

A Semantic Differential Study of Kansei Words on Packaged Beverage Products

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Abstract: *This study was aimed at determining Kansei space in various categories of beverage products based on the semantic differential method. There are 14 pairs of adjectives used to measure psychological impression or feeling toward the following six categories of beverage products: fruit beverage, tea beverage, carbonated drink, isotonic drink, mineral water, and coffee milk. Factor analysis was used to determine a Kansei space. It was Kansei hierarchy that has higher levels and more general. The results showed that the number of components of Kansei space for various categories of beverage products was not the same. Kansei space was composed of four components in the fruit beverage category: youthful, warm-energetic, gentle, and dignified; three components in the tea beverage category: natural-luxurious-gentle, dignified, and warm-youthful; four components in the carbonated drink category: youthful-amusing-energetic, stimulating-gentle, masculine-international, and relaxed; three components in the isotonic drink category: gentle-international, amusing-natural, and stimulating; three components in the mineral water category: modern-dignified-luxurious, international-warm, and natural-youthful; and three components in the coffee-milk category: international-dignified, gentle-masculine, and modern.*

Keywords - *Kansei/affective engineering, Kansei space, affective need, product design*

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I. INTRODUCTION

Beverage products belong to the category of fast-moving consumer goods (FMCG). These products are growing rapidly in Indonesia along with the changes in lifestyles. This also encourages the development of similar products and creates market competition. Therefore, producers should be able to produce beverage products that can be easily accepted by consumers in order to be profitable. Furthermore, producers need to know the factors that underlie the ways in which consumers select products. When selecting products, consumers do not only consider the function, quality, or price but also the emotional aspect. Products that are designed to meet functional aspects only can no longer be used for competitive advantage. Jiao et al., suggested that functional and affective needs are of primary importance to customer satisfaction [1].

In order to satisfy consumers, the product development process needs to consider the affective needs of consumers, such as product design. Affective design is a representation or inclusion affect (emotion, subjective impression, visual perceptions) in affective engineering [1]. This method was developed to obtain subjective impressions (which in Japanese is called Kansei) of the product. Kansei engineering (KE) is one of the affective engineering methods. This method is an effective technique in translating human Kansei (feelings and desires of consumers as the product domain) into product design elements [2].

Kansei is a state of mind that describes feelings toward a physical object, either a product or the environment, through the five senses [3], which are often referred to as psychological feelings [4]. Kansei is described as higher mental functions of the brain function, so Kansei can only be measured indirectly and partially [5], using an external measurement tool [4]. Gathering Kansei data or psychological feelings is an important stage in Kansei engineering because that is the information that describes affective consumer needs, feelings, and emotional states [1].

The Kansei engineering method has been widely applied, especially to durable goods. Among others it has been applied in the automotive industry, electronics, home appliances, architecture, daily tools, and work equipment [6,7]. The utilizations of the Kansei method/affective engineering are mostly applied to FMCG packaging design. Barnes et al. developed a KE tool kit and packaging technique for industry [8]. A packaging design on moisturizer packaging was developed by Henson et al., and Barnes et al. [8,9]. Application on the packaging of beverages was carried out by Barnes et al., in Nagamachi and Luo et al. [10,11].

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In their study, Luo et al., developed the 12 attributes of Kansei to assess the fitness between the quality perception of the consumer and product designer expectation [11]. The study was conducted on six groups of beverage products, with product design packaging as a variable of the research. The results of a preliminary study by Luo et al., indicated that consumer and designer information is important for the development of the packaging design in order to obtain a high level of matching quality [11]. The studies that used the perceptual matching method did not examine the Kansei word and Kanseispace, which are specific to each category of drinks. The aim of this study was to obtain more specific information about the Kansei word and Kansei space for each category of beverage products. This is necessary because research examining the attribution of Kansei word and Kansei space to the various categories of beverage packaging is still limited.

One of the methods used to gather psychological feelings (including emotions, moods, impressions, etc.) is the semantic differential method. The semantic differential method is a method developed by Osgood et al., that was designed to measure the connotative meaning of objects, events, or concepts [4,10,12]. Furthermore, this study used the factor analysis method to obtain the structure of semantic Kansei. According to Yang, the factor analysis method is the most frequently used method [13].

II. METHODS

The study was divided into several stages, which consisted of the identification of Kansei words, the preparation of the research instruments, data collection, processing, and analysis of data. Identification of Kansei words was preceded by collecting Kansei words from various sources. To facilitate the collection of Kansei words, this research was based on Luo et al., and Barnes et al., in Nagamachi because of the similarities to the research object [10,11]. The process of selecting the Kansei words was conducted with a simple set of linguistic guidelines [10]. Nevertheless, there are some adjustments in the determination of Kansei words in order to facilitate the respondents in understanding these words.

The research instrument used was the semantic differential method. In this study, the differential semantic scale was used to measure consumer impressions of the six categories of beverage packaging (fruit beverages, tea beverage, carbonated drink, isotonic drink, mineral water, and coffee-milk). The study used 14 pairs of Kansei words that were Kansei negative (left side) and Kansei positive (right side). The Kansei word pairs were: unpleasant<>pleasant, not gentle<>gentle, feminine<>masculine, traditional<>modern, mature<>youthful, not stimulating<>stimulating, artificial<>natural, common<>luxurious, not amusing<>amusing, not energetic<>energetic, local<>international, formal<>relaxed, cool<>warm, not dignified<>dignified.

The subjects researched were college students (13 male and 30 female) who were participants of a Product Planning and Development course. The data collection was done by distributing questionnaires. The questionnaire comprises two parts: the part that contains questions about personal data of respondents and the section containing questions related to basic research. Respondents were given questions such as "*The impression that you feel for a fruit beverage product (subsequently replaced with another beverage product category) is...*" Scores were given by awarding a mark indicating the rating of votes based on the semantic differential scale. A score of 1 indicated a very negative Kansei, and 5 indicated a very positive Kansei for each pair of Kansei words. The data collection results were analyzed using SPSS 20.

III. RESULT AND DISCUSSION

The respondents were college students participating in a Product Planning and Development course (13 men and 30 women), 14% of whom were aged ≤ 20 , and the remaining 86% were aged between 20 and 25. Figure 1 shows the average value of respondents' answers.

Figure 1 shows that the Kansei word with the highest average score for the fruit beverage category is "relaxed" (4.33), and the lowest (2.37) is "masculine." The highest Kansei word for the tea beverage category is "amusing" (4.42), and the lowest (2.28) is "international." The highest Kansei word for the carbonated drink category is "relaxed" (4.12) and the lowest is "energetic" (2.37). The highest Kansei word for the isotonic drink category is "dignified" (4.30) and the lowest is "international" (2.21). The highest Kansei word for the mineral water category is "stimulating" (4.37), and the lowest average is for "luxurious" (2.79). Finally, the highest Kansei word for the coffee-milk category is "relaxed" (4.33), and the lowest is "dignified" (2.53).

Results factor analysis shows that the variables and the sample were reasonable and can be analyzed further, as shown by KMO-MSA and Bartlett's test ($\alpha=0.00$) (Table 1). The value of KMO-MSA for the fruit beverage category is 0.661, while the MSA value for tea beverage is 0.770 (Table 1). Furthermore, the MSA values for carbonated drink, isotonic drink, mineral water, and milk-coffee are 0.637, 0.665, 0.705, and 0.674, respectively. Bartlett's test ($p < 0.001$) indicated that there were very significant differences between categories. Kansei words that had MSA values > 0.5 were analyzed further (Table 1). Table 2 is the result of extraction and rotation variables that indicate semantic space for six categories of beverage products.

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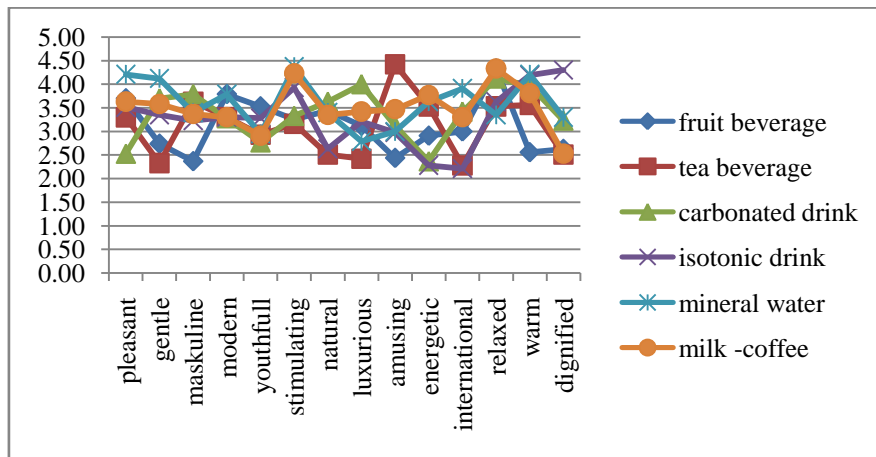


Figure1. The average Kansei score of six categories of beverage products.

Table I. Kansei words for each category of beverages product

Tea		Carbonated Drink		Isotonic Water		Mineral Water		Coffee-Milk	
Kansei word	MSA	Kansei word	MSA	Kansei word	MSA	Kansei word	MSA	Kansei word	MSA
pleasant	0.613	gentle	0.803	gentle	0.634	gentle	0.705	pleasant	0.710
gentle	0.602	modern	0.781	masculine	0.570	masculine	0.702	modern	0.670
masculine	0.624	youthful	0.604	modern	0.620	youthful	0.674	youthful	0.519
youthful	0.704	stimulating	0.768	youthful	0.622	stimulating	0.547	natural	0.629
stimulating	0.636	natural	0.784	stimulating	0.694	natural	0.752	luxurious	0.719
natural	0.624	luxurious	0.798	luxurious	0.794	luxurious	0.517	amusing	0.765
luxurious	0.723	amusing	0.680	amusing	0.638	amusing	0.605	international	0.727
amusing	0.733	international	0.885	energetic	0.717	energetic	0.674	relaxed	0.816
energetic	0.709	warm	0.648	international	0.618	international	0.743	warm	0.751
warm	0.679	dignified	0.745	relaxed	0.521	relaxed	0.743	dignified	0.773
dignified	0.552			dignified	0.673			dignified	0.701

Table II. Semantic space for each category of beverages product

Beverage category	Factor Analysis Result	
	Kansei space (loading factor value)	
fruit beverages	(1) youthful (0.740), luxurious (0.692), stimulating (0.690), natural (0.690), pleasant (0.505) (2) warm (0.821), energetic (0.795), amusing (0.690) (3) gentle (0.851), masculine (0.538) (4) dignified (0.859)	
tea	(1) natural (0.780), luxurious (0.776), gentle (0.760), international (0.614), stimulating (0.489) (2) dignified (0.769), modern (0.680) (3) warm (0.797), youthful (0.762)	
carbonated drink	(1) youthful (0.884), amusing (0.814), energetic (0.770) (2) stimulating (0.760), gentle (0.730), dignified (503) (3) maskulin (0.825), international (0.794) (4) relaxed (0.776), modern (0.653), luxurious (0.564)	
isotonic drink	(1) gentle (0.821), international (0.743), maskulin (0.622) (2) amusing (0.756), natural (0.711), luxurious (0.624), energetic (0.540) (3) stimulating (0.792), youthful (0.629), relaxed (0.499)	
water drink	(1) modern (0.764), dignified (0.723), luxurious (0.700), amusing (0.475) (2) warm (0.764), international (0.760), relaxed (0.628), gentle (0.560) (3) natural (0.788), youthful (0.747)	
milk -coffee	(1) international (0.787), dignified (0.745), youthful (0.675), pleasant (0.668) (2) gentle (0.847), maskulin (0.747), stimulating (0.447) (3) modern (0.772), natural (0.693), warm (0.563)	

There were four factors of fruit beverages whose eigenvalues respectively were 3.331, 1.840, 1.133, and 1.068 and this was able to clarify 67.02% of the variability. Likewise for carbonated drink, there were also four factors. The eigenvalues for the four factors in the carbonated drink category respectively were 2.973, 1.819, 1.320, and 1.164, and this clarified 66.14% of the variability. Tea beverage, isotonic drink, mineral water, and milk-coffee had three factors. The eigenvalues for tea beverage respectively were 3.49, 1.297, and 1.181, and this was able to clarify 59.58% of the variability. Factors of isotonic drink categories were able to clarify 57.76% of the variability, with the eigenvalues for each factor respectively being 3.240, 1.360 and 1.177. Three factors of mineral water were able to clarify 59.60% of the variability, with eigenvalues for each factor of 3.320,

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1.595, and 1.045. Finally, three factors of milk-coffee were able to explain 59.62% of the variability, with each factor's eigenvalue respectively being 2.916, 1.837, and 1.209.

For each factor formed, Kansei words with high loading factor values (> 0.7) are the determinant of a component factor. Those component factors that show a strong correlation between the variables studied and used as the name of Kansei space. An identification/naming process using this method was performed by Alikalfa [14]. On the other hand, this contrasts with Osgood's factor analysis that is divided into three: evaluation, potency, and activity factor. In this study, an identification/naming process based on the previous theory is not right, because the meaning of each attribution in the division does not fit the criteria of Osgood. Nagamachi and Lokman suggested giving the name factor that held the meaning of the related words from it [4].

Kansei space for the fruit beverage category was youthful, warm-energetic, gentle, and dignified. Kansei space for the tea beverage category was natural-luxurious-gentle, dignified, and warm-youthful. Kansei space for carbonated drink was youthful-amusing-energetic, stimulating-gentle, masculine-international, and relaxed. Kansei space for isotonic drink was an international gentleman, amusing-natural, and stimulating. Kansei space for mineral water was modern-dignified-luxurious, international-warm, and natural-youthful. The last category is coffee-milk, which had Kansei space that was international-dignified, gentle-masculine, and modern.

As previously mentioned, Kansei is a state of mind that describes feeling (feelings) toward a physical object, either a product or the environment, gathered by humans' five senses. The state of mind of each person is different depending on physical objects and environments deals, and internal factors such as personality, mood, experience, and so on [15]. One particular Kansei may be very specific to one person and another Kansei to another person, so we will get a lot of Kansei words that describe a particular product. These conditions make it difficult to conduct further analysis and thus should be simplified by applying a Kansei hierarchy [4,7]. Higher hierarchy shows that more common and higher Kansei can be summarized into just one or a few Kansei only.

Kansei space is a higher Kansei hierarchy and more general words, compared with Kansei attributions in the factor analysis result (Table 2). Kansei also describes affective needs of consumers. Such information is very useful for enabling manufacturers to translate those needs into a variety of product designs. The Kansei method is needed to translate product design elements appropriately [11]. The accuracy in translating this will determine whether the product can be easily accepted by markets and consumers.

IV. CONCLUSIONS

This study examined the Kansei words in various categories of beverage products and aimed to gain a higher Kansei hierarchy (Kansei space) that is more common. It also described the Kansei affective needs of consumers. The affective needs are important information for manufacturers to develop products that comply with the consumer expectations.

This study was considered to be at an early stage of obtaining information for further steps of Kansei/affective engineering. The subject of the research was limited to college students aged 18–23 years old. Therefore, the results did not represent any other age group. The stimuli that were used were not specific, so the research subjects were determined based on their perception and experience of the individual beverage categories. For further research, there should be more specific stimuli (e.g. packaging) for each category of beverage products.

REFERENCES

- [1]. Jiao, J.R.; Zhang, Y.; Helander, M. (2006). A Kansei mining system for affective design. *Expert Systems with Applications*, 30(4), 658-673.
- [2]. Matsubara, Y.; Nagamachi, M. (1997). Hybrid Kansei engineering system and design support. *International Journal of Industrial Ergonomics*, 19(2), 81-92.
- [3]. Nagamachi, M. (2002). Kansei engineering as a powerful consumer-oriented technology for product development. *Applied ergonomics*, 33(3), 289-294.
- [4]. Nagamachi, M.; Lokman, A.M. *Innovations of Kansei engineering* (UK: CRC Press. 2010).
- [5]. Nagasawa, S.Y. (2002). Kansei and business. *Kansei Engineering International*, 3(3), 3-12.
- [6]. Schutte, S. (2002). *Designing feelings into products: Integrating kansei engineering methodology in product development*. Thesis. Linköpings Universitet, Sweden.
- [7]. Schutte, S. (2005). *Engineering emotional values in product design*. Thesis. Kansei Engineering in Development, Department of Mechanical Engineering, Linköpings University, Sweden.
- [8]. Barnes, C.; Childs, T.; Henson, B.; Lillford, S. (2008). Kansei engineering toolkit for the packaging industry. *The TQM Journal*, 20(4), 372-388.
- [9]. Henson, B.; Barnes, C.; Livesey, R.; Childs, T.; Ewart, K. (2006). Affective consumer requirements: A case study of moisturizer packaging. *Concurrent Engineering*, 14(3), 187-196.
- [10]. Nagamachi, M. *Kansei engineering: Kansei/affective engineering (industrial innovation)* (Boca Raton: CRC Press. 2010)
- [11]. Luo, S.J.; Fu, Y.T.; Korvenmaa, P. (2012). A preliminary study of perceptual matching for the evaluation of beverage bottle design. *International Journal of Industrial Ergonomics*, 42(2), 219-232.
- [12]. Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1978). *The measurement of meaning* (Urbana: University of Illinois Press. 1957).

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- [13]. Yang, C.C. (2011). A classification-based kansei engineering system for modeling consumers' affective responses and analyzing product form features. *Expert Systems with Applications*, 38(9), 11382-11393.
- [14]. Alikalfa, E. Designing "quality feeling" in reach trucks: A Kansei engineering approach. *9th International Quality Management for Organizational Development (QMOD) Conference*, Liverpool, England, 2006, 147.
- [15]. Lévy, P.; Lee, S.; Yamanaka, T. On kansei and kansei design a description of Japanese design approach. *International Association of Societies of Design Research Conference*. Hongkong, 2007.

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