Design Sling Bag Using Kansei Engineering Method

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Abstract. The rapid development of the bag craft business has led to tighter competition. Companies must be able to produce products on the market. Facing business competition, the conditions that occurred in the Sabina collection business showed that in the sale of sling bag models in July 2019 there was still a decline of 12% of total sales. In developing a sling bag product, it is necessary to research the consumer's desire by using the engineering method as a bridge to the desires of consumers towards the desired product design, by defining consumer desires (images) identified through the words Kansei into product design. Then the conjoint analysis is used to get the value of the relationship between the design elements and Kansei word. The results of this study are from the Kansei word questionnaire obtained 7 pairs of Kansei words that represent the right words taking into account the products offered. The results of conjoint analysis based on categories that are closely related to each Kansei word are the design concepts of fabric, rectangular shape, medium size, and color variants.

1. Introduction

The development of products in the industrial world has become more advanced. Every company is demanded to always produce new and innovative products. Its products are expected to compete with other companies [1]. The success of the company also did not escape the role of consumers, because a very large level of sales is one of the factors of the company's progress. Humans show a strong interest in the product through the emotions they feel. Although emotions are very subjective and individualistic, able to identify the relationship between product elements and the expression of customers [2]. In the majority of the quality and reliability of products and services on the market are the same, thus evaluation based on the aesthetics and emotions of users or consumers becomes a very important precursor in the selection of certain products or services.

The rapid development of the bag craft business has led to tighter competition. To win the competition & win the market share, the company needs the development of a product. Companies must be able to produce products that compete in the market. Facing business competition, Sabina collection needs to create attractive and quality product designs so that the resulting product meets the tastes of the customer. Conditions occurring in the Sabina collection trading business show that sales of the sling bag model in July 2019 are still declining. The sales data of the Sabina collection bag are as follows:
Table 1. Data sale of Sabina collection

| No. | Code | Name of Goods | Sales for the Month (Pcs) | Difference | Information |
|-----|------|---------------|---------------------------|------------|-------------|
| 1   | Ph   | Pouch         | 1025                      | 1055       | ▲            |
| 2   | Tj   | Hand Bag      | 835                       | 950        | ▲            |
| 3   | Sb   | Sling Bag     | 855                       | 750        | ▼            |
| 4   | Tb   | Tote bag      | 1300                      | 1450       | ▲            |

This research aims to develop women's bags. Bag models Sling bag is one of the products that are in great demand by consumers, existing sling bags will be developed by making and replacing zippers that are stronger, attractive design, comfortable and durable. To increase the added value of sling bag products in the Sabina Collection trade business, the composer tries to recommend a sling bag design by paying attention to the voice of the customer through product design using the Kansei engineering method.

2. Literature Review

Product is an output obtained from a production process (transformation) and value added that is carried out on raw materials (material inputs). Whereas Production is all activities in creating and increasing the use of an item or service, for activities where production factors are needed in the form of knowledge in the form of land, capital, labor, and skills [3]. Products include more than just tangible or sensory goods. If broadly identified the product includes physical objects, services, people, places, organizations, ideas or mix of all the forms above. A product must have a life cycle or called product life cycles.

2.1. Product Development

Product development consists of product development which includes production, distribution and sales plans. Product development does not stand alone, but is part of the industrial innovation process. The development of this product covers almost all aspects of the company. There are several reasons why there is a need for a good product development process, including the following:

- Quality Guarantee
- Coordination
- Plan
- Management
- Improvisation

2.2. Kansei Engineering

Kansei is part of affective ergonomics. Many definitions and classifications of "emotion" are available in the literature relating to product design, marketing, psychology, and so on. In Japanese, the term for "emotion" is referred to as Kansei or psychological feelings. According to Nagamachi [1], Kansei is defined as the psychological feelings of customers or users of new products. A luxurious, beautiful, elegant and strong impression on a product or service is highly desirable. All human senses including sight, hearing, feeling, smell, taste, and cognition will be involved simultaneously [2]. People who are rich in Kansei are those who are full of emotion, knowledge, passion and ability to act sensitively to changes in the environment. If the product designer is able to seize these opportunities and pamper them they will create emotional satisfaction that leads to loyalty and delight.

However, emotions alone are not enough to describe Kansei. By interpreting what exactly the user or consumer wants, and realizing it in the form of a physical product or service, then confirming to the
user, that is the essence of Kansei. If consumers or users give a positive impression on the appearance and benefits of a product, and simultaneously produce an element of "wow" and closed with a confirmation "I will buy it" then Kansei successfully achieved.

Basically the emotional needs of consumers for a service product or service is increasingly dominant. Kansei engineering (KE) is a method for ensuring that a product or service meets the desired emotional response [4] Kansei comes from Japanese which means consumer emotional feelings and description of new products. When a user wants to buy something, he has a picture of a product like "luxurious, beautiful and strong". Kansei engineering technology enables consumer images and feelings to become a new product [1]. Kansei engineering aims to produce a new product based on the feelings and demands of consumers. There are four points to consider in Kansei engineering, namely:

- How to understand the feelings of consumers (Kansei) about products in terms of ergonomics and emotional estimates.
- How to identify the product design characteristics of Kansei consumers.
- How to build Kansei engineering as an ergonomics and technology.
- How to adjust product design to changes in social flows or people's choice trends [1]

3. Research Methodology

3.1. Types of Research
This type of research is a survey method research. According to [5] the survey method is a study conducted using a questionnaire as a research tool carried out in large and small populations, but the data studied is data from samples taken from that population, so it is found relative events, distribution and relationships between variables social and psychological.

3.2. Techniques of Data Collection and Data Analysis
This research uses data collection techniques such as: direct observation and interviews. Primary data is information or original data that is collected and related to the object to be examined. Collect primary data with direct observation and conduct interviews with the company to get the data needed. The instrument of data collection is interviews. The data needed is the questionnaire data of consumer desires, Kansei questionnaire data [6,7] closed questionnaire data, and technical characteristics questionnaire data. Secondary data is data obtained indirectly which is usually in the form of documents, files, archives, or company records [8]. This data is obtained through company documentation, literature, and other reading books related to research. Secondary data is the company's organizational structure, material data and production processes, company history, scope of business fields, organizational structure, equipment names and specifications, and marketing areas [9,10].

Data processing is carried out with the following steps:

- Collection of consumer voices based on Kansei's attributes and words.
- Conjoint analysis of the results of the Kansei (semantic differential) questionnaire answers. The selected product attributes are obtained based on conjoint analysis with the greatest utility value.
- An assessment of the level of consumer interest in selected product attributes. The value of importance is obtained from the results of a closed questionnaire attribute selected products

4. Result and Discussion
The word Kansei is obtained based on the results of the respondents' answers on the first questionnaire which is grouped into bag products which are described in table 2 as follows:
Table 2. Kansei word of bag products

| No. | Kansei Word  | No. | Kansei Word   |
|-----|--------------|-----|--------------|
| 1.  | Unique       | 13. | Nice         |
| 2.  | Simple       | 14. | Good         |
| 3.  | Luxury       | 15. | Strong       |
| 4.  | Elegant      | 16. | High Quality |
| 5.  | Beautiful    | 17. | Light        |
| 6.  | Interesting  | 18. | Medium       |
| 7.  | Cool         | 19. | Medium       |
| 8.  | Simple       | 20. | Plain        |
| 9.  | Minimalist   | 21. | Batik        |
| 10. | Long Lasting | 22. | Motif        |
| 11. | Water Resistant | 23. | Stripes     |

The word Kansei that has been collected is then reduced so that it does not have the same meaning between the words Kansei with one another. The reduction of the word Kansei as in table 3 follows:

Table 3. Kansei word of bag products selected

| No. | Kansei Word       | Kansei Word Selected |
|-----|-------------------|----------------------|
| 1.  | Unique            | Cool                 |
| 2.  | Beautiful         | Elegant              |
| 3.  | Interesting       | Simple               |
| 4.  | Cool              |                      |
| 5.  | Luxury            | Elegant              |
| 6.  | Elegant           |                      |
| 7.  | Simple            | Simple               |
| 8.  | Simple            |                      |
| 9.  | Minimalist        |                      |
| 10. | Long Lasting      |                      |
| 11. | Water Resistant   |                      |
| 12. | Premium           |                      |
| 13. | Nice              | Long Lasting         |
| 14. | Good              |                      |
| 15. | Strong            |                      |
| 16. | High Quality      |                      |
| 17. | Light             | Light                |
| 18. | Medium            | Medium               |
| 19. | Medium            |                      |
| 20. | Plain             |                      |
| 21. | Batik             |                      |
| 22. | Motif             | Plain                |
| 23. | Stripes           |                      |

Recapitulation of the average calculation results for each attribute and category on the sling bag product for the existing word bag can be seen in table 4 below:
Table 4. Recapitulation of average product calculation results for sling bag

| No. | Kansei Word                     | Bag Material | The Shape Of The Bag | Bag Size | Color Of The Bag |
|-----|---------------------------------|--------------|----------------------|---------|-----------------|
| 1   | Not Interesting-Interesting     | 6.47         | 6.43                 | 6.20    | 6.43            |
| 2   | Not elegant-Elegant             | 6.43         | 6.53                 | 6.03    | 6.23            |
| 3   | Not simple-Simple               | 6.20         | 6.27                 | 6.00    | 6.40            |
| 4   | Not Last Long-Long last         | 5.93         | 6.07                 | 6.23    | 6.27            |
| 5   | Heavy-Light                     | 5.90         | 5.53                 | 5.47    | 5.87            |
| 6   | Not Medium-Medium               | 5.43         | 4.80                 | 5.23    | 6.10            |
| 7   | Plain-motif                     | 4.17         | 4.13                 | 4.10    | 4.33            |

Validity test
Following table 5 recapitulation of the results of the calculation of the validity test using the formula is as follows:

Table 5. Recapitulation of average product calculation results for sling bag

| No. | Category    | RCount | Rtable | Information |
|-----|-------------|--------|--------|-------------|
| 1   | Fabric      | 0.631  | 0.3610 | Valid       |
| 2   | Rectangle   | 0.564  | 0.3610 | Valid       |
| 3   | Medium Size | 0.599  | 0.3610 | Valid       |
| 4   | Color Variant| 0.789  | 0.3610 | Valid       |

Based on the data calculation, it is known that the total Pearson correlation value is above 0.3610, so it is concluded that the questions on the closed questionnaire of the sling bag product bag are declared valid.

Reliability Test
Following table 6 recapitulation of the results of the calculation of the validity test using the formula is as follows:

Table 6. Recapitulation of Test Results for Reliability

| No. | Category    | RCount | Rtable | Information |
|-----|-------------|--------|--------|-------------|
| 1   | Fabric      | 0.715  | 0.6    | Reliable    |
| 2   | Rectangle   | 0.733  | 0.6    | Reliable    |
| 3   | Medium Size | 0.721  | 0.6    | Reliable    |
| 4   | Color Variant| 0.675  | 0.6    | Reliable    |

Design of Sling Bag
The sling bag design results based on consumer desires can be seen in the picture as follows:
Figure 1. Front bag sling bag design

The selected category specifications are the shape of a rectangular bag with the chosen size being medium, with a length of 24 cm, width 8 cm, and height 18 cm. The length of the bag strap is 120 cm, with a rope width of 2 cm, buckle strap so that it can be shortened short. The selected color is a color variant, namely black and milk brown.

Figure 2. Design of a sling bag top view

The word Kansei desired by the respondent determines the design output decision. The design of this bag is formed from the greatest values of each item that often appears. The design of this bag is the result of consumer desires (Customer need) in which the specifications of bag material, bag shape, bag size and bag color are determined based on the Kansei word questionnaire, Kansei questionnaire, and closed questionnaire. This design also pays attention to selected Kansei words which are attractive, elegant, simple, medium, durable, lightweight and motifs.

5. Conclusion
The conclusions obtained are based on the results of processing, data analysis and research objectives, namely. The word Kansei which is a priority for the improvement of sling bag products from the research results is attractive, elegant, simple, durable, lightweight, moderate, and motive. The level of importance of each item that affects consumer tastes, among others, as follows, the sling bag material is made of fabric with 4 words Kansei that is interesting, light, medium, and plain, which has the greatest utility values of 2.27, 1.90, 1.43 and 0.17. The shape of the sling bag is a rectangle with 7 words Kansei that is interesting, elegant, simple, durable, lightweight, medium and motif, which has the greatest utility values of 2.43, 2.23, 2.40, 2.27, 1.87, 2.10, and 0.33. The size of the sling bag is a medium size with 5 words Kansei that is attractive, elegant, simple, durable and lightweight, which has the greatest utility values of 2.37, 2.57, 2.23, 2.13 and 2.30., The color of the sling bag is a color variant with 6 words Kansei that is attractive, elegant, simple, durable, lightweight and motifs, which have the greatest utility values of 2.47, 2.53, 2.10, 2.10, 1.93 and 0.77.

References
[1] Nagamachi M 2002 Kansei engineering as a powerful consumer-oriented technology for product development Applied ergonomics 33(3) 289-294
[2] Hartono M 2018 Kansei Engineering di Industri Jasa: Sebuah Pendekatan Ergonomi
[3] Ady W A G 2011 Pengembangan desain kursi roda khususnya pada lansia berdasarkan citra (image) produk dengan metode Kansei engineering

[4] Mu'alim and Hidayat 2014 Redesign of Packaging with Kansei Engineering Method Al-Azhar Indonesia Journal Saints and Technology Series 2 (4): 215-2

[5] Sugiyono 2011 Research methods, Alfabeta Bandung, Bandung

[6] Hardininingtyas D, Tama I P, Eunike A and Andriani D P 2016 Studi Faktor Kansei Pada Produk Berbasis Kearifan Lokal (Studi Kasus: Batik Malangan) Journal of Engineering and Management in Industrial System 4 (2) 151-160

[7] Lee S, Harada A and Stappers P J 2002 Pleasure with products: Design based on Kansei Pleasure with products: Beyond usability 219-229

[8] Nagamachi M and Lokman A M 2011 Innovation of Kansei Engineering CRC Press Boca Raton

[9] Nagamachi Mitsuo 2011 Kansei/AffectiveEngineering Taylor & Francis Group (Boca Raton)

[10] Nagamachi M, Okazaki Y and Ishikawa M 2006 Kansei engineering and application of the rough sets model Proceedings of the Institution of Mechanical Engineers, Part I: Journal of Systems and Control Engineering 220 (8) 763-768