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Affective Design of Food Delivery Order Packaging

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Abstract: ***Advances in technology encourage Small and Medium Enterprises (UKM) owners to develop their businesses by making online purchases, one of which is Pak Dede's Soto Mie inn. An attractive packaging design can encourage positive perceptions from customers when making online purchases. Therefore, the aim of this research is to design Pak Dede's Soto Mie packaging that involves feelings, emotions, or consumer orientation using the Kansei engineering method. The first stage of the Kansei engineering method in this study is the collection of Kansei words by distributing questionnaires to Pak Dede's Soto Mie customers. The second stage is grouping the Kansei words using the Principal Component Analysis (PCA). The third stage is the formulation of Pak Dede's Soto Mie packaging design concept that will be designed using the Association Rule Mining (ARM). The fourth stage is designing an alternative packaging design for Pak Dede's Soto Mie. Then the last stage is the selection of design alternatives. Based on the results of the Association Rule Mining (ARM), there are two design concepts that are considered, namely simple and eco-friendly. In the selection of design alternatives, the eco-friendly design on the packaging of Pak Dede's Soto Mie is preferred by customers.***

Keywords: ***packaging design, Kansei engineering, food packaging***

I. INTRODUCTION

It is inevitable that the enhancement of technology and the expansion of the Internet Network has made big companies develop smart-phones in the past few decades. Nowadays, smart-phones have been used by many people [1], [2]. Based on the Google database, it is found that around 1.5 million of Android-base devices are spread out every day [3]. The increasing number of smart-phone requests is affecting various start-up companies to make easy use for users around the world [4]. Recently, cellular applications have been reaching some domains such as money services, knowledge of management, global market, social media, and transportation [5]. One such application that most Indonesian people used is an online transportation application for instance Gojek and Grab [6]. The increasing of the online transportation application users is also proven by the statements of Grab Holding Inc that the income of the Grab Company has achieved the decacorn level [7]. This level is one of the best start-up achievements in South East Asia. The decacorn is a term used to the start-up company with an income of more than 10 billion US dollars [8]. Besides the online application transportation, Gojek and Grab have also developed their services in terms of food delivery order namely GoFood (Gojek) and GrabFood (Grab). The services of GoFood and GrabFood have spread their wings by doing cooperation with the street foods, inns, and other Small and Medium Enterprises (SMEs). In line with the changing behavior of consumers who prefer online transactions [9], SMEs can sell their businesses online in addition to selling on the spot. However, there are still many things that should be considered by the SMEs before conducting cooperation with the online application. One of the things is related to the packaging design because the attractive packaging design can encourage positive perceptions from the customers to buy. Kansei engineering is a method that can be used to develop product packaging by involving the needs, feelings or emotions of consumers or it is called consumer-oriented [10]. The concept of consumer-oriented packaging design should be the main focus in product marketing for SME owners [11]. In this study, the Kansei engineering method will be developed in one of the SMEs, namely Pak Dede's Soto Mie inn. Soto is one of Indonesian foods in the form of soup. Pak Dede's Soto Mie wants to develop his business online (delivery orders) by partnering with Gojek and Grab. Therefore, this Pak Dede's Soto Mie inn must have an attractive packaging design.

II. METHODOLOGY

Pak Dede's Soto Mie is one of the SMEs that focused on a local special food becomes a subject in this study. The first preliminary step was delivering the questionnaire by using accidental sampling technique to 30 respondents as the consumers of Pak Dede's Soto Mie. The purpose of this study was to identify the problems pertinent to the Soto Mie packaging. The steps in this research methodology was followed the Kansei engineering Type I design [12]. The first stage of the Kansei engineering method in this study was the collection of Kansei words by distributing questionnaires to Pak Dede's Soto Mie customers. The collected Kansei words are used to translate customer feelings into design specifications [13].

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Then the data was collected by spreading questionnaire to 72 respondents by using a purposive sampling technique. The second step is benchmarking, which is the stage for comparing the packaging of similar food products on the market today. This stage can be a reference at the stage of formulating the design concept regarding what elements are in the packaging.

Benchmarking was done by analyzing the materials made, the dimension, the deficiency, and the efficiency of each sample product. The third step is grouping the Kansei words that had been collected to make an easy step of formulating the design concept. Data collection at this stage was carried out by distributing questionnaires. The data analysis in this step used Principal Component Analysis (PCA) with the XLSTAT software.The fourth step was to formulating the design concept. This stage aims to determine what elements should be considered in packaging design. This step also considered the same element designs that had been analyzed upon the process of benchmarking. The data analysis in this study used Association Rule Mining (ARM) with the Weka software. The result of the combination of the rules on the fourth step became the input to design alternative pictures of the Soto Mie package. The final step is an alternative product packaging design selection based on the user's emotional. In this last step, it was done by distributing questionnaire.

III. RESULT AND DISCUSSION

A. Identification of the Current Packaging Design

The purpose of this study was to identify the problems pertinent to the Soto Mie packaging. The first prior step was delivering the questionnaire by using a technique to 30 respondents as the consumers of Pak Dede's Soto Mie.

Based on the respondents' results taken from the preliminary questionnaire, it showed that the majority of the customers of Pak Dede's Soto Mie was less agree in which the packaging design had been attractive and good enough. The respondents also thought that it needed modification in the current packaging design to make an easy for the users. Hence, there should be a further analysis of this problem.

B. Collecting the Kansei Words

The distribution of the second questionnaire was done to the 72 respondents for collecting the Kansei words. Kansei words were words that had been collected from the customers to represent and picture the domain product. Based on the distribution of the second questionnaire, it was found that there were 68 Kansei words. However, those words still needed further analysis because the words were almost the same in terms of meaning. From the total words that had been collected, 20 words had been simplified. The results could be seen in Table 1.

Table- I: Kansei Word

No	*Kansei* word	No	*Kansei* word
1	Practical	11	Save
2	Cheap	12	Light
3	Modern	13	Attractive
4	Simple	14	Durable
5	Material is easy to find	15	Waterproof
6	Unique	16	Can be recycled
7	Simple	17	Hygienic
8	Heat resistant	18	Airtight
9	Easy	19	Not easy to spill
10	Strong	20	Heavy

The third stage from the Kansei engineering method after gathering the Kansei words was developing a deferential semantic scale. It was a psychological measurement scale that was used to make clear the psychological language structures. The differential semantic scale was used to arrange the negative and positive words in its horizontal lines. These words were not meant to the bad design but to represent both negative and positive designs related to a product in order to obtain a good design. For example, cheap- expensive was arranged on both sides of the continuum. Table 2 displayed a differential semantic scale from 20 Kansei chosen-words.

Table- II: Differential Semantic Scale

No	*Kansei Word*	Differential Semantic Scale
1	Practical	Not practical
2	Cheap	Expensive
3	Modern	Conventional
4	Simple	Complicated
5	Material is easy to find	Material is difficult to find
6	Unique	Normal
7	Simple	Expensive
8	Heat resistant	Not Heat resistant
9	Easy	Difficult
10	Strong	Weak
11	Save	Not save
12	Light	Weight
13	Attractive	Not attractive
14	Durable	Not Heat resistant
15	Waterproof	Not Heat resistant
16	Can be recycled	Cannot be recycled
17	Hygienic	Dirty
18	Airtight	Translucent air
19	Not easy to spill	Not easy to spill
20	Concise	Not concise

C. Benchmarking Product Design

Benchmarking was the comparative stage packaging the food products on the market today. This stage could be a reference to the stage of formulating the design concept that concerned with the element inside the packages. Bench-marketing was done to 13 kinds of packaging foods by analyzing the materials made, the dimension, the deficiency, and the efficiency of each sample product.

D. Collecting the Kansei Words

The next stage was grouping the Kansei words that had been done by distributing the third step of the questionnaire. In the third step of the questionnaire, it was displayed 20 Kansei words along with its differential semantic scale in every 13 products of benchmarking. The respondents were asked to give a score of whether the thirteen products close to the positive or negative word of differential semantic scale. The result of the third data of the questionnaire was first done the measurement of the scale rate Kansei words that had been obtained towards 13 products of benchmarking. The result of the differential semantic scale rate that had been obtained was then analyzed by using XLSTAT software.

The Principal Component Analysis (PCA) was used to see the relationship

between the benchmarking product that had been gathered and Kansei words. This relationship would then be a basis in grouping the Kansei words. This methodology was done by decreasing or reducing the factor of Kansei words in which it was not so significant without reducing the characteristic of the data. The positive values in this variable became the reference to make packaging design that was seen from the emotional customers.

The result of PCA analyzing data which was from the questionnaire was then displayed in Table 3. The eigenvalue and variability from the 1st factor to the 12th factor showed a smaller value. On the other side, the value of cumulative showed a great number from the 1st factor (F1) to the 12th factor (F12). The cumulative value resulted from the 3rd factor showed a value above 80% along with its value of 86.725%. It means that the 1st factor (F1) and the 2nd factor (F2) had represented to show the emotional structure of the customers. It was also showed that the emotional structure from the customers was influenced by the 1st factor (F1) and 2nd factor (F2).

Table- III: The Value of Principal Component Analysis

	F1	F2	F3	F4	F5	F6
Eigenvalue	11.768	3.863	1.714	0.755	0.724	0.420
Variability (%)	58.839	19.314	8.572	3.774	3.620	2.100
Cumulative %	58.839	78.153	86.725	90.499	94.119	96.220

Table- III: The Value of Principal Component Analysis (continued)

	F7	F8	F9	F10	F11	F12
Eigenvalue	0.284	0.168	0.110	0.100	0.062	0.033
Variability (%)	1.418	0.841	0.550	0.498	0.309	0.165
Cumulative %	97.637	98.479	99.028	99.527	99.835	100.000

In the Principal Component Analysis (PCA), it was found the value of factor loadings functioned to determine the design concept. Table 4 showed the emotional value of each factor. The loading factor which was used was the 1st factor (F1) and 2nd factor (F2). It could be determined based on the result of the Principal Component (PC) value in Table 3. In the factor loadings, it could be seen the factor from dominant Kansei Words.

Based on factor loadings in the 1st factor (F1) and 2nd factor (F2), it was found a variable that had big values that were seen through Grey block. Variables with big values in every emotional factor were used to determine the design concept.

In the 1st factor (F1), the Kansei words that the variable had a dominant value was "cheap", "simple", "easy", "not easy to spill, and "concise". While factor 2 (F2), the variables with the greatest and most prominent values are "modern", "light", "recyclable", and "airtight". Based on the PCA processing, it could be done by grouping Kansei words that had the same meaning.

In factor 1 (F1) the word "simple" can represent several variables that had the greatest value and dominant. Whereas in factor 2 (F2) the words that represented were "ecofriendly".

E. Formulating the design concept

At the Kansei words grouping stage, two design concepts were obtained, namely "simple" and "ecofriendly". Then the next step was to determine the 13 benchmarking products that had been obtained whether included in the design concept of "simple" or "ecofriendly".

Table- IV: Factor Ladings

Kansei Word	F1	F2
Practical	0,837	-0,070
Cheap	0,931	-0,199
Modern	0,394	-0,751
Simple	0,946	-0,138
Material is easy to find	0,883	0,206
Unique	-0,199	-0,646
Simple	0,742	0,406
Heat resistant	0,786	-0,079
Easy	0,949	-0,120
Strong	0,807	0,388
Save	0,779	-0,453
Light	0,605	-0,718
Attractive	0,736	-0,490
Durable	0,800	0,306
Waterproof	0,624	0,406
Can be recycled	-0,285	0,845
Hygienic	0,896	0,221
Airtight	0,635	0,628
Not easy to spill	0,937	0,250
Concise	0,951	-0,021

Table- V: Design concept (Y)

No	*Bench-marketing*	Design concept (Y)
1	Packaging 1	Simple
2	Packaging 2	Simple
3	Packaging 3	Simple
4	Packaging 4	Eco friendly
5	Packaging 5	Eco friendly
6	Packaging 6	Eco friendly
7	Packaging 7	Simple
8	Packaging 8	Eco friendly
9	Packaging 9	Eco friendly
10	Packaging 10	Simple
11	Packaging 11	Eco friendly
12	Packaging 12	Eco friendly
13	Packaging 13	Simple

The next stage of Kansei Engineering was to create design elements on the product to be designed. This design element was related to the final design specifications. For example, color, shape, size, and the like. In the design of this Soto Mie package, there were identified 7 design elements that would be used. The design element was obtained based on the results of the identification of elements on 13 benchmarking products that had been obtained previously. Table 6 presented the formulation of design elements to be made.

Table- VI: Design Element

No	Material (X1)	Size (X2)	Shape (X3)	Color (X4)
1	Plastic	Small	Rectangle	White
2	Plastic	Big	Rectangle	Transparent
3	Paper	Small	Oval	Chocolate
4	Paper	Medium	Round	Full-color
5	Paper	Small	Round	Chocolate
6	Paper	Big	Rectangle	Full-color
7	Plastic	Small	Round	Full-color
8	Paper	Medium	Octagonal	Full-color
9	Paper	Small	Trapezoidal	Full-color
10	Paper	Medium	Round	White
11	Paper	Medium	Oval	Chocolate
12	Paper	Medium	Rectangle	Chocolate
13	Aluminum Foil	Medium	Round	Silver

Table- VI: Design Element (Continued)

No	Picture (X5)	Content (X6)	Design concept (Y)
1	Not Pictorial	Product Brand	Simple
2	Not Pictorial	Manufacturer Information	Simple
3	Not Pictorial	Ingredients	Simple
4	Pictorial	Product Brand	Eco friendly
5	A bit pictorial	Expired Date	Eco friendly
6	Pictorial	Contact the Manufacturer	Eco friendly
7	Pictorial	Ingredients	Simple
8	A bit pictorial	Contact the Manufacturer	Eco friendly
9	Pictorial	Expired Date	Eco friendly
10	A bit pictorial	Product Logo	Simple
11	Not Pictorial	Product Logo	Eco friendly
12	Not Pictorial	Ingredients	Eco friendly
13	Not Pictorial	Product Brand	Simple

The design elements that had been obtained were then processed to gain several rules to formulate the concept of Soto Mie packaging design that would be designed. The data analysis in this study used Association Rule Mining (ARM) with the Weka software. Table 7 presented the results of the design concept formulation using Association Rule Mining (ARM).

Table- VII: Formulating the Design concept using Association Rule Mining (ARM)

No	Rule Combination	Conf	Lift	Lev	Conf
1	{Design concept (Y) = Eco friendly 7 ==> Material (X1) = Paper 7}	1	1.44	0.17	2.15
2	{Color (X4) = Brown 4 ==> Material (X1) = Paper 4}	1	1.44	0.09	1.23
3	{Image (X5) = Picture 4 ==> Color (X4) = Full color 4}	1	2.6	0.19	2.46
4	{Size (X2) = Medium Design concept (Y) = Eco friendly 4 ==> Material (X1) = Paper 4}	1	1.44	0.09	1.23
5	{Color (X4) = Full color Design concept (Y) = Eco friendly 4 ==> Material (X1) = Paper 4}	1	1.44	0.09	1.23
6	{Material (X1) = Color Paper (X4) = Full color 4 ==> Design concept (Y) = Eco friendly 4}	1	1.86	0.14	1.85
7	{Image (X5) = Little picture 3 ==> Material (X1) = Paper 3}	1	1.44	0.07	0.92
8	{Material (X1) = Plastic 3 ==> Design concept (Y) = Simple 3}	1	2.17	0.12	1.62
9	{Color (X4) = Image Brown (X5) = No picture 3 ==> Material (X1) = Paper 3}	1	1.44	0.07	0.92
10	{Material (X1) = Drawing Paper (X5) = No picture 3 ==> Color (X4) = Brown 3}	1	3.25	0.16	2.08
11	{Color (X4) = Brown Design concept (Y) = Eco friendly 3 ==> Material (X1) = Paper 3}	1	1.44	0.07	0.92
12	{Material (X1) = Drawing Paper (X5) = Picture 3 ==> Color (X4) = Full color 3}	1	2.6	0.14	1.85
13	{Image (X5) = Pictured Design concept (Y) = Eco friendly 3 ==> Material (X1) = Paper 3}	1	1.44	0.07	0.92
14	{Material (X1) = Drawing Paper (X5) = Pictured 3 ==> Design concept (Y) = Eco friendly 3}	1	1.86	0.11	1.38
15	{Image (X5) = Pictured Design concept (Y) = Eco friendly 3 ==> Color (X4) = Full color 3}	1	2.6	0.14	1.85
16	{Color (X4) = Full color Image (X5) = Pictorial Design concept (Y) = Eco friendly 3 ==> Material (X1) = Paper 3}	1	1.44	0.07	0.92
17	{Material (X1) = Drawing Paper (X5) = Pictured Design concept (Y) = Eco friendly 3 ==> Color (X4) = Full color 3}	1	2.6	0.14	1.85
18	{Material (X1) = Color Paper (X4) = Full color Image (X5) = Picture 3 ==> Design concept (Y) = Eco friendly 3}	1	1.86	0.11	1.38
19	{Image (X5) = Pictured Design concept (Y) = Eco friendly 3 ==> Material (X1) = Color Paper (X4) = Full color 3}	1	3.25	0.16	2.08

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20	{Material (X1) = Drawing Paper (X5) = Pictured 3 ==> Color (X4) = Full color Design concept (Y) = Eco friendly 3}	1	3.2 5	0.1 6	2.08

The Association Rule Mining (ARM) table showed the results of a combination of design elements for Soto Mie packaging that would be designed. The combined results used were only for the top 20 rules using a support value of 0.2 and a confidence value of 0.7. Rules that had a lift value of more than 1 could be stated that the rules were active and valid. So that the only combination of rules that had a lift value of more than 1 could be used to formulate design concepts.

The purpose of this stage was to formulate the Soto Mie packaging design concept that could represent the feelings/emotions of the customer. In Table 7, it could be seen that the highest rules with the highest lift value were rules number 10, 19, and 20 which had a lift value of 3.25. Therefore, the three rules became the main rules in formulating the Soto Mie packaging design concept. However, the formulation of the design concept still considered 17 other rules as additional concepts.

F. Packaging Design

Based on a summary of the results of data processing using the Association Rule Mining (ARM), two design concepts were taken into consideration: simple and ecofriendly. These two design concepts would be combined with other design elements of the Rule Mining Association (ARM) from designing Soto Mie packages. The packaging design results for the "simple" design concept were presented in Figures 1 and 2. Figure 1 was the outer packaging. Whereas Figure 2 was a container for Soto Mie.

Figure 1. Simple packaging design concept (outer packaging)

The concept of "Simple" was the first concept developed for Pak Dede's Soto Mie. There were six most important design elements that resulted from the design formulation process. The six elements were used to evaluate the resulting design formulation.

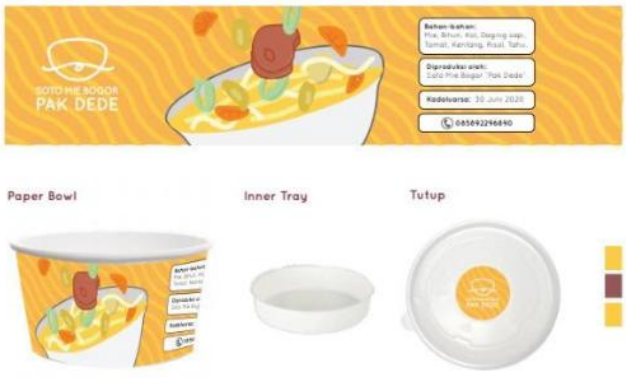

Figure 2. Simple packaging design concept (container packaging)

The packaging design results for the "Eco-friendly" design concept were presented in Figures 3 and 4. Figure 3 was the outer packaging / Soto Mie packaging. Whereas Figure 4 was a container for Soto Mie.

Figure 3. Eco-friendly packaging design concept (outer packaging)

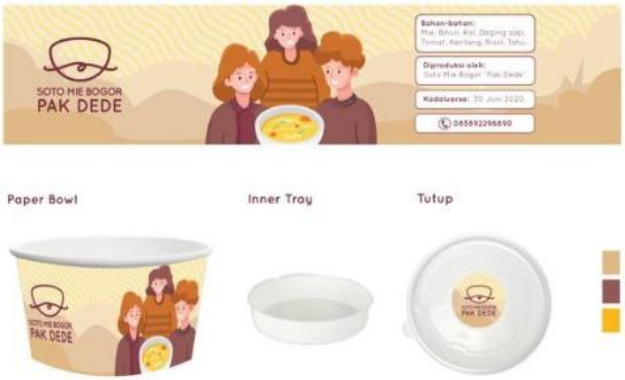

Figure 3. Eco-friendly packaging design concept (container packaging)

Based on the two design concepts that had been designed, then the fifth questionnaire was distributed. The distribution of this questionnaire aimed to find out the best design that represented the emotions or feelings of consumers. A summary of the results of the selection questionnaire for the concept of Soto Mie packaging design was presented in Table 8. The results of the questionnaire in the fifth stage showed that the design concept chosen was the second design concept, namely eco-friendly. This showed that the design of Soto Mie packaging with the eco-friendly concept could represent consumers' emotions or feelings.

Table- VIII: The selection of Soto Mie packaging design Concepts

Design Element	The design concept "Simple"	The design concept "Eco friendly"
Packaging Display (Color)		
Like	27	62
Dislike	45	10
Material Usage		
Like	41	58
Dislike	31	14
Packaging Size (Medium)		

Like	45	56
Dislike	27	16
Packaging Shape		
Like	49	68
Dislike	23	6
Soto Mie Packaging (overall)		
So dislike	3	0
Dislike	18	0
Neutral	23	2
Like	27	28
So like	1	42

IV. CONCLUSION

This study discusses packaging design for SMEs, one of which is Pak Dede's Soto Mie. The method used in this research is Kansei engineering which can represent the needs and feelings / emotions of consumers. The needs and feelings of consumers are translated into Kansei words for packaging design. The results showed that there are two words that represent the design concept, namely simple and eco-friendly. The two design alternatives are then designed and returned to consumers in the form of a questionnaire to find out the best design alternative. The packaging design of Pak Dede's Soto Mie with an eco-friendly concept was chosen.

This research is expected to encourage SME business owners to further develop their product packaging designs. This can also be a promotion for SMEs when selling their products online.

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