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Affective design identification on the development of batik convection product

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Abstract. The affective design is increasingly applied to product development in order to meet the desires and preferences of customers. Batik is a traditional Indonesian culture containing historical and cultural values. The development of batik design is one of the efforts to strengthen the identity and superiority of Indonesia's creative industries as well as to preserve batik as the cultural heritage of the nation. Batik product designs offered by the manufacturers do not necessarily correspond with the wishes of consumers, especially the affective values involved. Therefore it is necessary to identify consumer perceptions of convection-based batik product in the form of clothing and fabrics, especially the affective value as the consideration for the designer or manufacturer to develop design alternatives to batik convection products. This research aims to obtain information on consumer affective value, to identify the affective value perception differences among X and Y Generation and to classify affective value in the corresponding cluster of the batik products convection. This study uses Kansei engineering to determine the perception of affective design in the form of Kansei word. Cluster Analysis was used to form clusters that classify affective value of the same class. The results showed that there were 16 pairs of Kansei word which was worth as an affective consumer desire, the 3 indicators that had significant differences among X and Y Generation and 4 clusters with different characteristics.

Keywords: Affective Design; Batik; Kansei Engineering; Cluster Analysis

1. Introduction

The affective design is increasingly applied to the product development in order to meet the desires and preferences of customers. Theoretically, consumer's satisfaction and technical aspects (e.g., functionality, ergonomic and comfort) are equally important in determining the success of product design [1]. Batik is an Indonesian traditional culture containing a historical and cultural value. Batik is not limited to the appearance of beauty that is formed from the harmonious composition of motifs and colors but it also has a spiritual beauty that comes through the decoration and preparation of a pattern that has a philosophical meaning. Batik has also been recognized by UNESCO as "Intangible World Heritage" since October 2009. The development of batik is a cultural heritage that begins from Kraton then seeps outside the community of Kraton and eventually forms the industry based on culture and is developed from one generation to the next.



The development of batik design is one of the efforts to strengthen the identity and superiority of Indonesia's creative industries as well as to preserve batik as the cultural heritage of the nation [2]. According to Indrojarwo [3] in his research entitled "Development of Indonesia New Batik Design by Exploration and Exploitation of Recent Context", batik design is related to pattern or patra, motif, variety, color, scale, and composition. The development of batik design can be classified by the type of patra, production process, location, and era. Batik design development has quite an opportunity in the derivation of ancient batik designs into thousands various colors, scale, and proportion. Batik designers also use a voice of consumers regarding the wants of consumers in design. It is important to analyze the affective value of consumers such as feelings or emotions and transform them into an appropriate design in new product development.

Kansei engineering was proposed as a methodology for the affective design of the product in early 1970. This methodology aims to translate human psychological processes, such as feelings and emotions, into elements of appropriate product design, such as size, shape, and characteristic. Kansei engineering was defined as translating technology of a consumer's feeling of the product to the design elements. Kansei engineering uses someone's impression obtained from the environment or other factors using the senses of sight, hearing, feeling, smell and taste to develop the products according to these responses. This method has been used by the automotive manufacturing company, Mazda, the sports car called "Miyata" and has been a best seller in the U.S and Japan [4].

Creative industries should be developed because it has a significant contribution to the Indonesian economy and the center of innovated creation and creativity development. Creative industries also attract creative workers who have a high talent and form creative communities and create many innovations echoed up to the international level [5].

This research aimed to obtain information on consumer affective value, to identify the affective value perception differences among X and Y Generation and to classify affective values in the corresponding cluster of the batik products convection. The research tried to develop batik design from the customer's voice by obtaining information about their wants, especially the affective design in terms of colors, and designs. This information helps designers to design batik convection product.

2. Literature review

2.1. Affective design

Affective is something related with attitudes and values. Affective includes characters and behaviors such as feelings, interests, emotional attitude and values. Some experts say that a person's attitude can be foreseen amendments when someone has high-level cognitive powers. Affective is divided into more details in five levels: receiving, responding, valuing, and organization, characterization by value or complex value.

Emotion/motivation comes from the style of design, function, form, usability and user's experience. User/consumer emotion is a hidden desire. Design can cause some responses like happy, upset, excited, frustrated, and so on. The design that can motivate the user/consumer emotion is called affective design. An example is the signage designed for the Umeda Hospital in Tokyo by the Japanese designer Kenya Hara [6]. Signage is a general term for any type of display graphics that are intended to convey information to the user. The results of study indicated that signage was made of cotton cloth; it provides a comfortable, soft feeling to soothe the patient's mind. Hence, this signage can drive the users into a certain kind of emotion response, and this is said to be *Emotional Design* [7].

2.2. Kansei engineering

The word Kansei means feeling, impression and emotion. Kansei engineering is a method to translate the image customers or consumers' feelings into real design components. Kansei engineering is a technology-oriented method enabling image on how consumers feel united to the design process of a new product. Kansei engineering is defined as the translation technology of consumers feeling (Kansei) about upcoming products into a design element. Kansei emotional structures exist under the attitudes or behaviors of humans. This structure refers to Kansei as a person.

2.3. Cluster analysis

Cluster analysis is a method of analyzing the data. Cluster analysis as one of the methods of Data Mining aims to group the data with similar characteristics to the same 'region' and the data with different characteristics to the other 'area', to get a group of objects that have the same values or characteristics. In principle, cluster analysis is a process to reduce the number of large objects into fewer called clusters. This method is used by researchers who do not know a member of a group [8].

3. Methodology

3.1. Sample

This research used stratified sampling techniques to explore affective design in batik convection product development. Samples were taken by dividing the population into groups according to the classification of Generation X (The Baby Bust) and Generation Y (The Echo of the Baby Boom). Generation X was born between the years 1965 to 1976 or around the age of 40 – 51 years old and Generation Y was born between the years 1977 to 1997 or around age 19 -39 years old. 50 respondents were selected out of the data from the Department of Cooperatives and SMEs Semarang in March 2016. The respondents are people who understand the convection-based batik product. They are a craftsman or producer of batik, and have a knowledge ability to fill out a questionnaire in accordance with their basic knowledge.

3.2. Determining Kansei word

Determination of Kansei word was obtained from the magazine source, the existing literature, users, etc. Kansei word identification was done by observation and small group discussion. The selected word is shown in Table 1.

Table 1. Kansei word.

Kansei ID	Kansei word	Kansei ID	Kansei word
X1	Bright – Gloomy	X9	Formal – Casual
X2	Plain – Gaudy	X10	Unoriginal – Creative
X3	Colorful – Colorless	X11	Heavy – Light
X4	Traditional – Modern	X12	Comfortable – Uncomfortable
X5	Childish – Mature	X13	Thin – Thick
X6	Elegant – Not Elegant	X14	Harsh – Soft
X7	Simple – Complex	X15	Flimsy – Substantial
X8	Cute – Not cute	X16	Stiff – Pliable

3.3. Determining and designing questionnaire

The questionnaire of semantic differential showed the feelings of the respondents. Tests using Semantic Differential method was done by giving the value on 7 scales of Kansei word. Respondents were asked to rate batik convection product in accordance with Kansei word that had been described on the questionnaire. The questionnaires also provided a column where respondents could pour desires concerned with batik convection products. Examples of scale on the questionnaire can be seen in Table 2.

Table 2. Scale on questionnaire.

Color	Brig	1	2	3	4	5	6	7	Gloom
	Scor	-	-	-	0	1	2	3	Score

4. Results and discussion

4.1. Perception of batik convection product

Customer perception of batik convection product identified by Kansei word trend in 16 indicators is shown in Table 3.

Table 3. Customer perception (CP) of product in close-ended questionnaire.

Affective Dimension	CP	Affective Dimension	CP
Bright	+	Gloomy	
Plain	+	Gaudy	
Colorful	+	Colorless	
Traditional	+	Modern	+
Childish		Mature	+
Simple	+	Complex	
Elegant	+	Not-Elegant	
Cute	+	Not-Cute	
Formal	+	Casual	+
Unoriginal		Creative	+
Heavy		Light	+
Comfortable	+	Uncomfortable	
Thin	+	Thick	
Harsh		Soft	+
Flimsy		Substantial	+
Stiff		Pliable	+

Table 3 shows that customer perception of the affective dimension image can be focused on the bright, soft and colorful colors. Respondents preferred a more traditional design but did not leave a modern touch and also the impression of mature and simple but elegant ones. The design is also not separated from visual cuteness and creativity, not a formal design. Respondents chose the type of material that was light, thin and soft that could cause a sense of comfort. Material also should be a strong and flexible.

4.2. Testing the questionnaire

There were 16 indicators performed on this test. Each indicator was valid if the value of r calculations on Corrected Item-Total Correlation was greater than the value of r table. Data were collected from 50 respondents and a significance level of 5% was used. Obtained r table was 0.279 and the value of r table on each indicator that exceeds 0.279 declared valid and was concluded that the result of questionnaire was valid.

Next test was reliability test to indicate the level of consistency of a questionnaire. Test was done by comparison of the value of Cronbach's Alpha to the value of questionnaire test results. When questionnaire test result had a value greater than 0.6, then this questionnaire was reliable.

4.3. T-test

T-test was used to determine differences in the average of two independent sets of data, which in this study was referred to as Generation X and Generation Y. Results from the SPSS by Independent T-Test showed the value sig (2-tailed). If the value of sig (2-tailed) < 0.05 , it means that the indicator has a significant difference from others. The result showed that few indicators had significant differences; plain-gaudy, flimsy-substantial and stiff-pliable. It could be concluded that the perception of respondents Generation X and Y could be distinguished by the aspect of color and statement of material belonging to the batik convection products.

In plain-gaudy indicators between Gen X and Y, the difference was that Gen X respondents tended to prefer a positive statement (gaudy), while Gen Y tended to prefer negative statements (plain). At the flimsy-substantial indicators, Gen X chose positive statements (substantial) with high scores while Gen Y was more likely to have a value that was spread on the positive statement. In the stiff-pliable indicator it was seen that Gen X dominated a high value on the positive statement while Gen Y had a distribution value on the positive statement (pliable).

4.4. Cluster analysis

The clusters used here was a hierarchical cluster analysis by using Ward Method. The number of clusters was determined by ward method at the stage of agglomeration. Agglomeration performed grouping one by one [10]. Output of cluster analysis classified respondent into 4 clusters. The next step was to divide the data into a form of clusters using K-Means method. The obtained results are shown in Table 4. The result of the average of each cluster according to the respondents' perception on batik convection product can be seen in Figure 1.

Figure 1 show that respondents in cluster 1 tended to agree with negative statements of Kansei of color aspect (bright, plain and colorful). In design aspects they chose a traditional design (mature, simple, elegant, cute, formal and unoriginal-creative). In material aspect they preferred a light, comfortable, thin, soft, substantial and pliable material. While respondents in cluster 2 had little in common with cluster 1, who were inclined to agree with negative statements of Kansei but with different average values, mainly the color aspect of bright-gloomy, plain and colorful, prefer traditional design (childish, simple, elegant, cute, formal-casual and creative), and on material they preferred a heavy, comfortable, thin, soft, flimsy-substantial and stiff-pliable.

Table 4. The cluster.

Cluster	Member
1	12
2	6
3	21
4	11
Total	50

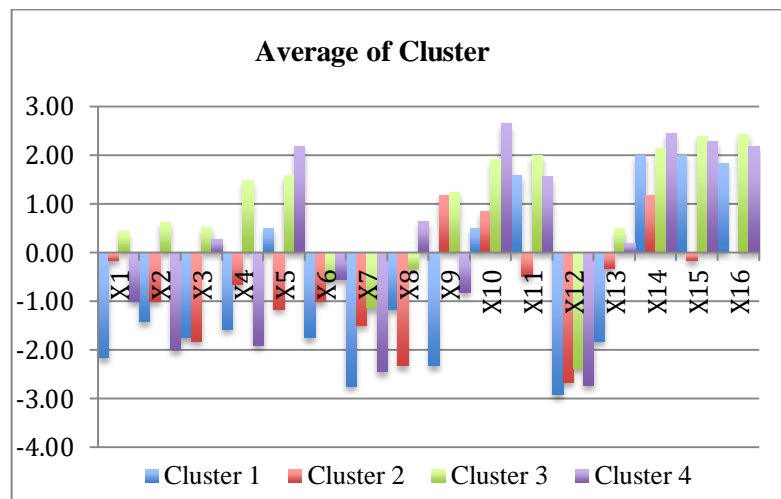


Figure 1. Average of cluster.

Respondents in cluster 3 tended to agree on a positive statement of Kansei on color aspect of gloomy, gaudy, and colorless; on design aspects of modern, mature, simple, elegant, cute, casual and creative; in the aspect of material that was light, comfortable, thick, soft, substantial and pliable. Respondents in cluster 4 looked balanced on both positive and negative statements of Kansei in terms of color aspect of bright, plain and colorless; in design aspects that traditional, mature, simple, elegant, cute-not cute, formal and creative; in the aspect of material that was light, comfortable, thin-thick, soft, substantial and pliable.

5. Conclusion

Based on the analysis and discussion it can be concluded that there are 16 pairs of Kansei word to reflect customer emotion on batik convection product. Overall, respondents tend to choose the bright, plain and colorful in the aspect of color; traditional-modern, mature, simple, elegant, cute, formal-casual and creative on design aspect; and light, comfortable, thin, soft, substantial and pliable in the aspect of materials.

Respondents in Generation X and Generation Y do not pay too much attention to other indicators. The respondents' perception of Generation X and Y can be distinguished by the aspect of color and preference on material of products. Gen X respondents tend to prefer a positive statement (gaudy), while Gen Y tends to prefer negative statements (plain). In flimsy-substantial indicators, Gen X

chooses positive statements (substantial) with high scores while Gen Y is more likely to have a value that is spread on the positive statement. In the stiff-pliable indicator it is seen that Gen X dominates a high value on the positive statement while Gen Y has a distribution value on the positive statement (pliable).

Cluster analysis form respondent into four clusters. The two dominant clusters are cluster three and cluster one. Cluster one with twelve respondents, has a high perception in color that is bright, plain and colorful; in design that is traditional, mature, simple, elegant, cute, formal and unoriginal-creative; the material is that light, comfortable, thin, soft, substantial and pliable. Cluster three consisting of 21 respondents has a high perception of the color that gloomy, gaudy and colorless; the design that is modern, mature, simple, elegant, cute, casual and creative; the material that is light, comfortable, thick, soft, substantial and pliable.

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