A discourse analysis for capturing Kansei words on design elements of the tea beverage bottles

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ABSTRACT: *The Kansei consumers through words expression have been completed using mostly conventional techniques such as consumer surveys and expert interviews. However, the techniques were not optimal to get the essence of affective expression consumers, such in beverage packaging design. For those requirement, we proposed an objective method to capture consumer perception holistically, supported by computational and traceable formulation. This works proposed a discourse analysis to capture the consumers' expression through Kansei words. The methods consisted of the mechanism of Key Element Extraction (KEE) and centrality-novelty valuation message, which combined text mining and mapping characteristic tea drink bottle. The results showed discourse analysis effectively extracted keywords interpretation valuation as consumer Kansei words. The products attribute design became the topic trigger since the message contained in the discussion is the flavor that is unique and different, cheap and affordable prices with material and grooves on the bottle. The characteristics of topic trigger messages when the topic of discussion related to the shape of the bottle packaging design is easy to handle, easy to open, simple design, easy to carry. The evaluate to Kansei words showed that consumers preferred products that provided the impression on the eye-catching, seriousness, and ergonomic design type.*

Keywords: *Kansei, discourse analysis, text mining, design packaging*

I. INTRODUCTION

Innovation in packaging design elements can create a new market niche, providing a benchmark on the product, as well as maintaining the trust and loyalty of customers. To achieve them, designers and engineers strive to produce packaging in effective, efficient, safe ways, and contains information about the product. One of the innovations can be done by a company to the product is developing product packaging based on customers needs [1]. Because the understand the need of consumers is critical in the development of the product [2], designers must be able to configure the packaging elements that make the characteristic of the product, convey information, communicate the value and brand of the product [3, 4,5]. Packaging is a touchpoint that visually means 'touches', an mental picture of consumers to a brand [5]

Consumers pay attention to the design of the bottle, particularly on aspects of the human factor, i.e. functionality, usability and pleasurable [6]. Ready to drink (RTD) - beverages bottle packaging design has the characteristics of physical and graphic aspects, which give appeal and have words that can be expressed by the consumers. Bottle packaging design complexity is in addition to meet the design elements such as color, text, image and is also determined by the shape of the packaging and meets the ergonomic aspects. Furthermore, a form of packaging will determine the volume of packaging, product price, durability, and recyclability. The plastic bottle has an integral view of the attributes of the brand image, bottle shape, logo, label, typography [7,8]. Shape of the bottle packaging design is different for each package based on the capacity of the bottle, the bottle height, height and width of the bottle body, the neck and shoulder angle of the bottle, the bottle-opening design, ease of gripping, the color of the bottle cap, bottle color and shape of the bottle. Consumers convenience while drinking is influenced by the flow volume from the bottle to opening and adjustability of the flow [9].

Consumer satisfaction for drinking is influenced by the design variables such as the opening diameter, material, and shape of the bottle. For example, the design of the cap and hand grip can lead to difficulties in the uncapped bottle that affect consumers satisfaction [10]. Furthermore, bottle packaging design can affect the ease of recycling and the manufacturing process so that the material and shape of the bottle should be uniform, but the diameter of the bottle cap can still be altered, adapted to consumer satisfaction. For example, the diameter opening of RTD packaging bottle that is optimum for convenience and satisfaction in adult consumers in Japan is 33 mm, where the diameter opening of the bottle on the market, i.e. 28 mm and 38 mm were felt very small and large [11]. Therefore, it is important to consider RTD bottle packaging design that is comfortable for all ages, gender, an aspect of culture, demography.

Research development of packaging design based on customer needs has been widely studied. [6] concludes that the evaluation on the product should also consider pleasurable-human factor and is based on the holistic view. Many methods and techniques in quantitative or qualitative have been developed to analyze consumers needs for a product [12]. However, consumers needs for a product, particularly the design of packaging, with regard to issues of utility, functionality, aesthetics, prestige, usability and pleasure are still needed to be done [2]. Knowledge on the expression of a consumer on design elements of packaging will make it easier to produce a product that is able to attract the attention of consumers because the average time required by the buyer's decision to buy a product is about 2.6 seconds and 70% of decision-making occurs in a shop or supermarket [13].

The ability of engineers to produce products that understand the emotional aspects and able to understand the mind of the consumers requires intuition and artistic expertise. However, this is not based on the perspective which has measuring parameters, does not have a rule – standardized method. A standardized method in developing packaging design should be able to capture consumer expression in the early stage of the design process on the characteristic of packaging design elements. Consumer perception of the design elements is important because the overall effect of the packaging does not come from a single element but from an organized whole element, working together to form a holistic design.

Therefore, important for a designer to get the expression – perception of the consumer beyond standard ideas, and originality. How a holistic view of customer needs – products pleasure can be extracted into the ideas in a Kansei word? [14] states that this can be done by discourse analysis through the extraction of keywords by participants. The importance of discourse analysis as synthesized from [15] is to determine the key expression of holistic of packaging design, the factors that differentiate between design elements and impression on the brand of a product that can be generalized. [16] states that at this time, extraction of words automatically in text form is very important. The results of text extraction can be in the forms of singular and plural words. Problems in single words are lacking to provide intact knowledge, so as to overcome, the authors propose a text mining mapping message.

Basically, the activity of discourse analysis is the analysis of the text to search for information, studying the distribution of word frequency, pattern recognition and extraction of information. Text analysis now is known as text mining, refers to the process of deriving high-quality information from text. The text is containing high-quality information if it is the combination of relevance, novelty, and interestingness. Extraction of keywords in the discussion which contains innovative and creative ideas and terminology could be called Kansei words.

Kansei Engineering (KE) is a method for developing a product design based on the perception of consumers by learning emotions and connected with the attributes of a product [16]. [17] explain that areas of research and the implications of Kansei engineering in product development require methods and tools are integrated. The basic assumption of the research method of KE is there is an influence effect on the relationship between the response of emotions and the attributes of a product. KE method is supported by many quantitative instruments in capturing consumer perceptions related to design elements. KE method has the ability to bridge the two directions in product development, i.e. the first, a manufacturer that pro-active develops and sells products to consumers (products out concept), the second is the idea of product development from the point of market needs (market-in concept).

Based on the explanation above, this study was conducted on beverage packaging in order 1) to analyze the pleasurable perception of the consumers, 2) to capture the holistic idea based on the key extraction of text 3) to analyze and map Kansei words and design elements of bottled tea. This paper is organized as follows, i.e. chapter 1 introduction, chapter 2 methodology and research setup, chapter 3 result, and discussion, chapter 4 conclusions, and recommendations.

II. METHODS

2.1 Product identification

It is a study on one of the ready to drink (RTD) products, i.e bottled tea. The packaging industry in this product P_c is growing rapidly, where the researchers have observed such product P_c in minimarket and see the diversity of design on the packaging. Product characters on the bottled beverages are trying to influence the perception and encourage consumers to consume through the visualization of packaging design elements. Innovation of visualization on the design elements based on the pleasurable aspect makes the product provoke curiosity and encourage consumers to try it. To obtain information on the product, the researchers identified the design elements E_e and sub-elements of the design E_{f,E_e,P_c} through expert opinion, literature study and observations of researchers. Products observed P C, c = {1,2, ..., 20} is derived from a variety of bottled RTD in Indonesia, both for products which have long known by consumers as well as new products. The products were observed from different brands and also variants of the same brand.

2.2 Participants identification and discussion session

The study began by analyzing the consumer's perception through focus group discussion (FGD). FGD was conducted three times in Indonesian languages so $G_a, a = \{1,2,3\}$. Each FGD was attended by seven participants $R_{b,G_a}, b = \{1,2,...,7\}$. The participants were people with a lifespan of 18-30 years old. Filling the questionnaire to retrieve data semantic differential is a new student. The sampling method using probability proportional stratified random sampling. This technique is used as a heterogeneous population, have certain characteristics, so that the sample size in each stratum or group is taken proportionately. Actually, the population in these ages has a very large market potential with a total amount of nearly 43,000,000 peoples (*BPS*, 2013). In addition, people in this group of ages are very responsive to the changes in the product.

When the implementation of FGD, participants observed aspect of the design elements of bottled tea $P_c, c = \{1,2,...,20\}$. FGD was composed of eight questions $T_d, d = \{1,2,...,8\}$ to get a statement and creative ideas to the evaluation and development of packaging in the context of functionality, usability and pleasureable. The topic of question was made by considering three aspects. First, the questions of involvement interaction to make participants feel comfortable with the topic of discussion by asking general matters related to the understanding and knowledge of functionality about the product preferred. Second, the exploration questions to obtain the contents of discussions related to the usability and perception on the product. In this case, consumers were asked about what they thought about the product design P_c and what elements E_e and sub-elements E_{f,E_e,P_c}, which make it preferable. Third, evaluation questions of design elements E_e, their expectations for the sample design, and innovative solutions to the deficiencies of design P_c.

2.3 Prepocessing text

As soon as the FGD was completed, FGD audio recording was translated into transcripts $D_{g,G_a}, g = \{1,2,3\}$. Each D_{g,G_a} containing messages $M_{h,G_a,T_d}, h \in Z$, so $D_{g,G_a} = \{M_{1,G_a,T_d}, M_{2,G_a,T_d}, ..., M_{h,G_a,T_d}\}$. Each M_{h,G_a,T_d} containing the original words $W_i^0, i \in Z$ of participants. To be able to identify words W_i^0 in each D_{g,G_a} tokenizing had done with space markers. Furthermore, the words W_i^0 were standardized by using a dictionary to be a standard word W_i^* which had previously been filtered to remove words that are not relevant to the Kansei words on packaging design. Filtering process was done manually with stop word list. Standardization of the words was conducted because participants using an expression that was not standard in the discussion, so it is necessary to find synonyms of standard word W_i^*, this process was done manually. After all the words in the D_{g,G_a} are standardized, all messages of M_{h,G_a,T_d} with the same topic of each document of D_{g,G_a} were grouped in the document $D_{g,T_d}^* = \{M_{1,G_1,T_d}, M_{1,G_2,T_d}, M_{1,G_3,T_d}\}$.

2.4 Keywords extraction

After text processing is completed, the next stage was word extracting. In the document D_g^*, T_d word extraction was done by using Key Element Extraction (KEE) method. The author adopted KEE algorithm that has been developed by Yasui [14]. Explained that KEE is the process of extracting keywords W_i^* to find the words often spoken by group members R_b during discussion G_a. KEE has two aspects, i.e. the terminology score $S(W_i^*)$ and participants score $S(R_b)$. Terminology score $S(W_i^*)$ which has a high score means it involves understanding of having creative and innovative ideas. Discussion participants R_b who have a high score means having the ability to contribute in the topic of discussion T_d. Participants and terminology scores were obtained by first calculating the weight of each word $\propto_{W_i^*}$. The mathematical formulations based on the idea [14] as follow.

Define the message M_{h,G_a,T_d} of each participant R_b in any document D_{g,G_a}. $D_{g,T_d}^* = \{M_{1,G_1,T_d}, M_{1,G_2,T_d}, M_{1,G_3,T_d}\}$. The proposed algorthim to calculate weights generality, weight particularity and term weight, respectively.

$$Wg_{W_i^*} = \frac{ln\left(\sum_d^8 \sum_h^H M_{h,G_a,T_d,R_b}^{W_i^*}\right)}{ln\left(\sum_d^8 \sum_h^H M_{h,G_a,T_d,R_b}\right)} \tag{1}$$

$$Wp_{W_i^*} = \frac{\sum_h^H M_{h,G_a,T_d,R_b}^{W_i^*}}{\sum_d^8 \sum_h^H M_{h,G_a,T_d,R_b}^{W_i^*}} \tag{2}$$

$$\propto_{W_i^*} = Wg_{W_i^*} \times Wp_{W_i^*} = \tag{3}$$

Participants scores and term scores are calculated as equation follows

$$S(R_b) \rightarrow \sum_{(R_b,W_i^*)\varepsilon E} S(W_i^*) \times w(R_b, W_i^* \times \propto (W_i^*) \tag{4}$$

$$S(W_i^*) \rightarrow \sum_{(R_b, W_i^*)\varepsilon E} S(R_b) \times w(R_b, W_i^* \times \propto (W_i^*)$$

(5)

The words SW_i^{*o} generated through the process of KEE were assumed as the Kansei words SW_i^{*o} on the packaging design elements. The authors will get hundreds of words SW_i^{*o} as consumers expression for the rating of design elements E_e bottled tea P_c. The Kansei words SW_i^{*o} were sorted by highest score and displayed in a graphic of trend line. Kansei words that were on the slope will be selected as the material for the next research step, i.e. to make the questionnaire Kr.

2.5 Measuring centrality and novelty

Information about the innovation does not just come from ideas that are often discussed but can also come from outside the main interesting conversation (peripheral). [14]state that the Kansei words SW_i^{*o} obtained through the algorithm KEE is a mainstream idea (centrality). To get an idea of holistic then added novelty criteria. Message (message) the results of these calculations will be a Kansei words $SW_i^{*o}cn$. Stages centrality measure and novelty as follows.

Centrality cr and novelty nt measurements were described as follow. Centrality cr is the number of messages $(M_{1,G_a,T_d}, M_{2,G_a,T_d}, \dots, M_{h,G_a,T_d})$ emerging as the center of discussion. Notation Mv is a vector of message value obtained from KEE calculation. Definition of centrality, i.e. $cr=max_{i \leqslant j < i+k} Mv(M_{h,G_a,T_d,i})$, $0 \leq cr M_{h,G_a,T_d,i}) < 1$, where $Mv(M_{h,G_a,T_d})$ is a message value $M_{h,G_a,T_d,i}$ by calculating a set of k message. $\{M_{h,G_a,T_d,j-k+1}, \dots M_{h,G_a,T_d,j-1}, M_{h,G_a,T_d,j}\}$. Centrality cr later was transformed in score with a range of -1 to 1. Mapping of centrality cr was resulted from the following function calculation.

(6)

$$cr'(M_{h,G_a,T_d,i}) = \begin{cases} \dfrac{cr(M_{h,G_a,T_d,i})}{e-1} & \text{if } cr(M_{h,G_a,T_d,i}) < e \\ \dfrac{\{cr(M_{h,G_a,T_d,i})-e\}}{1-e} & \text{if } cr(M_{h,G_a,T_d,i}) > e \end{cases}$$

Novelty nt is the message contained something new where the term W_i^* delivered was not mentioned in previous conversation. So novelty nt was based on the number of words W_i^* new in each message where the score of novelty is high when initiating a new topic in discussion. If the discussion D_{g,T_d}^* contained a series of messages $(M_{1,G_a,T_d}, M_{2,G_a,T_d}, \dots, M_{h,G_a,T_d})$, then novelty nt was assumed with $nt(M_{h,G_a,T_d}) = nt'(M_{h,G_a,T_d})$. Notation $nt'(M_{h,G_a,T_d})$ was the number of words that did not appear in the message set $\{M_{h-1,G_a,T_d}, \dots, M_{h+1,G_a,T_d}\}$. Novelty nt was transformed into a score with a range of -1 to 1 into $nt'(M_{1,G_a,T_d,i})$. N was the vector that stored the message of novelty. $Max\ N$ indicated the threshold if the $nt(M_{h,G_a,T_d}) > max\ N$ then $nt(M_{h,G_a,T_d}) = 1$. $Min\ N$ showed the lowest score N. The equation as follow

$$nt'(M_{h,G_a,T_d}) = \frac{2 \times nt(M_{h,G_a,T_d})}{max\ N - Min\ N} - 1$$

(7)

After completing the calculation of the centrality and novelty scores then proceed to make a map of the plot (figure 1). On the map of the plot, there were four areas that have the characteristic of a message, each of which, i.e. triggers topic $M_{h,G_a,T_d}tt$, potential chances $M_{h,G_a,T_d}pc$, topic follower $M_{h,G_a,T_d}tf$ and trifles $M_{h,G_a,T_d}tl$. Triggers topic $M_{h,G_a,T_d}tt$ had high novelty and centrality where the message generated brought new ideas and influenced the course of the discussion. Potential chances $M_{h,G_a,T_d}pc$ had a high value of novelty and low centrality, which had something new but few participants who pay attention to the message being delivered. Message in this quadrant may be a source of ideas for new product development. Characteristic of message on topic follower $M_{h,G_a,T_d}tftf$ was gave some ideas on topic and provided ideas or in-depth view on the discussion that took place. Trifles message $M_{h,G_a,T_d}tl$ produced did not affect the course of the ongoing discussion, which means that participants gave a quick-brief answer.

KEE results and information from the message mapping of centrality and novelty were used as a material for making the questionnaire Kr. Kansei words SW_i^{*o} compiled and sought for antonym $SW_i^{*o'}$ (B') by using a dictionary. The Kansei words SW_i^{*o} and $SW_i^{*o'}$ was later rated by respondents using semantic differential technique with a scale of -3 to 3. Respondents Rp gave their rating in the form of questionnaires to the design elements existing in bottled tea.
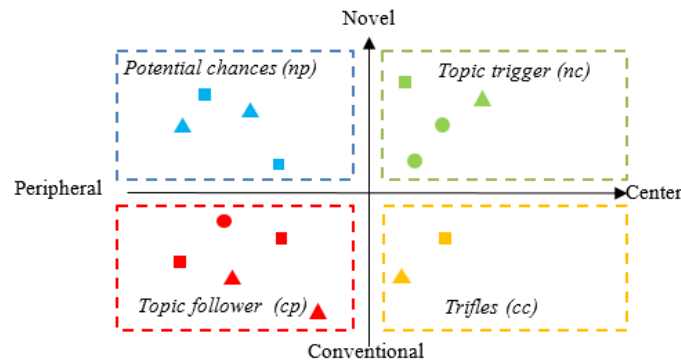
Fiure 1. Message feature map

As we know, to facilitating the computation of text mining, researchers create programs using Java language, that is to analyzing and compute tokenizing, filtering, alfa value, participant matrix, message matrix, KEE and centrality-novelty.

2.6 Analysis on Kansei words structure

The principal component analysis will be used for this study to analyze Kansei words resulted from discourse analysis. The researcher need to interpretation Kansei words from discourse analysis and find relation it's with design element of packaging design. Affective packaging design is a way of communication producer to the consumer through design elements, to obtain emotional experience of the consumer [18]. To determine the emotional relationship of Kansei words that have been obtained through a discourse analysis of design elements bottled tea drinks then be mapped to both. This is intended to get knowledge is design elements that make up the expression of Kansei words consumers, and whether consumers can know exactly the purpose of packaging.

The words have been grouped will help designers understand the affective consumers because the data set is already experiencing a reduction in dimensions. The purpose of PCA was to find the best low-dimensional representation of the variance in the multivariate data set. The dimensional reduction that does not eliminate the character of data, will simplify the data by transforming data in a linear manner to form the new coordinates by calculating the variance.

In this study, PCA was calculated by using the R programming. The steps are as follow, the research data is tabulated, calculated the average evaluations of participants and displayed in a matrix. Kansei word matrix $\{y_1, y_2, y_i, ...y_n\}$ x m bottled tea sample. Finding maximum of variance, after that calculating eigenvalue and eigenvector scores. Calculating Principal Component Score (PCs), indicated sample placement along the principal component. The principal component score provided a mapping of Kansei words with the products observed. Later, design elements found on the product were interpreted.

III. RESULT AND DISCUSSION

3.1 Consumers Perception of Pleasurable

From the discourse analysis on participants – consumers about an aspect of the design elements of bottled tea then words that contain elements of functionality, usability, and pleasurable were generated. Jordan (2000) states that designing pleasurable product can be approached with the concept of KE, which can help designers to understand the relationship between the formal properties and experience properties. For this case, the setting in the initial implementation of the FGD is very crucial, therefore, research topics to the participants were quickly explained, the rules of implementation of the discussion, and to the participants mentioned no wrong answer. Construction of questions on any FGD was made in systematic in order to explore the pleasurable of consumers.

Conversations on each FGD later were transferred into text form to be explored further. [19] mentions that text mining is classified into two types, namely statistical and semantics method. The statistical method is based on the frequency of words appearing in the text while the semantics method considers the meaning of words and how the features of words in the sentence structure. Analysis of interviews by using text mining will generate an understanding of the important words and relationship among words in a document. Several examples of FGD results are shown in Table 1 below.

Table I: Example of conversation results in the form of text on FGD 1

Discussion 1. What your favorite the tea beverage bottle packaging? Why	
(R₁)	My favorite drink is tea bottle sosro. The reason is often tough on tv. Formerly know bottled tea. Because if you want to buy that at first find it first. Because if I want to buy it in the search first
(R₂)	like teh botol Sosro, it feels different. Sosro if I see a more familiar, sosro probably more ahead in promoting.
(R₃)	I like Frestea, there are fruit-flavored drinks. The taste usual tea bitter. Price 11 12, at reasonable prices.
(R₄)	Plastic packaging is preferred Nu Greentea. I prefer to drink tea without sugar, so Nu Greentea similar to the original tea

Participants mentioned that their favorite drink tea flavor is influenced by 66% while it was stated that the design elements of the tea bottle have caused interest to find and purchase the products as much as 61%. Participants said that the decision to buy their favorite beverage was influenced by aspects of the products flavor, packaging, pricing, availability in a large amount, drinks volume, drinks aroma, many advertising and pioneer products. Consumers discussed that aspect of the packaging was influenced by elements of bottle shape, colors, label, images, and text. The expression of participants needs on the product and design elements in the tea packaging is tabulated in Table 2.

Expression of the participants towards their favorite drinks was associated with the elements of bottle shape that are comfortable to grip, there are bottle grooves, a proportional and packaging dimension that is fit to bag's pocket. Expression of the image elements on favorite drinks is simple, represents the product, and fresh. Elements of colors are expressed with not striking, natural, represent the product, and have a balanced composition. Elements of text are expressed in good words, orientalist, clear, legible, visible, simple and the font type that is harmonious with the image. Elements of the label, there is a *halal* logo, simple, informative, contain events promotion. This is in accordance with those mentioned [4, 8].

Table II. Expression of consumers' needs on the design of RTD bottled tea

No	Need	Expression
1.	Functionality	Aspects of taste, packaging attract attention and informative
2.	Usability	Bottle sizes corresponding hand, the image of an impressive unique and fresh, the writing easy to read simple and obvious, bottle easy to carry comfortably in the grasp-simple, a label that has the concept of a strong and clear, the composition of natural color, graphics seem manipulative, design packaging represents taste
3.	Pleasurable	Pleasurable consumer products and innovations suggested participants are bottle shape comfortable to hold, the bottle cap is opened and closed, the mouth of the bottle, the volume of bottles, packaging materials sturdy, packing more informative, bottle shape is unique, the basic bottle, robust design describes the content drinks, stickers do not cover the surface of the bottle.

Usability of participants on design elements at the time of the FGD was expressed by the size of the bottle corresponding to the grip, image that is giving an impression of unique and fresh, legible, simple and visible writing, bottle is easy to carry - comfortable to grip - simple, a label which has a strong and clear concept, natural colors composition, the graphics that seemed manipulative, packaging design represents flavor. Evaluation of consumers' products and innovations suggested by the participants are bottle shape that is comfortable to grip, the bottle cap that is easy to open and close, the bottle opening, the volume of bottle, sturdy packaging material, more informative packaging, unique bottle shape, sturdy bottle base, design describes the drinks content, stickers do not cover the surface of the bottle. The initial analysis of the expression of consumers' phrases and elements conducted with language processing based on the closeness of meaning.

Tabulation above is an information for the authors in classifying the relation between expression and design elements of packaging. Tabulation above does not describe the power of words generated. However, it is important to understand the direction of the conversation based on words expressed during the discussion and mapping of the product.

3.2 Text Mining and Kansei words extraction

The function of KEE is to find keywords in discussions by extracting the words in the text. The process of the algorithm will produce people who are active during discussions and keywords used by providing ratings to the participants and the words used. By applying KEE for discussion regarding consumers preferences and expression then Kansei words that represent a rating of consumers on the design elements of the bottled tea will be obtained.

Conversation on each FGD had been transferred into the form of a text was analyzed with the java language program to conduct words processing, counting KEE and message mapping based on the centrality-novelty score. The change of FGD material to text mining is a technique to get the benefit and interest of patterns, understanding the important words and relationship among words that are becoming information from the document. Synonym words then were performed in the text because participants expressed the expression of words in accordance with their respective terminology in the verbal conversation. The synonyms process was done for words that are not standardized and carried out with referred to the Indonesian Dictionary. Phrases

were conducted to ease the interpretation, for example, participants words that have one meaning merged into one word.

The tokenizing process of the results of this process was in the form of words which had been separated based on the spacing. The number of separated words at each discussion was calculated. This was done to ease the counting process of KEE. After these words were processed by tokenizing, then filter step was conducted. At this step, the word filtering used a stop word list obtained from a source already existed on the internet and also a few additional words of stop word list created by ourselves.

As soon as text processing was completed, the data were used to calculate Key Element Extraction (KEE) that is term weight, participant score, term score. Researchers get hundreds of Kansei words, which subsequently created the graphics for selection Kansei words. Kansei words with the highest scores are in the top of the slope, and was chosen to Kansei word as representative of keyword extraction. Table 3 shows a few of Kansei words, result of KEE calculation as follows.

Table III. Kansei words of the results of KEE calculation

Kansei word	KEE value	Kansei word	KEE value
tacky	0.932	suitable	0.152
easy to open	0.880	interesting	0.148
eyecatching	0.801	classic	0.125
balanced	0.774	tasteless	0.124
different	0.712	simple	0.122
excellent	0.707	modern	0.120
representative	0.707	ergonomics	0.112
refresh	0.581	pioneer	0.111
describe the product	0.546	masculine	0.110
solid impression	0.542	diverse	0.110
pretentious	0.542	feminine	0.109
special	0.542	beautiful	0.108
familiar	0.493	complicated	0.108
comfortable	0.489	fat	0.106
easy to carry	0.464	eccentric	0.105

3.3 Novelty and centrality of the message

Participants responses R_b in the form of Kansei words SW_i^{*o} through discourse analysis had provided a view that there was an interest of them during discussion on the design elements of packaging. Participants stated that the things they preferred, giving arguments to the existing design and innovation needed with regard to pleasurable aspect. Information from the consumers is very needed which strengthen points of view, provide a holistic knowledge in product development. Characteristics of the messages that were becoming topic a trigger, i.e. high novelty and centrality when the theme of the discussion related to the participants' favorite tea were *TBSls, FrtTA, NuGt, TeK*. The products became the topic trigger since the message contained in the discussion is the flavor that is unique and different, cheap and affordable prices, material and grooves on the bottle. Plotting results of characteristics mapping are in Figure 3 and 4 below.
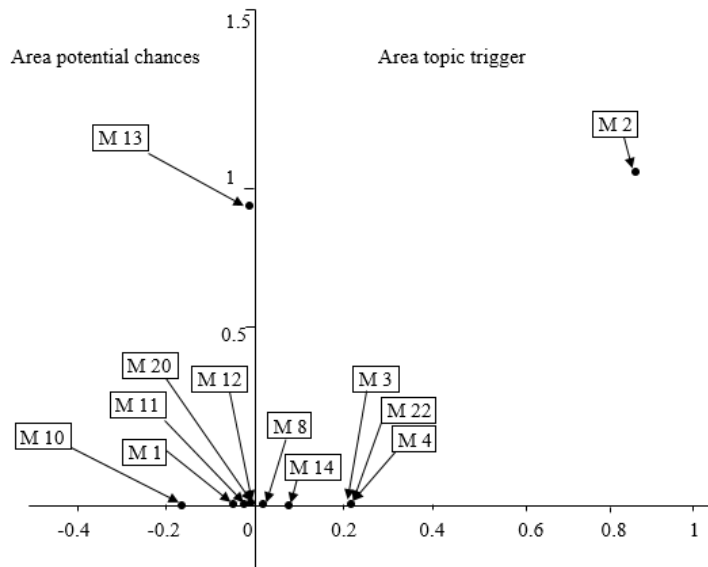

Figure II. Topic triggers message of favorite tea

Characteristics of the message that were becoming topic trigger when the theme of discussion related to the shape of the bottle packaging design were ergonomic aspects of the participants argued that the bottle is easy to carry, bottle cap that is easy to open, artistic indentations, sleek design, slim body, the bottle which has grooves. The substances of the message that had ideas and new topics (potential chances) for discussion theme of bottle design shape were a bottle has a suitable grip, simple design, stickers do not cover the surface of the bottle, the handle grip too far down, the volume of packaging, bottle shape, proportional design, groove on bottle cap, sturdy bottles base, slim body, product information, handle for adult, packaging material. Messages that were becoming the topic trigger and the potential chances were becoming inputs to make questionnaire in addition to the value generated by KEE.
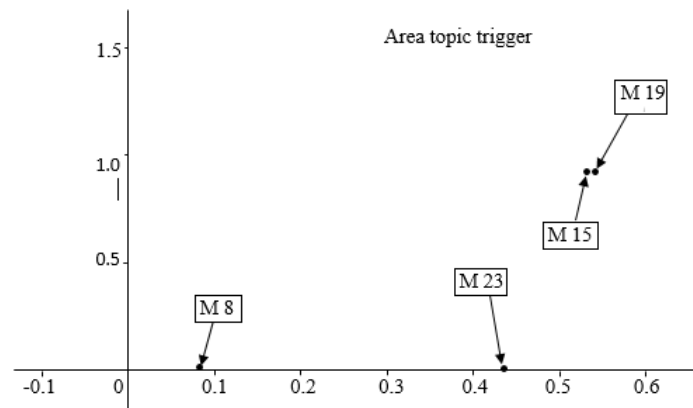

Figure III. T*opic triggers* messages of the shape of bottle packaging

All Kansei words of KEE were redefined so there were no words that have the same meaning or intention. This process was done manually with the help of synonyms process. The words were collated and then searched for their antonyms. The results of this process coupled with the message mapping of centrality and novelty, then the questionnaire formed is as follows. Kansei words structured in the form of a questionnaire of the results of discourse analysis were used to assess the expression of consumer preferences toward.

3.4 Reduction Kansei words

Kansei words as results of KEE and novelty-centrality were structured as inputs to make the questionnaires. A method for measuring the level of rating of consumers on the object was a semantic differential with a measuring scale of -3 to 3. Questionnaires sampling results data were carried out by 32 men and 41 women. The semantic differential data of survey results on the consumers are presented, the scores were obtained from the average results. The highest score of Kansei word of 'nice' was obtained by the products of F17GT, *IOHny, KyGT, Mocha, Mte, TPHrm, FTG, FrhA, NuGT, WTJm, ITHju*. The above data were expressions of Kansei words and preferences value of respondents on the design elements. The data semantic differential tabulation in the table are shown in Table 4 below.

Table 4. Semantic differential tabulation data

No	Product	nature	groove	x_i	x_j	common	plain
		1	2			69	70
1	FrshTA	1.139	1.177	...	...	0.405	0.215
2	FTG	1.342	1.127	...	...	0.772	0.899
3	FTPth	1.038	0.975	...	...	0.443	0.557
4	FrtTA	0.658	1.025	...	...	0.684	0.354
5	FrtTEx	0.519	0.823	...	...	0.570	0.215
6	F17GT	1.405	1.570	...	...	0.215	0.076
7	GTJsmn	0.899	0.747	...	...	1.228	1.025
8	IOHny	1.658	1.114	...	...	0.443	0.316
	y_i	...	...	...	...	...	...
	y_j	...	...	...	...	...	...
21	Thjau	0.861	1.203	...	...	0.582	0.633
22	TJvn	1.127	1.443	...	...	0.291	0.481
23	WTJm	0.936	1.321	...	...	0.241	0.241
24	WTLe	0.937	1.291	...	...	0.152	0.190
25	Zta	1.000	0.671	...	...	0.722	0.835

These data were used as a matrix for evaluating the data set. [20] states that multivariate data set consisting of *n* observations and *m* variables so as to produce a matrix *X* with dimension *n x m*, where *n* is the number of lines to be observed in this case was a sample of bottled drink and *m* column for a variable of Kansei words. A correlation matrix was calculated to obtain the scores of eigenvector and eigenvalue. Plot results of eigenvector score were presented in the form of screen plot, where there was four eigenvectors considered as representative of the entire data set. On the first PC, the highest negative score was the highest words of elegant, matching, artistic, creative, luxurious, aesthetic, expressive, trendy, eye-catching, attractive and modern. We interpreted this as an impression of Kansei word of eye-catching. Giving the name of eye-catching due to having the most number of synonyms.

3.5 Mapping and evaluation element of the product

Mapping and analysis of Kansei words with design elements discussed with dividing the plot into four quadrants. The evaluation of the Kansei words and design elements that characterize in comparison with the data focus group discussions. Image as a result of plotting by using script R statistical software package was remade for easy reading by words re-positioning. The products were observed to study the expression of the relation of consumers to RTD design elements was written in abbreviated.

The mapping was divided into four quadrants, with each quadrant has clustering results of Kansei words (Fig.5). In the first Principal Component, opposition between Kansei words of eye-catching and not artistic. In the second Principal Component, the opposition between Kansei words of serious and tacky. In the first quadrant, Kansei words clustering were masculine, mature, plain, dark-somber, simple, not striking, monotonous and classic. In the second quadrant, Kansei words clustering were original, natural, represent the product, informative, easy to open, easy to carry, good groove, matching, good, proportional bottle, innovative, aesthetic and elegant. The second quadrant gave an interpretation that Kansei words in this cluster represented the aspect of ergonomics and respondents gave the meaning that there was innovation in products. In the third quadrant, Kansei words clustering were trendy, expressive, eye-catching, feminine, young, bright, colorful and modern. In the fourth quadrant were not solid, already opened, uninformative, tacky, abstract, not good, mismatched, disproportionate and not elegant, and not exotic.

The first Principal Component on the left side, there was a product such as *F17GT, Mocha, FrshTA, WTLe* and WTJm, where the expression of Kansei word for this product was eye-catching with design elements display that was artistic, expressive, creative, matching, elegant and attractive. On the right side, the products were *GTJsmn, Lcha, Zta* with an expression of Kansei word for such products were not artistic, simple, not comfortable to touch, plump and common. At the top of the second principal component, Kansei word expression was serious with the products, i.e. *MTA, TBSls, Tjvn* and *NuGt*. At the bottom, the expression of Kansei word was tacky, represented by product *FrTex, FrtTA*.

The expression of eye-catching on the product of bottled tea was due to design elements of color and form of text. On *F17GT*, the dominant colors were red, white and blue with contrasting color sharpness, sanserif font type with readability and legibility on the font display. On the product of *FrtTA.*, color sharpness was contrast, label color represent the product, the dominant colors were green-blue-maroon. *Mocha* had a contrast color sharpness, the dominant colors on the label were black-green-gold, scrif font type with readability and legibility. [21] state that the increase of color saturation is causing potential associated with perception. [5] state that the red color on the design of the packaging used to attract attention, perceiving about the warmth, love, enthusiasm. The blue color is a symbol of power, dignity, and wisdom, but also associate to peace, relaxation. The green color perception is serenity, life, youth and freshness as well as the picture of health.

Mapping of Kansei words in the second quadrant was easy to open, comfortable to grip, easy to carry, exotic, fresh impression classified as an ergonomic expression. A representative of products for the words was *IOHny, TJvn, Kiyora*. Characters of *IOHny* were having a grooved shape, curve in the middle, pictures of tea leaves – tea garden – water droplets – ice cube – glasses – and Kanji words. In *TJvn*, the consumers gave the impression of one of them was exotic, where the word was characterized by the image of tea leaves – rippling water, serif font type, and large font size, proportional font, readability-legibility with the upper horizontal position. The exotic word of *TJvn* also came from the contrast color sharpness with the colors composition of red-white-black-green. The images of *KGT* were tea leaves - water droplets – rippling water – Kanji words. Moderate color sharpness with yellow-green colors composition. *KGT* was expressed ergonomic because it had a groove and curve in the middle of the bottle.
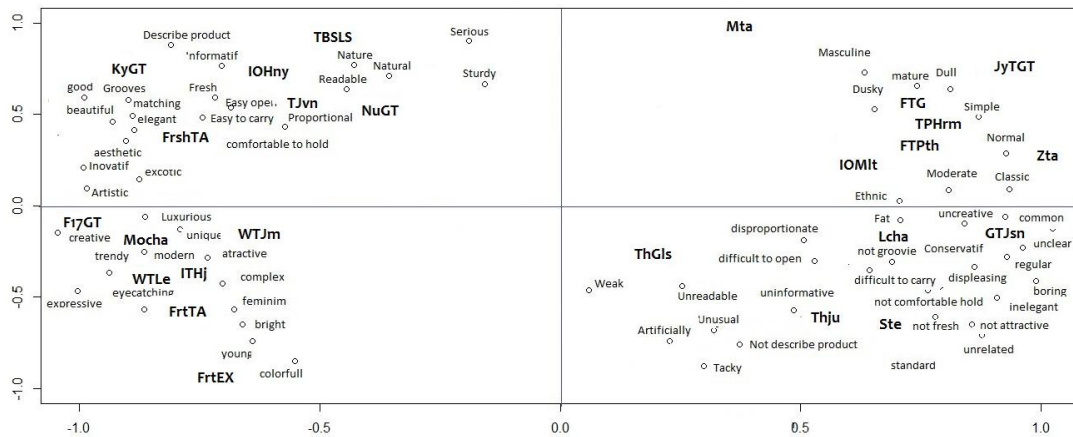
Figure 5. Graphic visualization PCA Kansei words and product

[21] state that the angular shape tends to be associated with energy, toughness, and strength, while a shape form has a perception of approachability, friendliness, and harmony. Further mentioned that the suitability of the elements of shape-color (angular shape combined with highly saturated color or shape rounded combined with lowly saturated color) will bring a positive impression on the overall impression of the product than the incongruency shape-color (angular shape combined with lowly saturated color or a rounded shape with highly saturated color). [22] states that there is a relation between the shape of the packaging with the words Kansei. [23] mentions the geometric shape of the packaging gives a key factor in bringing the product to the consumer. The packaging shape can dominate feature to know the brand identity, and colors are used to differentiate between products.

Words cluster of uncreative, not artistic and mismatched and monotonous was not artistic. Products in the word group were *Lcha, GTjmn* and *Stee*. Not artistic was presented by the design elements of image and colors. In *Lcha*, the images were leaves and sunflowers and the colors on the label were red, yellow and green. On the product of *GTjmn*, the image illustrations were one of tea leaf and the quite unclear mountains. The dominant color was green. This product had a shape that did not have a curve and looked plump by the consumers. On the product of *Ste*, the dominant colors were red and green with the images were the tea leaves and water droplets.

Kansei word of serious-masculine was represented by *Mta* and *TBSls*. Based on FGD this word was characterized by elements of image and color. *Mta* had images of tea leaves and water droplets, a single color of black on the text and contrast colors label: white-black-green. Association of a serious impression of *Mta* product by consumers was strengthened by the statement of [5] that the black color in product design and packaging design can communicate the impression of serious, reliability, represent the strength, clarity, luxury. The font type San serif big size with vertical position further reinforce the impression of masculine, as it is also called by the participants at the time of FGD. Typography should reflect the personality of the product and clearly, visualize the communication strategy [5]. Masculine word on *Mta* was also in the near quadrant with the serious word. This means that respondents characterized *Mta* product as serious-masculine. *Mta* had grooves and the curved middle body. [18] state that the packaging forms are classified into the volume, dimensions, proportional and shapes.The product *TBSls*, the font size of serif font type was small with horizontal-upper position and single color. Curved body shape also gave an impression of sturdy, since a result of the reduction of the word to the word was close to Kansei words of sturdy and easy to carry. The color was looked moderate with sub-elements of white and maroon. Kansei word expression of serious was also characterized by an element of a single colored serif font.

Kansei word of tacky was represented by the products of *FrtTEx* and *FrtA*. From FGD, the word 'tacky' was represented by elements of the picture, color, and label. The colors sharpness on both products was categorized as moderate, which the overall color of label represented the products. In *FrtA*, the dominant colors were red, yellow and silver. In *FrtTEx*, the dominant colors were purple, yellow and red. So it clear that the expression of 'tacky' was caused by the colors listed on the label of packaging design.

Kansei words of masculine, dark-somber and mature from the PCA results were grouped into one cluster. Products in this Kansei words group were *FTG* and *TPHrm* and *FTPth*. From FGD results, word of masculine was derived from elements of the image, color, label and bottle shape. Elements of the image of *FTG* were the tea leaves with water droplets, had a curve in the middle of the bottle, moderate color sharpness, the overall color of label represented the product and the dominant color was green with white color on the logo. *TPHrm* had contrast color elements, the overall color of label represented the product, the dominant color was red and white color on the font of the products, the picture was the tea leaves - water droplets, and the shape of

the bottle had a groove. *FTPth* had a curved groove in the middle of the bottle, moderate color sharpness and the overall color of the label did not represent the product, the dominant colors were yellow and white, the picture on the label were tea leaves - water droplets. [23] mention that humans have limitations in visual attention when looking at a product or brand on the shelves of shopping. Therefore, there must be features that warrant the visual attention of consumers. In terms of shape and contrast color dominated the initial phase of the search of product.

IV. CONCLUSION AND RECOMMENDATION

Implementation of discourse analysis had have explainded the detail of pleasurable aspect for the consumers design elements on bottled tea. Expression of the participants on the design elements in the course of the discussion was defined as consumers Kansei words. Combining the methods of key element extraction and message feature map had strengthened the holistic idea to formulate consumer Kansei words, i.e. the main and peripheral idea. The study also found that participants were able to analyze the products functionality, usability and emotional aspect of the product and gave attention to the human factor aspect on the design of bottle packaging. Participants identified design elements on the bottled tea, i.e. color, text, images, labels, and aspects of the packaging shape. Design elements of bottle packaging had visual perception expressed by the consumers in the form of Kansei words ratings. The results of ratings were the relation between Kansei words and the products had been clustered and mapped so that a product is called eye catching due to the design elements of color and form of writing. Kansei word expression of tacky was represented by the elements of image, colors, and labels. The product was assumed not artistic and not creative due to the shape that did not have a groove and looked plump. Finally, we purpose the changing process from voice recording into the text should be made through direct transfer. Completion of the process of translation can facilitate the work and time efficiency in the process of KEE, wherein Kansei words were obtained in real time as discourse analysis performed.

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