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To cite this article: H Prastawa et al 2021 IOP Conf. Ser.: Mater. Sci. Eng. 1072 012060

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Kansei engineering application in redesigning *carica* packaging to support local-small industry in Central Java

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Abstract. Packaging is one of the important elements of product sales. The packaging is one form of branding business of a business party. This study was conducted to apply the principles of Kansei Engineering to packaging products of *Carica*, one of the MSMEs in Wonosobo. This research was conducted to find out what kind of design desired by consumers of Carica products to encourage them to make purchases of these products. The method used is the Kansei Engineering method which will then be collaborated with the Kano model method and conjoint analysis. Kansei Engineering will help this research in determining what aspects consumers want to feel when they buy a *Carica* product. After that, using the Kano model principle will be determined categories from each aspect that consumers feel into several parts, namely basic attributes, linear attributes, attractive attributes, and non-significant attributes. Aspects included in the non-significant attribute category are considered not suitable to be used as a new design concept of Carica packaging. Finally, the packaging aspects that consumers want to feel when buying these products will be linked to the new design using conjoint analysis. This research concludes that the new packaging will be square and made of glass and has a label that has a fruit picture and has an orange theme.

1. Introduction

Carica sweets are one of the most famous from Wonosobo, Central Java, Indonesia. The fruit Vasconcellea Cundinamarcencis generally grows around the hills which have a fairly cold climate. Nowadays, Carica sweets are even sold online, showing that the businesses are in the promising development phase. MSME Embun Pagi is one of more than 200 carica sweets confectionery industries in Wonosobo is a business that is fostered by us, which has been producing since 2016. To compete with other similar businesses, MSME Embun Pagi requires a good and distinctive image of the product. Currently, Embun Pagi packages Carica sweets in a 7.5 cm diameter and 4 cm height plastic cup. It is also equipped with a yellow color label, which was designed around two years ago. The packaging costs IDR1.750 today. Figure 1 shows the existing packaging.



Figure 1. Existing packaging of *carica* sweets of MSME Embun Pagi.

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IConISE-ACISE 2020		IOP Publishing
IOP Conf. Series: Materials Science and Engineering	1072 (2021) 012060	doi:10.1088/1757-899X/1072/1/012060

The packaging is a science, art, and technology that aims to protect a product when it will be sent, stored, or sold or it can also be a production process that aims to package. In the past people said, "packaging protects what is sold", but now it turns into "packaging selling what is protected" [1]. Therefore, packaging must also have an attraction aspect for consumers [2]. Because in the end, the purpose of packaging is actually so that consumers buy the product [3]. Packaging also functions as the first communication medium between products produced by producers and consumers to display the image of the product itself. The current packaging of *carica* sweets in MSME Embun Pagi does not yet represent the company's identity and urgently need new packaging so that it looks more attractive. As common products in the market, the design process was only based on a designer's intuition and perception, not involving any scientific technique [4]. Therefore, attractive packaging design is needed by consumers effective and can protect the product itself.

Kansei Engineering aims to gain consumers' desires through feelings felt by consumers. When consumers want a product or service, their sensory needs will appear elegant, cheap, unique, etc., which is called Kansei. Therefore, Kansei can be interpreted as the psychological and physiological senses of consumers of the desired product or service [5]. Through Kansei's words obtained from various sources, the Kansei concept collects consumer feelings and turns them into product design specifications. Concerning customer satisfaction, Kano Model can also help product designers to get products that are following the customer's desires.

Therefore, this study aims to design *carica* sweets packaging that can show the identity of the product, increase consumer buying interest in the product, and protect the product so that the quality reaches consumers. The packaging design was carried out based on the assessment of the aspects needed by a consumer. As well, this research combined Kansei engineering with the Kano model concept to produce aspects that are truly important and needed by packaging.

2. Methodology

The research was conducted in an observatory method using two types of questionnaires, each of them for container and label of the packaging. Many 105 people were voluntarily involved as participants. Data were collected via online questionnaires.

The preliminary stage was an open question to gain Kansei's words. Related Kansei words were also determined from previous studies in product design. Then the first questionnaire was distributed to assess any aspects that participants want when interacting with *carica* sweets products. Participants were asked to rate packaging design according to each Kansei words by selecting one of five points of Likert-like scale. This scale was applied to quantify their impressions and feelings towards the design of *carica* packaging in general. This process was used as input to the second questionnaire.

In the second questionnaire, the packaging was divided into two parts, namely the container section and the label section. In the container section, the idea of packaging design elements was divided into ideas of shape, size, and material. While in the label section, it was divided into colors and illustrated images. Furthermore, Kansei word mapping was conducted with the Kano model diagram. At this stage, each aspect of packaging will be obtained using the Kano concept so that it divides the packaging aspects into four categories, i.e. basic attributes, linear attribute, attractive attributes, and non-significant attributes. The non-significant category was discarded because it was considered to not affect the changes in the packaging. The final step was to design a packaging design proposal. It was carried out using the analysis to determine the relationship between Kansei words and packaging design elements, so that the combination of packaging design elements desired by consumers was well explained.

3. Result and Discussion

3.1. Respondents profile

The selected respondents consisted of 49 males and 56 females, aged between 15 and 40 years, with a total of 105 people. Respondents are students of University X in Indonesia. Participants are recruited based on whether they are familiar with e-learning and e-commerce sites. This consideration encourages

IConISE-ACISE 2020		IOP Publishing
IOP Conf. Series: Materials Science and Engineering	1072 (2021) 012060	doi:10.1088/1757-899X/1072/1/012060

the selection of respondents from students, and the sampling plan used is non-probability sampling, more precisely purposive sampling. The mean age is 17.6 years (SD = 3.45); 46.6% are male, and 53.4% female. Residence, 36.1% are Central Java and 63.9% are others. Demographic data in this group is shown in Table 1.

	1		
Variable	Frequency	Percentage	
Gender			
Male	49	46.6	
Female	56	53.4	
Age			
15 - 25	21	20	
26 - 36	52	49.5	
37 - 47	32	30.5	
Educated			
Under graduate	63	60	
School	40	38.1	
Others	2	1.9	
Province			
Central Java	38	36.1	
Others	72	63.9	

 Table 1. Profile of respondent.

3.2. Consumer identification

In product design, it is necessary to know who the users for mapping the needs. Unfortunately, in the current condition, there was no focus on the market for the sweet *carica* products of the MSMEs. However, by knowing *carica* sweets products are a typical souvenir product, it can be assumed that the product will be purchased by consumers who are likely not domiciled in the area, which was travelers from outside Wonosobo. Therefore, especially for consumers who are new to the product, *carica* sweet product was expected to have an interesting point and convince consumers to make purchases. Moreover, the product was expected to have simple, easy to carry, easy to store, practical, and lightweight for traveling needs.

3.3. Kansei words collection

The first step in this research is data collection in the form of Kansei words. At this stage, the data collected comes from two sources. The first source was taken from references on packaging product development and the second source was taken through a questionnaire distributed to participants regarding their feelings about *carica* packaging products. Twenty-eight Kansei words had been collected as follows: unique, portable, easy to store, have product image, reusable, luxurious, single-use, interesting, easy to remember, easy to open, informative, convincing, tight, tough, transparent, simple, safe, limited edition, eco-friendly, hygienic, ergonomic, practical, durable, up-to-date, brightly colored, plain, lightweight, and economic.

3.4. First questionnaire

After collecting the data of each Kansei words on a Likert-like scale, validity tests were conducted. With 4 times repetitions, 15 Kansei words were passed the validity tests. In a reliability test with Cronbach's Alpha, all data were concluded as reliable and can be further analyzed.

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3.5. Generate design idea

By paying attention to consumer needs for products that have been described before, this research chose products that can translate that needs. By benchmarking, the design elements of the container were divided into three parts, namely material, shape, and size. In the materials section, the sample design elements were divided into glass and plastic, concerning consumer needs for safe packaging, plastic materials are chosen rather than glass-based packaging. Glass materials, on the other hand, referred to consumer needs for unique packaging. In the shape section, the sample design elements were divided into balls, boxes, and tubes. The tubes and boxes were based on consumer needs for portable and easily stored packaging. As an alternative, ball shape can fill consumers' needs for uniqueness. The size section was divided into small and large, to complete all consumers' needs. Figure 2 shows the container samples.

The design elements of the label were divided into color and image. In the color section, there were vellow and orange, which generalized the selection from male and female perspectives. These colors can also symbolize the color of the *carica* fruit itself as the basic ingredient of the product. Whereas the image section was categorized into fruit, mountain, and plain elements. These selections were considered simple and directly related to the product. Figure 3 comprises the samples of labels.







Figure 3. Research samples of label.

3.6. Second questionnaire

In the container, there are eleven Kansei words, i.e. unique, portable, easy to store, easy to open, singleuse, safe, practical, durable, easy to remember, tight and lightweight. For the label section, there were six Kansei words, i.e. unique, have product images, easy to remember, informative, bright, and plain colors. Besides, there are additional questions in this second questionnaire, whether the participants saw the container or label as good or not.

3.7. Kano model mapping

The data needed in mapping the Kano model in both the container section and label section are, among others, the average value of each Kansei words in the first questionnaire and the second questionnaire data, as proposed in [6]. Two categories indicate the tendency of an attribute to appear according to the participants called the positive category. Vice versa, the negative category was the category that shows the tendency of an attribute to be eliminated according to the participants.

To find out the Kansei words section of the container, the average Kansei words section of the container was obtained by summing all the values given by participants to Kansei words and dividing by the number of participants. This value will determine which data from the second questionnaire was included in the positive or negative category. After the previous stage was complete, then the next step is to find the correlation value of each Kansei words to its global evaluation. Each correlation value for all Kansei words either positive or negative will be the source of making the Kano model in the cartesian graph in the final stage. The ordinate was derived from the Kansei words correlation value for the positive global evaluation, and the abscissa was derived from the Kansei words correlation value for evaluation the global category was negative, and the center of the graph was sourced from both averages. Finally, Kano display models can be made in the form of diagrams for parts of containers and labels, respectively in Figure 4 and 5. The results of the mapping Kano Model were Kansei words which were categorized as insignificant attributes, that were portable and easy to remember for the container, and easy to remember for the label. For Kansei words that are not included in the category of attributes that are not significant, they will still be used at the next stage in this research because Kansei words were stated to have a value that consumers consider in choosing this product.



Figure 4. Kano diagram of a container.

IOP Conf. Series: Materials Science and Engineering

1072 (2021) 012060

doi:10.1088/1757-899X/1072/1/012060



Figure 5. Kano diagram of a label.

Conjoint analysis 3.8.

Conjoint analysis was used to determine the relationship between design elements and Kansei words according to the results of the second questionnaire. The input data used to carry out this conjoint analysis was the average Kansei word data in each design in the second questionnaire. Later on, from the utility of container and label, we can choose the largest utility value of each item for each Kansei words. The overall selected packaging design elements were then determined by the category mode chosen in Kansei words. In other words, the category that appears most often will be the category in the overall selected item. Based on that process, container design elements and selected labels was a small glass box container and orange fruit label, as shown in Figure 6. These characteristics were correlated with Kansei words easy to open similar to Rahmayani research result [7], safe, easy to store [8], practical, tight, lightweight, unique, durable, and have product pictures on it propose this study, singleuse [9].



Figure 6. Selected design combination.

MSME Embun Pagi was then recommended to change the packaging of the product into a small glass box and labeled with an image of *carica* fruit in it with an orange theme color. Additional costs were needed to change the product packaging now. However, MSMEs should make this research recommendation as to their business investment through engineering their products in the packaging field. This is supported by various studies listed in the book on consumer behavior [10], where it is said that packaging is an important aspect that is directly felt by consumers when interacting with a product, not to mention *carica* products in these MSMEs. This study also supports the opinion that affective factors increasingly show a significant trend in influencing the selection of a product [11].

4. Conclusion

A new design of *carica* sweets packaging was proposed to involve the emotional aspects of consumers: a small glass box container and an orange label with pictures of *carica* fruits on it. As the packaging is an important aspect of a product, the new design was hoping to gain more attention of the prospective customers, as it is easy to open, safe, practical, tight, lightweight, unique, easy to store, single-use, durable, and have product pictures on it.

Acknowledgment

The authors thank MSME Embun Pagi as the study object. This research was financially supported by The Faculty of Engineering, Diponegoro University, Indonesia through Strategic Research Grant 2019 number 3161/3/UN7.3.3/PG/2019.

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