

## Design of chocolate processed product packaging with Kansei engineering approach in SME-scale cocoa processing industry in South Sulawesi

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### Abstract

Packaging is one of the keys to maintaining product quality, packaging involves designing and producing activities, to protect the product. Packaging always involves design so that the product message can be conveyed to consumers, the current function of packaging is to protect the product as well as an effective marketing medium. The method used in this study is the kansei engineering method and the data used were obtained from distributing questionnaires that lasted for 1 month with the aim of the research, namely, to obtain the kansei word used to determine the redesign of the chalodo candy packaging. Based on the results of research and data processing carried out in the SME-scale cocoa processing industry, it is still found that product packaging is not in accordance with customer expectations, especially the current chalodo candy packaging has an ordinary design and packaging materials made of plastic with an ordinary appearance so that consumers less interested in the product. This study aims to create a new packaging design according to the wishes of consumers, using the Kansei Engineering method to translate the psychological feelings of consumers to obtain the results of packaging designs for chocolate products.

**Keywords:** Kansei Engineering; Kansei Word; Design; Packaging

### 1 Introduction

Economic growth in Indonesia at a macro level certainly has a good impact on consumer purchasing power, one of the growing factors is the food industry, both small and large with a wide variety of products to meet consumer needs and interests [1]. Packaging is one of the keys in maintaining product quality [2] "Packaging involves designing and producing the container or wrapper for a product" which means, packaging involves designing and producing activities, to protect the product, packaging always involves design so that the message products can be delivered to consumers, the current function of packaging is to protect the product as well as an effective marketing medium [2].

Designing this packaging is a very vital strategy to support the increase in product selling value, because nowadays competition continues to increase and is getting tougher but people's consumption patterns are shifting to fast and practical products [3]. With an unattractive product appearance, the achievement of a sale will not be achieved, with good packaging, the product image will not be far from reaching the level of success, research on developing packaging designs that are in accordance with consumer desires to increase sales figures with kansei engineering [4]. The cocoa processing industry is one of the small and medium industries that produce cocoa beans into several products. The SME-scale cocoa industry in South Sulawesi produces processed cocoa products with various product variations. The processed cocoa shows that from raw materials dried cocoa beans can be processed into several kinds of products including silverqueen, delfi, fonnut, and sweetheart (chalodo). From the sales data for the four products, chlodo chocolate has the lowest number of purchase intensity, which only has thousands of product sales per month. While the

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other three products have sales intensity that is above the average product sales [5]. To be able to compete with these chocolate brands, cholodo is still continuously innovating to find the right formulation for their chocolate so that it does not compete with other products. [6].

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## 2 Material and methods

### 2.1 Research Time and Place

The place of research in this paper is carried out in the cocoa bean processing industry in the province of South Sulawesi. The research time is for 10 months by distributing online questionnaires.

### 2.2 Types of Research

The type of data used in this study, namely qualitative and quantitative data generated from the distribution of questionnaires consisting of 3 kinds of questionnaires. With the following steps:

The type of data used in this study, namely qualitative and quantitative data generated from the distribution of questionnaires consisting of 3 kinds of questionnaires. The Kansei Engineering method used in this study is Kansei Engineering type 2 [8].

### 2.3 Data Processing

The steps to achieve the goal with the Kansei Engineering Type-I method are described below.

- Develop a Strategy: Developing a strategy aims to determine the direction of the product/service to be developed. This stage is very important because it is fundamental or basic, namely determining the purpose of the research.
- Collecting Kansei Word; Kansei Word is the result of respondents' responses to product impressions. Kansei Word was collected to be used as a reference in the research.
- Determining the Semantic Differential Attitude Scale from Kansei Word; Kansei Word obtained is then designed into a questionnaire or other tools as a form of approach to the research objectives. The questionnaire contains a Semantic Differential attitude scale, which is a 5 bipolar scale device with adjectives variables that are paired but have opposite meanings.
- Collecting Product Samples; the purpose of collecting product samples is to stimulate respondents when filling out and scoring the Semantic Differential questionnaire so as to create an image of the desired product description.
- Creating a Category/Item List; Making a list of categories/Items aims to categorize the Kansei Words obtained with the design elements of a product.
- Research Evaluation; Kansei Words that have been categorized into design elements are then evaluated for their usability and relevance to the product to be designed.
- Data Analysis Using Multivariate Analysis; Data analysis is carried out so that the Kansei Word which was originally an abstract and emotional picture can be calculated and expressed in the design design unit.
- Interpretation of Data Analysis; the data from the multivariate analysis is then translated into product design elements.
- Translating the results of the analysis to the designer; the results of the interpretation of data analysis are product design attributes. The product design attributes are then used as a reference in product design

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## 3 Results

### 3.1 Kansei Word

Based on the results of data collection through the distribution of questionnaires and interviews with respondents, several Kansei words were obtained. The kansei word data obtained consisted of 193 kansei words and then eliminated into 17 selected kansei words as shown in Table 1.

**Table 1** Kansei word after being eliminated

No.	Kansei Word
1	Interesting
2	Simple
3	pictorial
4	Environmentally friendly
5	Water proof
6	Easy to pocket
7	Elegant
8	Don't cheat
9	Transparent
10	Easy to open
11	Durable
12	Chocolate identity
13	Unique
14	Neat
15	Can recycle
16	Light
17	Hygienic

After the Kansei Word elimination process was followed up by testing the validity of the data on the 17 Kansei Words that had been determined. This validity test was conducted to establish confidence that the instrument used in determining the Kansei Word for packaging design can be trusted. The results of the validity test are as shown in Table 2 and Table 3.

**Table 2** Validation Test

No	Kansei Word Elimination	Score	Description
1	Interesting	0.312	Valid
2	Simple	0.067	Tidak Valid
3	pictorial	0.180	Valid
4	Environmentally friendly	0.212	Valid
5	Water proof	0.369	Valid
6	Easy to pocket	0.137	Tidak valid
7	Elegant	0.675	Valid
8	Don't cheat	0.335	Valid
9	Transparent	0.542	Valid
10	Easy to open	0.631	Valid
11	Durable	0.405	Valid
12	Chocolate identity	0.435	Valid
13	Unique	0.155	Tidak Valid
14	Neat	0.184	Valid
15	Can recycle	0.334	Valid
16	Light	0.151	Tidak valid
17	Hygienic	0.413	Valid

**Table 3** Fourth Validation Test

No	Kansei word	Score	Description
1	Water proof	0.463	Valid
2	Elegant	0.709	Valid
3	Don't cheat	0.316	Valid
4	Transparent	0.616	Valid
5	Easy to open	0.725	Valid
6	Durable	0.458	Valid
7	Chocolate identity	0.425	Valid
8	Can be recycled	0.403	Valid
9	Hygienic	0.479	Valid

The results of the validity analysis above show that the 9 selected kansei words have met the validity standard, which is  $>0.30$ . This shows that the 9 kansei words have uniformity of data and can be used in this study. The next stage is reliability analysis to see the adequacy of research data. Based on the reliability test of 9 kansei words that have been declared valid. [9].

**Table 4** Reliability Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.715	0.759	10

The results of the reliability test show the Cronbach's Alpha value of 0.759 which means that this data is reliable because  $> 0.7$ . [10]. this means that the research data is quite good in measuring what should be measured (reliable).

**Table 5** KMO and Bartlett's

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure Of Sampling Adequacy.		0.628
Barlett's Test Of Sphericity	Approx Chi-Square	99,118
	df	36
	Sig	0.000

The resulting KMO value is 0.628 ( $> 0.05$ ) with a significance value of  $p < 0.05$  which indicates that this research data is feasible to be processed. [11].

**Table 6** Anti Image Matrices (MSA) testing

No	Kansei word	MSA Value
1	Water proof	0.614
2	Elegant	0.602
3	Don't cheat	0.535
4	Transparent	0.698
5	Easy to open	0.705
6	Durable	0.656
7	Chocolate identity	0.594
8	Can be recycled	0.572
9	Hygienic	0.561

To find out the feasibility of 9 variables which include Water proof, Elegant, don't cheat, Transparent, Easy to open, Durable, Chocolate identity, Can be recycled, Hygienic, Anti Image matrices testing is carried out. Anti-Image matrices testing was conducted to determine whether the variables were partially feasible to be analyzed and not excluded from the test.

**Table 7** Packaging design items and categories

No	Element	Kategori
1	Form	Pouch
		Tube
		Rectangle
2	Size	Small
		Big
3	Ingredient	Aluminium foil
		Plastic
4	Color	Brown
		Blue

Based on the utility value that has been obtained from the previous conjoint analysis processing, the important value is obtained for each factor or design element, in this case the greatest utility value for each factor is the selected specification for the design of chocolate candy packaging.

**Table 8** Value Analysis of the Importance of Factors

No	Design Elements	Category	Utility
1	Form	Pouch	7.76
2	Appearance	Small	7.11
3	Ingredient	Aluminium foil	7.38
4	Colour	Blue	7.21

#### 4 Kansei Word Based Packaging Design

The design concept and specifications are the last step before designing and designing chocolate candy packaging. The design is carried out based on the results of the feasibility test of factor analysis on the MSA test where the selected kansei word is a word that has an MSA value  $> 0.5$ . The number of kansei words that have an MSA value  $> 0.5$  is 9 words. The final packaging specifications obtained are based on the kansei engineering method, namely the packaging in the form of a square, small display, made of aluminum foil with a blue color. In addition to the main packaging specifications, there are additional items supporting chocolate candy packaging, namely complete product information and packaging that protects the product. Here is a picture of the chocolate candy packaging after the redesign:



**Figure 1** Sample Packaging before redesign



**Figure 2** Packaging after redesign

#### 5 Discussion

Based on the results of data collection related to the aspects that customers want in the development of chocolate products, there are several important things to get attention. Packaging is important for products because it is closely related to product sales [7]. The packaging design can be developed or redesigned based on the Kansei Engineering approach [8, 9, 10, 11]. Based on the Kansei Word approach, one of the product packaging in the SME-scale cocoa processing industry in South Sulawesi can be developed according to customer wishes. The packaging will be redesigned based on consideration of the use of water-resistant materials in order to protect environmentally friendly products for a long time. This is important because packaging has an important role to protect food products as a whole [12]. In this regard, the packaging should be waterproof in order to meet the expectations of the main purpose of packaging, namely maintaining the safety, integrity, and food quality of chocolate products [13]. Based on the results of the analysis, it is shown that the packaging design is expected to meet the criteria of being elegant, transparent, easy to open, durable, containing chocolate identity information, made from recyclables and hygienic. In addition, packaging can be developed by adjusting the shape of the packaging, packaging color, and packaging material.

## 6 Conclusion

Identification of consumer desires for chlodo candy packaging is waterproof, elegant, transparent, easy to open, durable, has an identity, can be recycled and hygienic, with the categories of square shape, small appearance, aluminum foil and blue.

Based on the previous background, the packaging is made of ordinary plastic so that it reduces consumer interest in buying. After doing research, the packaging design was changed to aluminum foil according to the demands of the candy consumers.

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## Compliance with ethical standards

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### Disclosure of conflict of interest

All authors have no conflict of interest related to the writing and publishing of this article.

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