tomato sauce

* enriched with fish oil (omega-3)
* no preservatives

Ingredients:
pilchard, tomato paste, water, fish oil,sugar, shallot, garlic and vinegar

Nutritive values:
Moisture 68.2%, protein 14.6%, fat 10.1%, carbohydrate 4.3%, ash 2.8%

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