

Consumer Preferences for The Design of Smoked Fish Packaging Using Conjoint Analysis

Dwi Nurul Izzhati^{1*}, Hasan Mastrisiswadi¹, Jazuli¹, Tita Talitha¹

Abstract. *Research on smoked fish packaging has only focused on its functional side to increase product life. Meanwhile, research on smoked fish packaging design that focuses on improving and expanding markets has never existed. Until now, smoked fish was sold without packaging even though the amount of production continued to increase. The purpose of this study was to determine consumer preferences for the design of smoked fish packaging. With the recognition of these preferences, it is expected that the smoked fish industry players can apply it so that it can increase the sale value and the number of sales. This study uses focus group discussion as a qualitative method and conjoint analysis as a quantitative method. Color, material, shape, size, brand, and additional information is the attribute chosen at the focus group discussion as a representation of smoked fish packaging to determine the level of its preference. The results of this study indicate that the preferred packaging is the one with white colour, made from plastic, in blocks, weighing ¼ Kg, having a brand, and that includes nutritional content and halal information, wherein brands have the highest preference compared to other attributes.*

Keywords: *smoked fish, focus group discussions, conjoint analysis, brand*

I. INTRODUCTION

Packaging serves to protect products from various contaminants and maintain product life (Coles et al., 2003; Marsh & Bugusu, 2007). In addition, the packaging is also able to attract consumers so that it can increase sales and expand the market (Orth & Malkewitz, 2008). However, there are still many products that have not used packaging in sales, such as seafood and its processed products. Indonesia, one of the largest countries in Southeast Asia where 70% of its territory is the sea (3,544,743.9 km²), has a very abundant number of seafood products. Most of the products, however, were sold without packaging, one of which is smoked fish products (see Figure 1).

Smoked fish is a processed marine product using smoking process to reduce the amount of water content so that bacteria cannot live and multiply (Hall, 2010). This method has

traditionally been used to increase the age of marine products in Indonesia. It also enables the seafood products to get a special aroma, taste, and color (Hall, 2010). Smoked fish has dominated processed fisheries in Semarang (one of the major cities in Indonesia) as much as 84.6% of the total production or as much as 2,203,680 Kg in 2000 (Prihantoro, 2014). In 2011, the number even reached 7,637,064 Kg. Although the amount continues to increase, this smoked fish product is sold without packaging. To deal with the ASEAN free market, smoked fish needs good packaging to be able to continue to compete with other countries and expand the market. (Izzhati et al., 2018).



Figure 1. The process of selling smoked fish

The current research was inspired by research works conducted by Heide and Olsen (2017) and Carlucci et al. (2015) which stated that the packaging of marine products received less attention from researchers. Research on smoked

¹ Industrial Engineering Department, Engineering Faculty, Universitas Dian Nuswantoro, Jl. Nakula 1, No. 5-11, Semarang

* email: izzhati@yahoo.com

fish packaging has only focused on its functional side to increase product life (Ibrahim et al., 2008; Olayemi et al., 2015; Purwaningsih et al., 2018). Meanwhile, research on smoked fish packaging design that focuses on improving and expanding markets has never existed.

The method that is commonly used in assessing consumer preferences towards a set of attributes is conjoint analysis (see, for instance, (Almli et al., 2015; Claret et al., 2012; Mastriswadi & Herianto, 2017)). According to (Hair et al., 2009), conjoint analysis is a multivariate technique specifically developed to understand how respondents develop preferences for various objects (products, services, or ideas). Referring to Eversheim (Eversheim, 2009), conjoint analysis is used to assess consumer acceptance of products and their functions. In the analysis, it is assumed that the total satisfaction of a product is the sum of the satisfaction of each product component individually. A similar approach was successfully used by (Claret et al., 2012) with sea fish and (Furnols et al., 2011) with lamb meat.

The purpose of this study was to determine consumer preferences for the design of smoked fish packaging. With the recognition of these preferences, it is expected that the smoked fish industry players can apply it so that it can increase the sale value and the number of sales. To achieve this goal, this research determines the level and attributes when designing profiles using a qualitative approach and to determine consumer preferences for the design of smoked fish packaging using Conjoint Analysis method.

II. RESEARCH METHODS

Focus groups: selection of attributes and levels

The selection of attributes and levels in smoked fish packaging is done using focus group discussion. Focus group discussions aim to identify various perspectives on research topics and to gain understanding related to the perspective itself (Hennink, 2013). Focus group discussions were also conducted by (Claret et al., 2012) and (Neumark-Sztainer et al., 1999). Before focusing on group discussions, an open questionnaire regarding the desired attributes

and level of smoked fish packaging was distributed. Respondents were recruited by considering their age (i.e. between 18 and 60 years), gender (i.e. 50% male and 50% female), and the frequency of buying smoked fish (i.e. more than twice a week, less than twice a week, and almost never). The results of this open questionnaire were used as material in focus group discussions to determine the attributes and level of smoked fish packaging to create a profile.

Conjoint analysis study

Participants who were recruited in this study amounted to 100 people whose ages range from 18 to 60 years old with high school as their minimum last education. Questionnaires of which choices were all selected were considered not valid. Other socio-demographic data used are employment and total income in one month.

Smoked fish packaging profile used for conjoint analysis process is based on the results of the focus group discussion that has been conducted. The attributes and levels selected can be seen in Table 1.

Table 1. Attributes and levels used in conjoint analysis

ATTRIBUTE	LEVEL
Color	green, white, transparent
Material	plastic, paperboard
Shape	block, cube
Size	1/2 kg, 1/4 kg
Brand	available, unavailable
Additional Information	halal, hygiene, nutrition

The conjoint analysis process used in this study does not use full factorial design because the number of combinations produced is too large ($3 \times 2 \times 2 \times 2 \times 2 \times 3 = 144$). For this reason, orthogonal arrays are used to construct fractional factorial plans (Halbrendt et al., 1991; Harrison et al., 1998). The profiles generated from this process can be seen in Table 2.

The profiles that have been obtained are then designed visually by showing each characteristic. The visualizations of these profiles can be seen in Figure 2.

Table 2. Profile of smoked fish packaging using orthogonal arrays

ID	Color	Material	Shape	Size (Kg)	Brand	Additional information
CA01	Green	Plastic	Block	1/2	Available	Halal
CA02	Green	Paperboard	Cube	1/2	Unavailable	Hygiene
CA03	Green	Plastic	Cube	1/2	Unavailable	Halal
CA04	Transparent	Plastic	Cube	1/2	Available	Nutrition
CA05	Transparent	Paperboard	Block	1/4	Unavailable	Halal
CA06	Green	Paperboard	Cube	1/4	Unavailable	Nutrition
CA07	White	Plastic	Block	1/2	Unavailable	Hygiene
CA08	White	Paperboard	Cube	1/2	Available	Halal
CA09	Transparent	Paperboard	Block	1/2	Unavailable	Halal
CA10	Green	Plastic	Cube	1/4	Unavailable	Halal
CA11	White	Paperboard	Cube	1/4	Available	Halal
CA12	Green	Plastic	Block	1/4	Available	Halal
CA13	Transparent	Plastic	Cube	1/4	Available	Hygiene
CA14	Green	Paperboard	Block	1/2	Available	Nutrition
CA15	White	Plastic	Block	1/4	Unavailable	Nutrition
CA16	Green	Paperboard	Block	1/4	Available	Hygiene
CA17	White	Plastic	Cube	1/2	Available	Nutrition
CA18	Green	Plastic	Cube	1/4	Available	Hygiene



Figure 2. Visualization of CA04 profiles (left), CA10 (center), and CA17 (right)

The conjoint analysis data collection is done by using a questionnaire. The questionnaire showed each profile to be assessed by consumers with a range of 1 to 10 (Rating-based). The use of this method was chosen because it was considered simpler and easier to understand by respondents (Green & Srinivasan, 1978; Leigh et al., 1984). In collecting conjoint data, respondents were first made informed that the assessment here is only related to the outer packaging. The smoked fish in the packaging has been vacuumed to prolong life and maintain its quality (Huss, 1997; Ibrahim et al., 2008; Purwaningsih et al., 2018). The conjoint analysis is done with the help of SPSS software. The results of this SPSS will later show the estimated utility of each level, the importance of each level and the correlation value for each respondent and for overall respondents.

III. RESULT AND DISCUSSIONS

Focus groups

From the focus group discussions, various attributes the consumers are concerned with are obtained. The consumers also provide different levels of each attribute (see Table 1). However, not all attributes and levels are used. The most desirable attributes and levels obtained from the focus group discussions are then used in creating profiles. For example, the attribute “easy to carry” is not in Table 1. This attribute has actually been stated in the focus group discussion only because they are considered to be too general and it lacks technical specifications. Likewise, only green, white, and transparent colors are considered most suitable for the smoked fish products used. This is based on the high level of color attributes that

must be limited so that the number of profiles produced is not too many.

One level that is quite interesting in this study is the additional information attribute, where many consumers propose halal brand in the smoked fish packaging. As a country with the largest number of muslims in the world (Jafari & Scott, 2014), Indonesia is very concerned about it. In Islam, "halal" is commonly referred to as manners and acts that are in unity with the sayings of God and the last prophet (Latiff et al., 2017). Granting a halal brand is of course through a certification carried out by an Islamic religious body in the country. With the halal brand, someone will be more sure to buy the product, especially for muslims (Adura et al., 2015; Fathi et al., 2016; Ismail et al., 2018; Jamal & Sharifuddin, 2015; Zailani et al., 2015).

Conjoint analysis

The social-demographic characteristics of the consumers involved in this study can be seen in Table 3. The number of respondents who took part in this study was 100 people. The percentage of men compared to women is 40% compared to 60%. Most respondents aged between 18-30 years (58%), had the last elementary education (54%), and were at intermediate perceived economic situation (73%).

The most relevant factor in smoke fish is the brand (with importance value of 30.303%), followed by additional information (18.721%), color (18.662%), material (12.031%), shape (11.445%), and finally size (8.837). See Table 4.

Color is an important part of a package that shows the characteristics of the food (Grimes & Doole, 1998; Kauppinen-Räsänen, 2014). Basically, the color of smoked fish is blackish

Table 3. Socio-demographic characteristic

Socio-demographic characteristic		%
Gender	Male	60
	Female	40
Age	18-30	58
	30-45	27
	>45	15
Education	High School	54
	Diploma	12
	Bachelor	34
Perceived Economic Situation	Difficult	9
	Intermediate	73
	Well off	18

Table 4. Overall utility estimates of each level and importance value of each attribute

Attributes	Level	Utility Estimate	Importance values (%)
Color	Green	-0.048	
	White	0.075	18.662
	Transparent	-0.027	
Material	Plastic	0.014	12.031
	Paperboard	-0.014	
Shape	Block	0.243	11.445
	Cube	-0.243	
Size	1/2 Kg	-0.137	8.837
	1/4 Kg	0.137	
Brand	Available	0.913	30.303
	Unavailable	-0.913	
Additional Information	Halal	0.016	
	Hygiene	-0.125	18.721
	Nutrition	0.109	

brown due to the smoking process. Based on the results of the focus group discussions, this color sometimes does not attract the consumers to buy and tends to be ignored. For this reason, different colors that can attract the consumers to buy are needed. In the focus group, white is considered to be very attractive to the consumers. This is because the white color is a symbol of cleanliness and purity (Aslam, 2006), a bright color that is contrast to the color of smoked fish that tends to be dark. This white color is believed to give changes to the consumer's view of smoked fish as an unclean product. Therefore, this white color has the highest value at the utility level in the color attribute with a value of 0.075.

Green color which is also covered in the focus group discussion is considered to represent the color of health (Aslam, 2006), which matches the dark color of smoked fish. This green color is an option compared to other colors because it is considered to be able to attract the consumers. However, it turns out that the consumers do not prefer this color with a utility value of -0.048.

Transparent (colorless) is also chosen to represent the packaging of smoked fish. Transparent colors are expected to enable consumers to see the physical form of smoked fish directly and increases sales (Billeter, et al., 2012; Simmonds, et al., 2018). However, in contrast to previous studies, research conducted by Vilnai-Yavetz & Koren (2013) shows that transparent colors actually have a negative impact on product evaluation. In this study, the transparent color of smoked fish packaging is in the middle position of preference with a utility value of -0.027.

The material used in this study is divided into two, namely plastic and paperboard. The material in question is the outer material of smoked fish packaging. The respondents have been told that the best-smoked fish packaging is by vacuum (Huss, 1997; Ibrahim et al., 2008; Purwaningsih et al., 2018). It's just that there is a need for external packaging that can provide attraction from the side of the sale. Based on this research, material prioritized by the consumers is plastic with a utility value of 0.014. Plastic is an option because it feels lighter and simpler than

paperboard. Plastic usage is also felt to be easier and cheaper for the consumers when compared to paperboard boxes (López-Rubio et al., 2004; Marsh & Bugusu, 2007).

As with material, the shape is also only divided into two, namely blocks and cubes. The form of packaging can also influence consumer opinion on a product (Arnheim, 1974; Becker, et al., 2011; Van Rompay, et al., 2005; van Rompay, et al., 2005; Zhang, et al., 2006). The block shape is preferred by the consumers with a utility value of 0.243. Unlike the cube, the shape of the block is preferred because the consumers associate it with the shape of a fish that tends to be elongated rather than square, although it is possible that smoked fish will be wrapped in a square shape first. However, not many people do it. Consumers often find a whole smoked fish with its head. Research on which form of smoked fish is preferred has never been done before.

Size is an important part of the packaging that can provide more information. From the research conducted by Aerts & Smits (2017) and Wansink & Kim (2005) size gives effect to the consumption of a product. Likewise, the research conducted by Makanjuola & Enujiugha (2015) stated that the greater the product is, the greater the impression. However, in this study, size does not have enough importance value. Its importance value is even the lowest one compared to other attributes. This may be contributed by the visualization given at the time of distributing questionnaires. The options of ½ kg and ¼ kg may not give a significant difference, even though they were written separately with the picture. The size of ¼ kg is the choice of the consumers with a utility value of 0.137. The smaller size is preferred by the consumers because it is considered more practical and it tends to be favored by the consumers with middle economic level.

Brand is information on product name or manufacturer that makes it. Branding and packaging affect how consumers value a product (Deliza & Macfie, 1996; Dong & Gleim, 2018). In this research, brands are found to be having the highest importance compared to other attributes. Packaging that is equipped with a brand is

preferred with a utility value of 0.913. This is consistent with the research conducted by Lange et al. (2002). With the brand, the consumers want to buy the product more than if there is no brand. The use of brands will greatly help the producers in increasing their sales and facilitate marketing. With the brand, the consumers will find products more easily than they previously bought (traceability). For the consumers, if the product is good and they are satisfied, then the customer will buy the product with the same brand again. Conversely, if the product is bad and they are not satisfied, the consumer will be easy to avoid it. Not only that, these customers will easily give the advice to buy or not to buy to other customers, either directly or through reviews on social media. This brand then provides security guarantees for the consumers in choosing products.

In the focus group discussion, three additional information needed to be added was halal content, hygienic content and nutritional content. Nutritional and halal contents have utility values of 0.109 and 0.16, respectively. Nutritional content is important for the consumers because it is very useful for diets. With the information on nutritional content, the consumers are able to estimate their nutritional needs and find out whether the product is safe for consumption. These results are consistent with the statements of Dantas et al. (2004), Deliza, et al. (2003), and Ford, et al. (1998) that the composition of nutrients also contributes positively to consumer perceptions.

Meanwhile, halal information on products has a preference value not higher than that of the nutritional content. This is consistent with the results of the previous focus group discussions which stated that this information was important, but for some Muslims who had known that the seafood products were all halal, this information was no longer important. After further study, some Muslims have known that the seafood product in its basic presence is clearly halal. Some Muslims still think that during the manufacturing or packaging process there can be product inaccuracies (Adura et al., 2015; Fathi et al., 2016; Ismail et al., 2018; Jamal & Sharifuddin,

2015; Zailani et al., 2015). For this reason, they are very careful and they need information whether the product is halal or not.

In contrast to previous expectations in the focus group discussion, information about the level of product hygiene that appears in the packaging is not very popular for the consumers. In fact, the existing smoked fish is considered unhygienic. The results of this study is contrast to the statements of Dantas et al. (Dantas et al., 2004), Hodgson & Bruhn (1993) and McEwan (1994) which state that the level of hygiene, quality and presentation suggestions are very important for consumers. This could be due to the data collection during the questionnaire. The respondents were told that the smoked fish in the packaging had been vacuumed, thus they presumably assume that the product was definitely hygienic.

IV. CONCLUSION

The most important factor for the consumers when choosing smoked fish packaging was brand with importance value of 30.303%. During this time, despite its importance in marketing, various products of smoked fish sold on the market rarely include their brand. In addition, a preferred smoked fish packaging design according to this study is white, made from plastic, of shaped blocks, weighing ¼ Kg, has a brand, and includes nutritional content and halal information. Considering the fact that there is no research on the preferred form of smoked fish, whether in pieces or in the whole form with the head, it is necessary to conduct a study on this matter.

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