Herbal beverage packaging product design using kansei engineering

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ARTICLE INFORMATION	ABSTRACT
Article History - Article Submit 14/11/2022 - Article Revision 25/12/2022 - Article Accepted 30/12/2022	The appearance of the packaging on drinks is a required consumer attraction factor, because the appearance of herbal drinks will compete with manufactured beverage products. This article aims to identify consumer needs in the packaging design of the products, determine the design element in the herbal beverage packaging. This study discusses the design of herbal beverage packaging using the kansei engineering method. The kansei engineering method is a design method using the emotional approach of the respondents. The steps in solving using the kansei method are, the first step is to collect kansei words and structuring kansei words, the second is to determine the factors from the respondents' responses, the third is to calculate the relationship between the factors and the variables in it. The result of this research is to design a herbal beverage packaging that is adapted to the selected kansei words. Kansei words used as the basis for packaging design include practical, attractive, informative, quality packaging materials, colorful, medium packaging sizes, medium packaging forms, modern packaging forms, innovative, pictorial, recyclable, transparent packaging bottles, interesting writing fonts.

1. INTRODUCTION

Designing this packaging is a very vital strategy to support the increase in product selling value, because nowadays competition continues to increase and is getting tougher but people's consumption patterns are shifting to fast and practical products. With the appearance of a product that is less attractive, the achievement of a sale will not be achieved, with good packaging it can encourage the achievement of sales levels [1].

In the community business that produces traditional soft drinks or herbal drink, they should optimize the taste and packaging design so that they can compete in the market with modern product drinks out there [2]. The appearance of the packaging is a factor attracting consumers that is needed, because the appearance and shape of variations of herbal or traditional soft drinks will compete with manufactured beverage products, which have taste quality and packaging designs that make consumers interested in buying them. One of the promotions carried out by selling the herbal drink is through social media such as Instagram and Google Business. Thus, consumers who want to buy can only see the packaging [3].

Packaging may be viewed as an item that serves to preserve and safeguard the products contained within it, as well as to present a specific image to persuade buyers. Security, communication, ergonomics, aesthetics, identity, promotion, and environmental considerations must all be considered and displayed in good packaging [4][5].

This study aims to facilitate complaints from consumers of herbal drink, namely by making a herbal beverage packaging that is in accordance with the wishes of consumers, because a

good design is a design that is designed based on consumer needs and is supported by good quality and appearance [6].

This study employs the kansei engineering method, which improves the consumer's perception and emotion. This study redesigned the packaging for herbal beverage products, because consumers will choose packaging that they find attractive based on their feelings and emotions [7]. The advantage of analyzing using this method is that it is a method based on human feelings in analyzing a product packaging, and this method is also based on human sensibility towards an object that influences it in making a decision according to their needs and satisfaction [8].

2. LITERATURE REVIEW

2.1 Packaging

Packaging involves designing and producing the container or wrapper for a product" which means that the packaging process involves designing and producing activities, the main function of the packaging itself is to protect the product so that the product quality is maintained [9].

2.2 Definition of kansei

In Japanese, Kansei means sensitivity, while in English it is often referred to as Affective Engineering [7]. Kansei in more detail according to the Dainihon Japanese Dictionary: "Kansei: Sensitivity of a 9 sensory organ where sensation or perception takes place in answer to stimuli from the external world". Kansei is defined as a person's subjective impression of his surroundings that is captured by the five senses [10].

Kansei has several connotations in Japanese, including feeling, sensitivity, and emotion. When a consumer desires a product or service, sensory requirements such as elegant, affordable, distinctive, and so on emerge. This sensory requirement is known as a kansei. Kansei may thus be defined as a consumer's psychological and physiological perception of the desired product or service [11][12].

2.3 Kansei engineering

Kansei engineering has been used to design the Kansei for various products around the world. Kansei Engineering is a technology that enables the expression of human emotions during the design process. I have the perspective that Kansei is unique for different domains and also unique for different groups of people who use different goals, and use verbal instruments in their methodology [13][14].

2.4 Types of kansei engineering

Kansei Engineering has several types, each with a different method for dealing with problems. Nagamachi Types of Kansei Engineering, namely [15][16].
I.   Kansei Engineering Type-1 Category Classification
II.   Kansei Engineering Type-2 Kansei Engineering System (KES)
III.   Kansei Engineering Type-3 Hybrid Kansei Engineering System
IV.   Kansei Engineering Type-4 Kansei Engineering Modeling

2.5 Analysis factor

Factor analysis is used to determine which factors are dominant when describing a problem. In the context of statistical analysis, regression, and classification, one variable is referred to as the dependent variable or criterion, and the other as the independent variable or predictor. In factor analysis, the term "interdependence technique" refers to the process through which each independent set of relationships is identified [17].

3. METHOD

The research methodology is the steps taken to achieve the objectives of the research conducted [13], the steps in compiling this research are as follows:
A.   Identification of problem and goals
     Problem identification is the process of finding research problems obtained based on the

background and preliminary studies to be analyzed, examined or further evaluated. The purpose of this study is to identify consumer needs in the packaging design for beverage products from the Kansei word that has been obtained which also determines the many factors in the packaging design for herbal beverage products.

B. Collecting literature studies related to kansei engineering.
   Scientific journals and studies are needed for the development of theoretical frameworks in order to obtain practical methods or procedures to solve problems encountered during the research process. Journals and literature studies refer to reference books, or online journals or other research related to this issue.

C. Determine the characteristics of the respondents, the initial packaging of the initial herbal drink, and the questionnaire.

D. Collecting kansei words and structuring kansei words.
   Making a questionnaire for the first time, this questionnaire is useful for collecting kansei words or bringing up kansei words for herbal beverage packaging products in accordance with consumers' emotional feelings related to product functionality, understanding usability and emotional elements of product design, and evaluating herbal beverage packaging designs.

E. Conducting validity and reliability tests, grouping kansei words using factor analysis.
   Validity test was conducted to find out whether the questionnaire data that has been obtained for all items is valid or not. Reliability test to find out whether the data that has been obtained is reliable or not by looking at the Cronchbach Alpha output, if Croncbach alpha > 0.6 then it can be said that the data is reliable.

F. Determination of design elements by identifying factors in each category and attributes.
   Further factor analysis is carried out, namely carrying out this factoring process to determine whether all kansei words can be grouped into one or several factors. Factor determination can be seen from the eigenvalues of each component.

G. Herbal drink packaging design.
   In designing new packaging designs obtained from the stages that have been carried out.

H. Conclusion
   The conclusion contains the results of the goals that have been made which are then considered the results to be implemented in the real world. Suggestions themselves are constructive input or criticism for writers and for further writing to make it better.

3   RESULT AND DISCUSSION

3.1 Questioner development

The stage of making this questionnaire is useful for getting or bringing up kansei words regarding aspects of herbal drink packaging product design elements which are usually adjectives. Respondents from the first questionnaire that were distributed were resellers and consumers who had consumed herbal drinks with an age range of over 14 years. This questionnaire was distributed through a google form consisting of several questions to get creative ideas for the development of herbal drink packaging designs for the product.

3.2 Kansei word collection

Kansei words were obtained from the results after distributing questionnaires to respondents, based on kansei words that have been obtained from distributing questionnaires there are 72 kansei words. The following is a Table 1 of questionnaire question formats submitted to respondents.

Table 1. Questionnaire question format

Purpose	Numb	Question
Find product functionality	1	Have you ever consumed any beverage products in bottles?
	2	Do you know herbal drink products?
	3	Have you ever consumed the lemonade ice drink?

Purpose	Numb	Question
	4	Do factors in the packaging design of a product affect your decision to buy or consume the product? (examples of factors: Aesthetics, Size, Color, Image, BPOM)
Understand the usability and emotional elements of product design	5	Have you ever consumed any beverage products in bottles?
	6	What are the design elements that influence your perception of the Ice Lemonade herbal drink packaging design? (For example, Modern, Colorful, Aesthetic, Image, Expiry Date, BPOM, Attractive, Unique, Size)
Evaluate designs for human factors solutions	7	What kind of packaging design do you want for the shape of the herbal drink Ice Lemonade packaging design? (Example: Easy to open, Easy to grip, Light weight, Saves space, Ergonomic)
	8	In your opinion, what factors should be improved in the Ice Lemonade beverage product? (eg: Color, Aesthetic, Innovative, Unique, Image, Font, Logo)
	9	In your opinion, what are the design elements that characterize the herbal beverage product packaging for Lemonade Ice? (Example: Image Design, Color Combination)
	10	Please write down at least 15 words of expression or feeling that you want to reflect on the Ice Lemonade drink product packaging? (for example: Unique, Attractive, Informative, Practical, Ergonomic, Colorful, Saves space, Simple, Light, Big, Small, Fresh)

3.3 Kansei word structure

In structuring, kansei words that have the same meaning and purpose are grouped, then a selection is made from each group to represent the kansei words, and finally one kansei word that is representative of the group is selected. The results of the structuring can be seen in Table 2.

Table 2. Kansei word

No	Kansei Word
1	Practical
2	Interesting
3	Informative
4	Quality Packaging Materials
5	Coloured
6	Medium Pack Size
7	Modern Packaging
8	Innovative
9	Illustrated
10	Recyclable
11	Transparent Packaging Bottle
12	Interesting Writing Font Types

3.4 Kansei word structure

This stage uses a questionnaire that has a scale in each question that serves to measure the value that represents the point of view of the respondent. The scale used uses the numbers 1-5.

The questionnaire contains the "kansei word" (Kansei word) used from the selected kansei word and its opposite which will affect the impression of the product packaging.

3.5 Validity and reliability testing

Testing this questionnaire using SPSS 16.0. and divided into two parts, namely:

3.5.1 The validity test used was Correlation Bivariate and chose Person Correlations Coeficients as a reference and Two-Tailed on the Test of Significant. The variable is said to be valid if the value of Sig 2-tiled 0.05 and has a Person correlation > 0.361. Recapitulation of validity test results can be seen in Table 3.

Table 3. Validity test

No	Pearson Correlation	r Table	Result
1	0.657	0.1918	Valid
2	0.520	0.1918	Valid
3	0.523	0.1918	Valid
4	0.628	0.1918	Valid
5	0.63	0.1918	Valid
6	0.476	0.1918	Valid
7	0.515	0.1918	Valid
8	0.546	0.1918	Valid
9	0.692	0.1918	Valid
10	0.719	0.1918	Valid
11	0.723	0.1918	Valid
12	0.762	0.1918	Valid

3.5.2 After the variable is declared valid, the next step is to perform a reliability test using SPSS 16.0 software. The variable is declared reliable if the Cronbach' Alpha value is greater than 0.6. The following is the output of the results of the reliability test see Figure 1.

Reliability Statistics

Cronbach's Alpha	N of Items
.848	12

Figure 1. Reliability test

3.5.3 Grouping kansei words using factor analysis

The stages carried out include the following:

A. Variable testing with the KMO and Bartlett tests,

The results of the KMO and Bartlett tests can be seen in Figure 2.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.858
Bartlett's Test of Sphericity	Approx. Chi-Square	388.837
	df	66
	Sig.	.000

Figure 2. KMO and bartlett test

B. Anti images matrices tests

The results of the Anti Image Matrices test can be seen in Table 4.

Table 4. Anti images matrices test result

No	Kansei Word	Value MSA
1	Practical	0.893
2	Interesting	0.872
3	Informative	0.908
4	Quality Packaging Materials	0.896
5	Coloured	0.785
6	Medium Pack Size	0.699
7	Modern Packaging	0.851
8	Innovative	0.850
9	Illustrated	0.849
10	Recyclable	0.852
11	Transparent Packaging Bottle	0.906
12	Interesting Writing Font Types	0.888

From the results obtained, the MSA value for all Kansei Words is > 0.5. Shows that these components influence consumers in choosing herbal drink packaging.

C. Factoring process

In the factoring process, look at the eigenvalues of each component or kansei words. Eigenvalues function to find out that the component will be extracted into a factor whose number is in accordance with the number of components that have eigenvalues > 1. The results of testing the factoring and matrix processes can be seen in Table 5.

In the factoring process, look at the eigenvalues of each component. Eigenvalues function to find out that the component will be extracted into a factor whose number is in accordance with the number of components that have eigenvalues > 1. Based on the table formed 3 factors formed from 12 variables (Kansei Word).

Table 5. Process factoring result

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.684	39.035	39.035	4.684	39.035	39.035
2	1.148	9.567	48.602	1.148	9.567	48.602
3	1.016	8.467	57.069	1.016	8.467	57.069
4	.929	7.742	64.810			
5	.806	6.714	71.524			
6	.720	5.998	77.522			
7	.603	5.028	82.550			
8	.574	4.783	87.333			
9	.487	4.054	91.387			
10	.397	3.309	94.696			
11	.343	2.859	97.555			
12	.293	2.445	100.000			

Extraction Method: Principal Component Analysis.

D. Factor rotation

Factor rotation using the Varimax rotation method will clarify the position of a variable to be included in one factor or another. There is a factor weight (factor loading) which shows the magnitude of the correlation between the initial variables and the factors formed. The following is the result of factor rotation testing Table 6.

Table 6. Factor rotation result

Rotated Component Matrix^a

	Component		
	1	2	3
Pertanyaan_1	.566	.401	.002
Pertanyaan_2	.595	.248	-.392
Pertanyaan_3	.605	-.010	.097
Pertanyaan_4	.694	.058	.132
Pertanyaan_5	.611	.042	.402
Pertanyaan_6	.183	.132	.813
Pertanyaan_7	.016	.688	.396
Pertanyaan_8	.158	.809	-.096
Pertanyaan_9	.664	.306	.079
Pertanyaan_10	.507	.518	.208
Pertanyaan_11	.625	.404	.136
Pertanyaan_12	.575	.385	.436

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

E. The process of grouping based on factors

This process is done by entering the variable into a factor by looking at the value of the largest component matrix. If the value of the component matrix <0.5 then the factor loading value for each factor will be removed. The following is a table recapitulation of the results of grouping based on factors. Table 7 shows Kansei Word Grouping Rotation.

Table 7. Kansei word grouping rotation

Factor	Factor 1	Factor 2	Factor 3
	Practical	Transparent Packaging Bottle	Medium Pack Size
	Interesting	Inovative	
	Informative	Recyclable	
Kansei Word	Quality Packaging Materials		
	Coloured		
	Illustrated		
	Transparent Packaging Bottle		
	Interesting Writing Font Types		

Factor 1 is Function, Information, Materials and Packaging Design, then the second factor is packaging form and standardization, and the thir factor is packaging size.

F. Herbal drink packaging design

Determine design elements and attributes for herbal drink product packaging. The design process for herbal drink packaging is as follows:

- The attribute for practicality is by using packaging that makes it easy to hold and easy to open.
- Interesting, interesting attributes, namely by using a packaging design that has aesthetic value.
- Informative attributes, namely there is information about package size, there is a halal lIgo, expiration date, there is product.
- The packaging material used for this packaging design is plastic made from PET (Polyethylene Terephalate).
- The color of the packaging used in the packaging design is to use secondary colors which are a combination of the basic colors so that the colors obtained are not monotonous.
- The image attribute used is that there is an image that becomes the identity of the herbal drink packaging.
- The selected color transparent packaging bottle is a transparent or clear bottle packaging so that the contents and freshness of the product herbal drink can be seen.
- The type of interesting writing font used.
- The selected modern packaging form has a small mouth shape and the bottle shape used is a concave shape on the body of the bottle.
- Innovative for this new packaging design brings new ideas with recyclable packaging.
- Packaging can be recycled using PET-based packaging materials, due to the nature of the PET material, it can be recycled.
- The selected packaging size is using a medium packaging size with a packaging size of 500 ml

Based on the design of the herbal drink packaging that has been obtained. The following is the previous packaging design and the results of the new design of the herbal drink packaging. The Figure 3 is an image of a beverage packaging design that is already on the market, before the re-design process is carried out.

Figure 3. Old packaging design

Then, the Figure 4 new packaging design below is the result of a new herbal drink packaging design, after carrying out the process of designing a new design using the kansei engineering method. The image above shows a representation of some of the items and categories that have been identified as being important to consumers based on consumer feedback; however, the kata kansei that has been identified as being important to consumers is practical, informative, interesting, quality packaging material, coloured, medium pack size,

modern packaging, innovative, illustrated, recyclable, transparent packaging bottle, interesting writing font types.

Figure 4. New packaging design

4 CONCLUSION

Based on the research that has been done, the following conclusions can be drawn, Consumer needs obtained after going through the process of collecting kansei words for herbal drink packaging designs, obtained 12 selected kansei words consisting of, practical, informative, quality packaging materials, color, medium size packaging, modern packaging forms, innovative, pictorial, recyclable, transparent packaging bottle, attractive writing font type. Design elements obtained after conducting factor analysis by entering 12 variables into a factor by looking at the largest component value matrix, then 3 design element factors are obtained. Factor 1 is Function, Information, Materials and Packaging Design, then the second factor is packaging form and standardization, and the third factor is packaging size. The advantage of the new packaging design for herbal beverage product packaging is the shape of the packaging which has a curve in the middle of the bottle, making it easier to grip and carry everywhere. The mouth of the bottle is smaller than before, so it makes it easy for consumers to drink it, because it doesn't spill easily. On the packaging label there is complete information so that it can add value to consumer confidence because there is no need to worry anymore about this lemonade product. Then for the new packaging material using PET plastic where PET plastic is recyclable, so this packaging bottle is environmentally friendly.

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