Designing Souvenir Products Berastagi Clothes with Kansei Engineering Method

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Abstract. Consumer desire is something that is very vital to be criticized in product design. Clothing products are also known as the time changing industry, which is an industry that must continue to innovate to meet consumer desires. Berastagi clothing products are one of the typical souvenirs of the Berastagi tourism area. Based on a preliminary survey conducted on 84 tourists, 70.24 percent stated that the dress design was not attractive. As many as 70 percent of the tourists state that the design of these clothes is outdated. Therefore it is necessary to design new clothes designs. The method used in this study is kansei engineering to identify the kansei, items, and product categories that are consumer’s preferences. In this study, four questionnaires were used. The first questionnaire is an open questionnaire that is used to analyze the product word kansei. The results are obtained in the form of nineteen kansei words which will be used as input to the second questionnaire. Each kansei word was assessed by the respondent using a semantic differential scale. The results of the data adequacy test for the second questionnaire obtained N' value of 91 while the number of samples was 93 so that the data was sufficient. The results of the validity test state that all kansei words are valid. The reliability test yields a value of 0.907 or greater than 0.60 so that the data is considered reliable. MSA and KMO test results obtained all valid data. Questionnaire III was used to determine product stimulus. The results of the second questionnaire were analyzed for conjoint analysis in order to obtain 8 product stimuli. Questionnaire IV is used to find out the models used to fulfill each customer's kansei words. In addition, an analysis of the main preferences of customers was also carried out. The final result is that the model with the highest utility which is the customer's preference is clothing with cotton materials, ikat motif, cardigan models, white color, and long sleeves.

1. Introduction
Consumer desire is very important in designing a product in order to be widely accepted by the market [1]. Product design is done to create quality products and can meet the wishes of consumers so that products can be accepted and compete with competitors [2]. A good product should meet two basic characteristics. The first characteristic is physical factors consisting of basic performance needs, quality, capacity, and appearance. The second characteristic is the mental factor which is an aesthetic display that can attract consumers [3]. Product designs that have unique values or characteristics are more able to compete in the world of industry fashion [4].

The Fashion industry is an industry that never stops innovating at all times or is also known as the time-changing industry. Innovation in product appearance is necessary to maintain customer interest in the fashion product. Berastagi City is one of the iconic tourist attractions in Karo Regency, North Sumatra. In 2017, tourist visits to Berastagi reached 837,476 visits [5]. Berastagi has a temperature
between 16.40°C-23.90°C so that the air feels cool [6]. In addition to nature tourism, Berastagi is also known for its cultural tourism. Various souvenirs with Batak Karo Culture pattern can be found here. One of the typical souvenirs of berastagi tourism area is a dress with a typical batak pattern. However, based on a preliminary survey conducted on 84 tourists, 70.24 percent stated that the design of the clothes is less attractive. A total of 70 percent stated that the design of the shirt is very old-fashioned and does not correspond to the present era. The design of clothes available today in the market can not meet the expectations and desires of consumers so it is necessary to design new clothing products that are by the wishes of consumers.

One method that can be used to design products is kansei engineering which is a system of assessment based on feelings to produce a real component [7]. This method is used to translate consumer needs based on psychological feelings costumer into product parameters [8]. Kansei was introduced by Mitsuo Nagamachi (Dean of Hiroshima International University) as a method of engineering that involves sensitivity and feeling integrated by senses of vision, hearing, smell, taste, and skin sensation [9]. The application of Kansei Engineering Approach in product design will produce products that are effective and have high aesthetic value [10]. Product design is one of the main factors that are considered by consumers in choosing batik because the design of a product will affect the appearance, as stated by Kotler that design is a totality of privileges that affect the appearance and function of a product in terms of consumer needs [11]. Kansei engineering is used to determine the look and design of clothes that are in following the wishes of consumers.

2. Methodology

This research was conducted using questionnaires. There are 4 questionnaires used and there are several stages of processing of each quiz. The first is an open questionnaire that is used to collect customer perceptions that are transformed into kansei words from souvenir products typical of berastagi clothes. A total of three souvenir designs berastagi clothes in the market as an example to be responded by consumers. Kansei words from emotionally related consumers are used as a second questionnaire input.

In the second questionnaire, kansei's words compared to his opponent's words were then assessed by respondents using semantic differential 1-5. There are 4 steps of data processing carried out in this second questionnaire. The first step is to test the adequacy of the data to determine whether the collected data already represents the population. If the value $N' < N$, the data is considered sufficient [12]. The second step is to test the validity of the data with a significance of 5% to determine the invalid kansei word. If invalid, the kansei word is selected and a follow-up iteration validity test is performed until all kansei word is valid. The third step is a reliability test to see the consistency of a measuring instrument to measure the same symptoms. A measuring instrument is considered consistent if the Alpha Cronbach coefficient is above 0.6 [13]. The last step is the analysis of factors carried out to reduce variables that are related to each other [14]. Before factor analysis is performed, Kaiser Mayer Olkin (KMO) testing needs to be done as a condition. Factor analysis can be done if the KMO value is between 0.5 to 1.0 and vice versa if the KMO value is less than 0.5, the factor analysis cannot be done [15]. After the KMO analysis is fulfilled, a Measure of Sampling Adequacy (MSA) analysis is carried out [16]. The end result is valid kansei words and can be used at a later stage.

The third questionnaire is the preliminary questionnaire of the fourth questionnaire. The third questionnaire contains items and categories that have been made based on the preferences of existing Baju Berastagi souvenir products. In this questionnaire, each respondent chooses five categories and two items from each category that are considered by consumers in buying souvenir products Berastagi clothes. Five items with each of the next two categories are carried out conjoin analysis processing to determine the product stimuli. Conjoint analysis is done with a full profile approach.

In the fourth questionnaire, stimuli products are judged based on kansei words that have been formed on a semantic differential scale of 1-5. Number 1 is chosen if the design is considered very unattractive, number 2 is chosen if the design is considered unattractive, number 3 is chosen if the design is considered ordinary, number 4 is chosen if the design is considered attractive, and number 5...
is chosen if the design is considered very attractive. Respondents were asked to assess the suitability of the product model in each product stimuli against the words kansei. The processing of the fourth questionnaire is done by looking for utility values. The category that most supports kansei word is marked with the highest utility value. The result is a category of models of souvenir clothes berastagi from each kansei word.

3. Result and Discussion

3.1. Data Collection Questionnaire I

The questionnaire I is an open questionnaire used to collect kansei words based on consumer perception. A total of 40 respondents were asked to give an assessment and specification of the clothes they wanted. Words related to a user's feelings are taken as kansei words. The final hasi obtained as many as 19 kansei words shown in Table 1.

| No | Kansei Words | No | Kansei Words | No | Kansei Words |
|----|--------------|----|--------------|----|--------------|
| 1  | Closed       | 8  | Cheap        | 15 | Flexible     |
| 2  | Varied       | 9  | Colorful     | 16 | Natural      |
| 3  | Elegant      | 10 | Bright       | 17 | Not Slippery |
| 4  | Smooth       | 11 | Calm         | 18 | Not Sexy     |
| 5  | Absorb       | 12 | Simple       | 19 | Long         |
| 6  | Big          | 13 | Modern       |    |              |
| 7  | Thick        | 14 | Causal       |    |              |

3.2. Data Collection Questionnaire II

Questioner II is used to assess the kansei word that is the preference and desire of consumers using the semantic differential scale. A questionnaire was distributed to 93 people who had visited the tourist area Berastagi and had seen souvenirs directly Berastagi clothes. Respondents were asked to rate each kansei word with 5 semantic differential scales consisting of 1 (very disagree), 2 (disagree), 3 (neither), 4 (agree), or 5 (very agree). Furthermore, data is carried out data adequacy test, validity test, and relatability test.

- Data Adequacy Test Results
  The data adequacy test is carried out to see if the data can represent the population. The data adequacy test was conducted with a confidence level of 95%. The final result is an N' value of 91 while the number of samples is 93. It can be concluded that N > N' so that the data is said to be sufficient

- Validity Test Results
  A validity test is performed to determine a valid kansei word. The validity test is carried out with a significant rate of 5%. Based on the validity test, all kansei word is declared valid because the value of R calculates greater than the value of R table. The R-value of each kansei word can be seen in Table 2.
Table 2. Validity Test

| Kansei Words | $R$  | $R_{table}$ | Description | Kansei Words | $R$  | $R_{table}$ | Description |
|--------------|------|-------------|-------------|--------------|------|-------------|-------------|
| Closed       | 0.771| 0.202       | Valid       | Calm         | 0.531| 0.202       | Valid       |
| Varied       | 0.693| 0.202       | Valid       | Simple       | 0.759| 0.202       | Valid       |
| Elegant      | 0.299| 0.202       | Valid       | Modern       | 0.760| 0.202       | Valid       |
| Smooth       | 0.908| 0.202       | Valid       | Causal       | 0.757| 0.202       | Valid       |
| Absorb       | 0.869| 0.202       | Valid       | Flexible     | 0.772| 0.202       | Valid       |
| Big          | 0.362| 0.202       | Valid       | Natural      | 0.302| 0.202       | Valid       |
| Thick        | 0.460| 0.202       | Valid       | Not Slippery | 0.509| 0.202       | Valid       |
| Cheap        | 0.743| 0.202       | Valid       | Not Sexy     | 0.845| 0.202       | Valid       |
| Colorful     | 0.268| 0.202       | Valid       | Long         | 0.682| 0.202       | Valid       |
| Bright       | 0.207| 0.202       | Valid       |              |      |             |             |

- Reliability Test Results
Reliability tests are performed to see the consistency of questionnaires. Based on reliability test, the alpha cronbach value is 0.907. It can be concluded that the value is greater than 0.6 so that the data is declared reliable.

- Factor Analysis
Factor analysis is carried out to reduce variables that are related to each other. The first step in performing factor analysis is the KMO test. Based on the results of data processing, the kmo value was obtained by 0.877. The KMO value is greater than 0.5 so it is feasible to proceed to the next stage. MSA tests are performed to reduce invalid word kansei. The MSA test results are shown in Table 3.

Table 3. MSA Test

| Kansei Words | MSA count | MSA | Description | Kansei Words | MSA count | MSA | Description |
|--------------|-----------|-----|-------------|--------------|-----------|-----|-------------|
| Closed       | 0.895     | 0.5 | Valid       | Calm         | 0.797     | 0.5 | Valid       |
| Varied       | 0.844     | 0.5 | Valid       | Simple       | 0.903     | 0.5 | Valid       |
| Elegant      | 0.700     | 0.5 | Valid       | Modern       | 0.941     | 0.5 | Valid       |
| Smooth       | 0.926     | 0.5 | Valid       | Causal       | 0.952     | 0.5 | Valid       |
| Absorb       | 0.940     | 0.5 | Valid       | Flexible     | 0.958     | 0.5 | Valid       |
| Big          | 0.637     | 0.5 | Valid       | Natural      | 0.584     | 0.5 | Valid       |
| Thick        | 0.710     | 0.5 | Valid       | Not Slippery | 0.837     | 0.5 | Valid       |
| Cheap        | 0.910     | 0.5 | Valid       | Not Sexy     | 0.932     | 0.5 | Valid       |
| Colorful     | 0.571     | 0.5 | Valid       | Long         | 0.883     | 0.5 | Valid       |
| Bright       | 0.670     | 0.5 | Valid       |              |           |     |             |
3.3. Data Collection Questionnaire III

Questionnaire III is used to determine stimuli in questionnaire IV. Some of the steps taken in collecting and processing data questionnaire III are as follows:

- **Product Item and Category Determination**
  The first step is to determine the items and categories of products that will be the consumer's choice. The determination is based on the products in the market. Items and categories of souvenir products Baju Berastagi shown in Table 4.

  **Table 4. Item and Category Determination**

| Item      | Category | Item      | Category | Item      | Category | Item      | Category |
|-----------|----------|-----------|----------|-----------|----------|-----------|----------|
| Materials | Polyester| Color     | Red      | Motif     | Mandala  | Arm       | Arm ¾    |
|           |          |           |          |           |          |           |          |
| Spandex   |          | Chocolate |          | Geometric |          | Long      |          |
| Rayon     |          | Sky Blue  |          | Batik     |          | Short     |          |
| Cotton    |          | Purple    |          | Tie Dye   |          |          |          |
| Hyget     |          | Gray      |          | Floral    |          |          |          |
| Woll      |          | Green Grass|         | Connective|          |          |          |

Each respondent was asked to choose five items with each of the two categories that become the preference in buying souvenirs Berastagi clothes from all items and categories. Items and categories with the most preferences are shown in Table 5.

  **Table 5. Selected Items and Categories**

| Item      | Category | Item      | Category | Item      | Category |
|-----------|----------|-----------|----------|-----------|----------|
| Materials | Rayon    | Color     | Black    | Motif     | Connective|
|           | Cotton   |           | White    |           | Mandala  |
| Arm       | Long     | Model     | Cardigan |          |          |
|           | Short    | T-shirt   |          |          |          |

- **Conjoint Analysis**
  Conjoint analysis is carried out to determine the stimuli of the product. Conjoint analysis is done with a full profile approach. The results of conjoint analysis of rice products can be seen in Table 6.
### Table 6. Conjoint Analysis Results

| Stimulus | Material | Motif  | Model    | Colour | Arm  |
|----------|----------|--------|----------|--------|------|
| 1        | Cotton   | Mandala| Cardigan | Black  | Short|
| 2        | Rayon    | Mandala| T-shirt  | Black  | Short|
| 3        | Rayon    | Connective| Cardigan | Black  | Long |
| 4        | Rayon    | Connective| T-shirt  | White  | Short|
| 5        | Rayon    | Mandala| Cardigan | White  | Long |
| 6        | Cotton   | Connective| Cardigan | Black  | Long |
| 7        | Cotton   | Mandala| T-shirt  | White  | Long |
| 8        | Cotton   | Connective| Cardigan | White  | Short|

### 3.4. Data Collection Questionnaire IV

In questionnaire IV, respondents were asked to rate each stimulus based on kansei words using the semantic differential scale. The result is a utility assessment to determine the categories that can meet the words of the customer kansei. The category with the highest utility is shown in Table 7.

### Table 7. Utility

| Kansei Words (Utility) | Material (Utility) | Motif (Utility) | Model (Utility) | Colour (Utility) | Arm (Utility) |
|------------------------|--------------------|-----------------|-----------------|-----------------|--------------|
| Closed (0.221)         | Cotton (0.007)     | Mandala (0.186)| Black (0.057)   | Long (0.032)    |
| Varied (0.082)         | Rayon (0.025)      | Mandala (0.082)| Cardigan (0.096)| Long (0.032)    |
| Elegant (0.018)        | Rayon (0.060)      | Mandala (0.246)| Cardigan (0.067)| Long (0.032)    |
| Smooth (0.086)         | Cotton (0.007)     | Connective (0.043)| Black (0.021) | Short (0.028)  |
| Absorb (0.075)         | Rayon (0.032)      | Connective (0.075)| T-shirt (0.003)| Short (0.003)  |
| Big (0.028)            | Rayon (0.043)      | Mandala (0.014)| T-shirt (0.071)| Long (0.057)   |
| Thick (0.057)          | Cotton (0.079)     | Mandala (0.057)| T-shirt (0.021)| Long (0.100)   |
| Cheap (0.100)          | Rayon (0.021)      | Mandala (0.014)| Cardigan (0.092)| Short (0.043)  |
| Colorful (0.046)       | Rayon (0.003)      | Mandala (0.046)| T-shirt (0.154)| Short (0.060)  |
| Bright (0.003)         | Rayon (0.046)      | Connective (0.017)| Cardigan (0.553)| Long (0.017)  |
In addition to calculating the category utilization for each kansei words, utility calculations are also performed to determine the overall design that is the consumer's preference. The results of the overall utility calculation can be seen in Table 8. Based on utility calculations, categories that are in accordance with consumer desires are clothes with cotton materials, ikat motifs, cardigan models, white color, and long sleeves

| Material | Motif       | Model   | Colour | Arm   |
|----------|-------------|---------|--------|-------|
| Cotton   | Mandala     | T-shirt | Black  | Long  |
| (-0.367) | (-0.709)    | (-0.615)| (0.025)| (0.727)|
| Rayon    | Connective  | Cardigan| White  | Short |
| (0.291)  | (0.419)     | (0.368) | (0.479)| (-0.572)|

4. Conclusion

Based on the research obtained 19 kansei word that can meet the needs of consumers consisting of closed, varied, elegant, smooth, absorbing, large, thick, cheap, colorful, bright, calm, simple, modern, casual, flexible, natural, not slippery, not sexy, and long. There are 5 items with each consisting of two categories to meet the wishes of consumers. Utility calculations obtained that the design of clothes that can meet the needs of consumers are clothing with ikat motifs, cardigan models, white colors, and long sleeves. Research is recommended to continue by comparing the proposed design motif with the motif of the shirt that is currently on the market whether there is a difference in consumer preferences in buying both products.
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