Redesigning the packaging of batik fabric products using kansei engineering method (Case study: Rumah Batik Komar)

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Abstract. Packaging is an important part of a product. Rumah Batik Komar, which produces batik and creates batik tourism will improve their product package so that the new packaging designs will be made at a lower cost but still provide good quality. The purpose of this study is to minimize packaging costs by designing new packaging based on the respondents’ wishes while maintaining the quality of the packaging that will be redesigned. The method used is Kansei Engineering, which is a method that defines consumer desires based on the image through Kansei Words into product design. The Conjoint Analysis is used to determine the value of the relationship between the element design and Kansei Words. The result shows that the desired packaging by the customer is black, rectangular and made of paper. From the calculation results there are 12 kansei words that represent the image of the respondent's wishes including made of paper, attractive-coloured, using ribbons, reusable, recyclable, saving space, instagrammable, attractive, luxurious, easy to carry, having logos and hard textured.

1. Introduction
Business competition is a natural experience that cannot be avoided by businessmen because every business has its own competitors. To survive in a business competition, the company must develop a strategy. It needs to look for the method to increase satisfaction of customers. It also needs to improve processes of business, decrease organization costs and gain competitive advantage. A challenge that they are facing is need to rapidly respond to the various and changing demands of customers [1]. Therefore, companies must pay attention to all aspects of quality starting from the products offered should have good quality, to other aspects, such as packaging.

Kansei engineering as a technology that is consumer-oriented and ergonomics intends to translate kansei to the field of the product design. It also translates the function of the product mechanical. It is called the consumer-oriented aspect. Kansei Engineering is used in the automotive, electrical appliance,
construction, clothing and other different industries [5]. Kansei Engineering method for designing product has been carried out by several researchers, such as for packaging design chocolate bar [6], tea powder [7] and vehicle system [8].

Batik is a work of art that utilizes many elements of drawing ornaments on cloth with a dyeing process using wax called "malam". Aside from being a cultural heritage, batik is now also a commodity in the form of basic materials for various needs such as fashion, interior complementary elements, etc. Batik is also displayed in fashion trends. Bandung city has many batik houses that provide various kinds of batik fabrics, batik clothing, and batik tourism. One of them is Rumah Batik Komar. Rumah Batik Komar provides many batik products ranging from fabrics, clothe, to batik tourism. Batik Komar has expanded their designs to become more modern by combining new, unique, thematic contemporary design creations and also keep abreast of the latest fashion trends, so that they can compete in the fashion business world, especially batik. Now Rumah Batik Komar will design a new packaging at a cheaper price with luxury impression that the packaging is expected to reflect the quality and the luxury of batik produced by Rumah Batik Komar.

In accordance with the formulation of the problem as for in this study the objectives to be achieved are: (1) Making new attractive and cheaper packaging designs based on the wishes of consumers and the Rumah Batik Komar at the Rumah Batik Komar. (2) Get positive responses from consumers towards new packaging or packaging designs.

2. Method
Data collection is done to obtain the information needed. The data collection is to conduct observations and the distribution of questionnaires.

2.1. Kansei engineering
Kansei engineering is a technology that unites kansei (feelings and emotions) with the engineering discipline. It is a field in which the development of products that brings happiness and satisfaction to humans is performed technologically, by analysing human emotions and incorporating them into product design [9].

2.2. Conjoint analysis
Conjoint analysis is a multivariate technique developed specifically to understand how respondents develop preferences for any types of object (products, services, or ideas) [10]. It is based on the simple premise that consumers evaluate the value of an object (real or hypothetical) by combining the separate amounts of value provided by each attribute.

2.3. Sample size
To determine the number of samples, we use the linear time function formula. Linear time function is the determination of the number of samples based on estimated time constraints. The number of samples taken by the formula as follows:

\[ n = \frac{T - t_0}{t_1} \]  

\( n \) : Many samples selected  
\( T \) : Time available for research  
\( t_0 \) : Fixed time  
\( t_1 \) : Time used for sampling units

3. Results and discussion
Cost of making the existing packaging is distinguished by its size, i.e. Rp.25,000/pc for large size, Rp.20,000/pc for medium size, and Rp.15,000/pc for small size.
3.1. Kansei word
The Kansei words are determined by distributing open questionnaires to the respondents and then are tested the validity, reliability, factor analysis, MSA, and KMO. The Kansei words that represent the respondent's wishes including made of paper, attractive-coloured, using ribbons, reusable, recyclable, saving-space, Instagramable, attractive, luxurious, easy to carry, having logos, and hard textured.

3.2. Determination of the number of respondents
The number of respondents is determined by using a linear time function as seen in Equation 1. The calculation is as follows:

\[ T = 30 \text{ days} \times 24 \text{ Hours} = 720 \text{ Hours/Month} \]
\[ t_0 = 30 \text{ Days} \times 8 \text{ Hours/Days} = 240 \text{ Hours/Month} \]
\[ t_1 = 9 \text{ Minute/Perso} \times 0,15 \text{ Hours/Days} = 4,5 \text{ Hours/Month} \]

\[ n = \frac{T - t_0}{t_1} = \frac{720 - 240}{4,5} = \frac{60 \text{ Jam}}{4,5 \text{ Jam}} = 106,66 \approx 107 \]

The result shows that the number of respondents of 107 people and the validated questionnaire will be distributed to 107 respondents.

3.3. Output results of conjoint analysis utility
The results of the conjoint analysis utility of the 12 Kansei Words shows that the packaging desired is made of paper, rectangular, and black. The recapitulation can be seen in Table 1.

| Kansei Word  | Colour | Shape | Material |
|--------------|--------|-------|----------|
| Made of paper | Black  | Rectangle | Paper    |
| Attractive-coloured | White  | Rectangle | Plastic  |
| Using ribbons | Black  | Rectangle | Paper    |
| Reusable     | Black  | Rectangle | Plastic  |
| Recyclable   | White  | Rectangle | Paper    |
| Saving space | Black  | Tube    | Paper    |
| Instagramable| Black  | Tube    | Paper    |
| Attractive   | White  | Tube    | Paper    |
| Luxurious    | Black  | Tube    | Plastic  |
| Easy to carry| White  | Rectangle | Paper    |
| Having logos | Black  | Tube    | Paper    |
| Hard textured| Black  | Rectangle | Plastic  |

3.4. Analysis of the importance of factors
Calculating the importance of factors is used to determine the percentage (%) of the factors in the contribution of the Kansei Word. The percentage of the importance of factors describes the image of costumer and respondents to a product based on Kansei Word. In calculating the significance analysis of factors obtained from conjoint analysis calculation, the importance of factors can be seen in Table 2.
### Table 2. Factor analysis.

| Kansei Word          | Colour (%) | Shape (%) | Material (%) | The most important factor    |
|----------------------|------------|-----------|--------------|-----------------------------|
| Made of paper        | 14.286     | 42.857    | 42.857       | material / Shape            |
| Attractive-coloured  | 33.333     | 55.556    | 11.111       | Shape                       |
| Using ribbons        | 40.000     | 20.000    | 40.000       | Colour / material           |
| Reusable             | 38.462     | 38.462    | 23.077       | Colour / Shape              |
| Recyclable           | 57.143     | 28.571    | 14.286       | Colour                      |
| Saving space         | 36.842     | 57.895    | 5.263        | Shape                       |
| Instagrammable       | 23.077     | 69.231    | 7.692        | Shape                       |
| Attractive           | 26.316     | 57.895    | 15.789       | Shape                       |
| Luxurious            | 60.000     | 20.000    | 20.000       | Colour                      |
| Easy to carry        | 5.882      | 41.176    | 52.941       | material                    |
| Having logos         | 0.000      | 33.333    | 66.667       | material                    |
| Hard textured        | 66.667     | 0.000     | 33.333       | Colour                      |
| Summary              | 36.546     | 42.271    | 27.751       | Shape                       |

Referring to the data processing, the respondents consider that form is the most important factor in the packaging for the Rumah Batik Komar fabric, followed by colour as the second element, and material as the last important element.

#### 3.5. Packaging redesign concept

The packaging that will be made will retain the current logo, considering the logo of Rumah Batik Komar has been patented. The logo can be seen in Figure 1.

![Figure 1. Logo of Rumah Batik Komar.](image1)

After the design logo has been established, the product packaging layout will be made with the same size in the previous packaging design, while the layout can be seen in figure 2. The final design of package for Rumah Batik Komar can be seen in figure 3.

![Figure 2. Packaging layout.](image2)
3.6. Analysis of new packaging image

Design packaging costs are adjusted to the material and place where the packaging is made, so that the costs described can be in accordance with the costs to be included. The minimum order of packaging is 300 pieces. For the existing packaging, the packaging price is of Rp. 7,500,000, while the cost required to make a package in the same place with the proposed material and specifications is of Rp. 3,106,000. Thus, the new packaging design have saved of Rp. 4,494,000.

4. Conclusion

Based on the discussion in this study, the researchers conclude some of the results of the study as follows:

- Referring to the consumer image, the desired new packaging is black, rectangular and made of paper-based. Referring to the Kansai word, the new packaging is made of paper with attractive-coloured, using ribbons, reusable, recyclable, saving space, instagrammable, attractive, luxurious, easy to carry, having logos and hard textured.
- The cost of making new packaging is lower than the cost of existing packaging.
- The new packaging design get a positive response from the respondents.

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