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Designing attributes of a multifunction table using the kansei engineering method

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ABSTRACT

CV JAYA MAKMUR is a company that produces rattan processing and produces furniture made from rattan and wood. This CV can produce 60 pieces of furniture per month and the delivery is 10 tables. The tables produced are ordinary tables generally available on the market. This research aims to obtain a design and prototype of a multifunctional table that is comfortable and practical for consumers using the Kansei Engineering method. The contribution of this research is to help declare Kansei Engineering as a method of processing values as input into product attributes as output. Kansei Engineering's development is a consumer-oriented ergonomics technology that is used to translate consumer feelings as a basis for developing new products. This provides an alternative, namely creating a product design that produces a multifunctional table product that allows achieving this function at a minimum total cost without reducing the quality of the product. Kansei Engineering is needed to produce products that meet consumer needs.

Keywords: Kansei engineering; table; multifunction.

1. INTRODUCTION

Products have a significant role in the industry. When purchasing a product, consumers must take into account aspects such as design, dimensions, color, material, and other additional features [1]. If consumers as the end party are dissatisfied with the appearance or additional features of the product, they may think again before making a purchase [2]. The demand for competitive capabilities and product development emphasizes the importance for designers to have high creativity and a good understanding of consumer preferences [3]. The level of suitability between the product and the consumer is one of the factors that determines the value of a product [4].

CV JAYA MAKMUR is a company that produces rattan processing and the production of furniture made from rattan and wood. This CV can produce 60 pieces of furniture per month and the delivery is 10 tables. The tables produced are ordinary tables generally available on the market. Reduced demand for tables by consumers because the size is too large for narrow spaces. The minimalist concept is a reference for consumers in choosing their table products. So this provides an alternative, namely creating a product design that produces a multifunctional table product. Apart from being made into a table, this multifunctional table can also be used as a bookshelf. The aim is to provide alternative multifunctional table product designs through the results of using customer satisfaction methods. The combination of characteristics of goods including color, packaging, price, brand, and quality, as well as service and customer views on sales which is the process of producing results carried out by producers or companies and then selling them to consumers or called products [5].

Kansei engineering is used to determine the design of the table that becomes the product at CV JAYA MAKMUR. Kansei Engineering provides input from respondents' opinions which can be used to redesign the table to be multifunctional [6]. Identify viable new product features for each existing feature and develop a set of alternatives that allow the feature to achieve to customer satisfaction [7]. The Kansai engineering method can develop ordinary table products into multifunctional tables with one of the advantages, namely consumer satisfaction [8]. The expected results of the Kansei method are to obtain maximum results that can be enjoyed by consumers and producers [9].

Previous research from the analysis of multifunctional sofa designs using the Kansei technique method can be concluded: There are 8 (eight) Kansei sentences selected based on survey data through the distribution of questionnaires allocated to the questionnaire above totaling 30 questionnaires [10]. Two ratings of design elements are selected from Kansei words: Rating 1, if the design element is influenced by the Kansei word, and Rating 0 if the design element is not influenced by the Kansei word [11].The results of the KMO and Bartlett tests show that the KMO sampling adequacy measure (MSA) is 0.669. Because the value is 0.669, which is greater than 0.5 and the significance level is 0.000 [12].Thus, it shows that there is a relationship or correlation between Kansei variables, and is worthy of being the object of further analysis [13]. The MSA of each Kansei variable exceeds 0.5, allowing advanced processing of all variables [14]. The results of testing the explanation of the Total Variance process show that of the eight variables entered, 3 factors were formed. Therefore, based on the decision criteria of the Kolmogorov-Smirnov normality test, it can be concluded that the data has a normal distribution.

The aim of the research carried out is as follows: To determine consumers' desires for tables ordered with Kansei's word. To determine the multifunctional table design using the Kansei engineering method.

2. METHOD

This research was conducted at a furniture company in Sidoarjo. CV JAYA MAKMUR is a company that operates in the field of rattan processing and the production of furniture made from rattan and wood [15]. This research was carried out for 3 months from January to March 2023 [16].

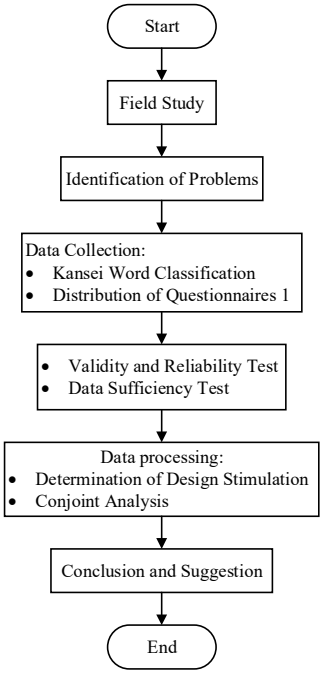

Figure 1. The flow of research implementation

2 RESULTS AND DISCUSSION

Kansei Word

From collecting kansei words, the results of collecting kansei words are obtained. The following is a table collection of multifunctional Kansei words.

Table 1. Kansei words.

No	Kansei Word
1	Comfortable
2	Innovative
3	Durable
4	Can be set
5	Affordable prices
6	Attractive color
7	Safe
8	Easy to move

Barlett and KMO Tests

The purpose of the Barlett test is to evaluate the correlation between the variables used, while the KMO (Kaiser Major Olkin) test is used to assess whether the samples taken are eligible for further analysis [17].

Table 2. KMO and Bartlett's test.

Data	KMO and Bartlett's Test
51	0,854

MSA is a useful statistic for assessing how accurately a variable is predicted by another variable with a small error [18]. In other words, MSA functions to measure attribute validity. The MSA value ranges from 0 (zero) to 1, and conclusions are drawn based on the MSA value that has been obtained.

Table 3. MSA.

No	Kansei Word	MSA value	MSA	Note
1	Comfortable	0.839	0.5	Valid
2	Innovative	0.856	0.5	Valid
3	Durable	0.868	0.5	Valid
4	Can be set	0.857	0.5	Valid
5	Affordable prices	0.836	0.5	Valid
6	Attractive color	0.821	0.5	Valid
7	Safe	0.908	0.5	Valid
8	Easy to move	0.872	0.5	Valid

Validity and reliability

The level of consumer importance is determined from a questionnaire where respondents are asked to choose four answer criteria: very unimportant, not important, important, and very important. The five response criteria will be evaluated using a Likert scale with values from 1 to 4.

Table 4. Validity.

No	Kansei Word	R Tabel (N=49)	Corrected Item Total Correlation
1	Comfortable	0.281	718
2	Innovative	0.281	637
3	Durable	0.281	708
4	Can be set	0.281	726
5	Affordable prices	0.281	543
6	Attractive color	0.281	548
7	Safe	0.281	439
8	Easy to move	0.281	642

The results in Table 4 of distributing interest level questionnaires to 51 respondents produced 15 statements from Kansei. Data is considered valid if the calculated r value is greater than or > than table r. The r table value in 51 respondents is 0.281 taken from the value df = N-2 with a significance value of 5%.

Table 5. Reliability test.

Reliability test	
Cronbach's Alpha	**Number of Items**
0.934	8

The reliability test is carried out after confirming the validity of the data processing results from the validity test. After ensuring the validity of all data, a reliability test was carried out. The reliability test results in Table 5 show a value of 0.934, which indicates reliable criteria. This shows that the consistency of the data in the questionnaire is very high, which means that if the questionnaire is distributed again, respondents will most likely give the same answers as before

Determination of design simulation

Rarely, determining the design plan, begins with determining the type and design drawing. The resulting stimulation is based on SPSS output through menus and writing a syntax editor

Table 6. Design simulation.

No	Design	Material	Color
1	Foldable	Wood	Bright color
2	Foldable	Stainless steel	Colorful
3	Simple	Wood	Dark Color
4	Can be removed	Wood	Colorful
5	Simple	Rattan	Colorful
6	Can be removed	Rattan	Bright color
7	Can be removed	Stainless steel	Dark Color
8	Foldable	Rotan	Dark Color
9	Simple	Stainless steel	Bright color

Conjoint analysis

Conjoint analysis is an analytical technique used to determine the perceived importance of a particular product and the utility value obtained from the product attributes in question

Table 7. Conjoint analysis.

No	Design	Material	Color	Total
1	Foldable	Wood	Bright color	207
2	Foldable	Stainless steel	Colorful	213
3	Simple	Wood	Dark Color	198
4	Can be removed	Wood	Colorful	214
5	Simple	Rattan	Colorful	215
6	Can be removed	Rattan	Bright color	196
7	Can be removed	Stainless steel	Dark Color	209
8	Foldable	Rotan	Dark Color	207
9	Simple	Stainless steel	Bright color	209
		Total		**1868**
		Average		**4,071**

Constant Value Calculation

$$Constant\ Value = \frac{\sum Robot}{n \times respondent} \quad (1)$$

$$Constant\ Value = \frac{\sum 207+213+198+214+215+196+209+207+2}{9 \times 51}$$

$$Constant\ Value = \frac{1868}{459}$$

Calculation of the utility value of design items

The utility value is obtained by subtracting the average of the item concerned from the average of all items. The average of related items is obtained by dividing the sum of the weights of related items divided by the total number of statements of related items.

$$Foldable\ design = \frac{207+213+207}{3\times51} - 4.10 \quad (2)$$

$$Foldable\ design = \frac{627}{153} - 4.10$$

$$= 4.10 - 4.10$$

$$= 0$$

Below are the overall utility values summarized in each design category.

Table 8. Overall utility.

Factor	Items	Constant	X item	Utility	X items - Utilities
Desain	Foldable	4,07	4,10	0,03	4,0697
	Simple		4,07	0,00	4,0697
	Can be removed		4,05	-0,02	4,0697
Material	Wood	4,07	4,04	-0,03	4,0697
	Stainless steel		4,13	0,06	4,0697
	Rattan		4,04	-0,03	4,0697
Color	Bright colour	4,07	4	-0,07	4,0697
	Colorful		4,19	0,12	4,0697
	Dark Color		4,02	-0,05	4,0697

The utility value results obtained from combined analytical processing produce significant values for each indicator or design element. The ultimate usefulness of each element lies in the technical parameters chosen for the multifunctional table design. The highest utility value was obtained in the folding design category with a utility value of 0.03, in the stainless-steel material category with a value of 0.06, and in the color palette color category it had a value of 0.12. The categories that have been selected are the final specifications for designing a multifunctional table.

A. Table recommendations

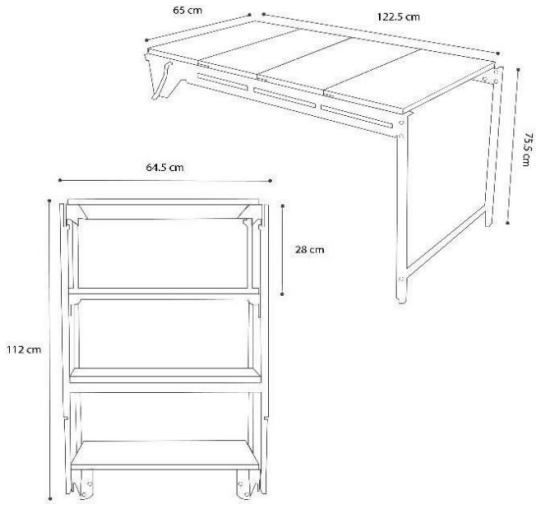

Figure 2. Recommended table design.

3 CONCLUSION

The results of the analysis and the research conclusions of multifunctional furniture property designers use the Kansei engineering method. It can be concluded that there are 8 Kansei words selected based on consumer surveys. Multifunctional furniture property design using the Kansei engineering

method. The Kansei words that have been selected have the following scores: Score 1: if the design element is affected or influenced by the Kansei word and Score 0: if it is not affected. The results of the KMO and Bartlett tests reflect that the KMO sampling size adequacy (MSA) is 0.854. This value is greater than >0.5 and the significance level is 0.000. So it shows that there is a correlation between the Kansei variables and needs special treatment. Each Kansei variable has an MSA value > 0.5 so that all variables can be processed further. The results of data validity testing show that of the 8 Kansei words tested, the level of validity is higher than the level of reliability (r > 0.3). The results of data reliability testing show that the 8 Kansei words tested have a level of reliability with a Cronbach Alpha value of >.0.6. Thus, it can be concluded that the data is normally distributed.

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