Consumers affection analysis of chocolate product using Kansei Engineering

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Abstract. Research on consumer affection is done to chocolate bar product. Every consumer has different comments on a product depending on the taste experience they once had, known as Kansei words. In this research, consumer’s Kansei was captured through interviews and social media, also identified by consumer temperament type using Temperament application. The results showed that more complete of consumer affection, detail and technical to become design elements, obtained through interviews while the use of social media is able to reach more comprehensive respondent. Temperament types need to be considered in product design to be more suitable with the wishes of consumers.

1. Introduction

Chocolate is a type of product processed from cocoa beans. Initially, chocolate is consumed as a drink and is only enjoyed by the nobility, but now chocolate has been processed into various types of products and can be enjoyed by everyone. Solid chocolate (bar) is one form of chocolate products are widely circulated in the market. The decision of a person to buy a chocolate product can be influenced by many things, such as a delicious taste, unique shape, beautiful packaging, and additional ingredients in the chocolate products such as raisin, nut, almond, etc [1].

When a group of people is asked what they think of a chocolate product they have ever consumed, there will be many answers that may be given by those people. They will express the impression of the chocolate product in accordance with the experience of taste, feel personal so that the perceptions will be diverse [2]. Comment or expression that delivered known as Kansei Words, observation of Kansei Words delivered by someone can be utilized in product development. Kansei engineering is a technology that translates consumer Kansei into product design [3].

Study on consumer perceptions about the different types of chocolate, ie white, dark, and milk chocolate related to health have been done in Uruguay [4]. Another study concerning consumer perception in Banda Aceh on chocolate products recommends that marketing stimuli as one of the product attributes can influence consumer perception [5]. The application of Kansei Engineering was conducted in Tehran to determine consumer perceptions of soy sauce bottles and the results of the study can produce guidelines for emotional interface design for soy sauce bottle products [6]. The application of Kansei engineering and Kano model has been done in the design of footwear products
so that the design is obtained in accordance with the psychological consumer [7]. Applications Kansei Engineering and Association rules mining in product design indicate the relation pattern of design elements based on human feelings can be derived from all parts of the product [8]. Kansei engineering and text mining were once used to capture consumer interest in a product through consumer comments on the product [9]. The results of Kansei Engineering and Data Mining applications in ceramic manufacturing in Thailand show indications that proposed models and rules can interpret product design elements that are influenced by customer emotion [10]. Consumer comments about a product can describe the personality type. There are 4 personality types: Phlegmatic, Choleric, Sanguine, and Melancholy. The application of Kansei and Personality Types has been studied and considered in the development of the design of a product [11,12].

In this research, Kansei engineering is applied to the development of chocolate products. Consumer affection is captured through interviews and social media.

2. Method
Kansei engineering is applied in product development and/or development of work methods. The process undertaken in the form of Kansei Analysis is the analysis of consumer affection to the survey results about what attracts consumers, can be in form of shape, color, taste, and price.

The Kansei words are usually adjectives or words related to human feelings. The identification of the word Kansei is done by manual language programming which identifies Kansei words in user comments on social media.

Kansei engineering translates consumer Kansei into product design, through the following process [3]:
1. Choose and define the basic design elements visually
2. Identify and collect consumer Kansei about chocolate products (on social media done with data acquisition on account related to chocolate)
3. Analysis Kansei data with statistical methods/techniques to explain the structure of Kansei (on social media done with manual language processing, preprocessing and extract)
4. Translating the Results of Analysis into the development design

The Kansei Engineering process can be seen in Figure 1.
3. Result and Discussion

3.1. Results of Kansei Words Through Interviews
Data collection through interviews conducted on respondents located in Medan and using Google Form to capture the respondents who are in further locations. The respondents involved were 98 students, they were college and high school students scattered in Medan, Padang, Bandung, Surabaya, Yogyakarta, and Jakarta. Respondents aged 15-24 years. Questions gave about aspects of design elements for chocolate bar products, namely geometry shapes, size, type, and inclusions.

The collected Kansei word is related to the respondent's perception of the chocolate bar product based on the sense of sight, touch, and taste. For that, the use of chocolate brands in the market needs to be raised.

The Kansei words obtained can be categorized into 2 groups, namely:

- Centrality, the Kansei words that emerged more than once, and there were 41 words in this research.
- Novelty, the Kansei words that emerged only once/unique and there were 80 words.

There is a difference in the way Kansei words are delivered by respondents who are college and high school students. Kansei spoke by students is more limited in vocabulary and consideration in buying. The college student respondents were able to explain their perceptions more broadly about the chocolate products that had been consumed and had considered the effects of the product on health.

3.2. Results of Kansei Words Through Social Media
The identification of Kansei words in social media is done by searching for the adjectives contained in the comments on the social media accounts of Instagram and Facebook chocolate producers. There were 331 respondents collected. The results of Kansei words collecting 10 types of chocolate from 4
brands with design elements in the form of brands, geometric shapes, sizes and types of chocolate make different Kansei words. The word love appears in every type of product, as well as favorite and delicious words. The word sweet and gentle is another Kansei word that often appears.

The process of acquisition data or collect data manually (manual processing language), using social media take some time. Not all of the Kansei words collected to be considered in chocolate product development design. Kansei word can be selected if it has a score above the predetermined value (in this study, \( \text{Extract value} > 0.1 \))

3.3. Respondent Type Based on Temperament

Respondents who were interviewed also to identify the temperament type. Known 4 basic temperament types are Sanguine (Cheerful, Friendly), Choleric (Optimistic, Active), Melancholy (Sensitive, Perfectionist), and Phlegmatic (Calm, Relax). Temperament application is an application that can be used to know someone temperament type. Temperament is a trend pattern, a dynamic factor that takes into account how individuals react to different conditions/ situations. Kansei words spoken by someone can be used to know their temperament type. By using Temperament software, the test results of respondent's temperament are as in Table 1.

| No | Temperament Type                | Amount of Respondents |
|----|--------------------------------|-----------------------|
| 1  | Phlegmatic – Melancholy         | 9                     |
| 2  | Sanguine – Choleric             | 5                     |
| 3  | Melancholy                      | 11                    |
| 4  | Phlegmatic                      | 27                    |
| 5  | Sanguine – Melancholy           | 6                     |
| 6  | Sanguine                        | 19                    |
| 7  | Phlegmatic – Choleric           | 5                     |
| 8  | Choleric                        | 7                     |
| 9  | Phlegmatic – Sanguine           | 9                     |
|    | **Total Respondents**           | **98**                |

From the table above, it was obtained 9 types of respondents’ temperament. In addition to the 4 pure temperaments of Sanguine, Choleric, Phlegmatic and Melancholy, there are also five mixed temperaments of the four basic temperaments. The respondent's temperament can be an input in the chocolate product development so that it can produce design elements that match the type of consumer temperament.

3.4. Discussions

The results of Kansei word selection through interviews and social media show different ways of expressing consumer feelings. Kansei words obtained through interviews show more affection ready to be translated into design elements. In terms of taste, the social media methods obtained by Kansei words such as “tasty” and on the interview method showed the disclosure is "tasty", "more chocolate", "tastier chocolate," and some say "more delicious bitten". In addition, in the method of interviewing also obtained the Kansei words which state "more easily eaten with two hands", "more in accordance with the size of the mouth", "not fast soft in the outside air", "more easily stored", and "more easily broken". Through social media, the number of respondents can be captured a lot but with a more concise Kansei words, while with the method of interviewing, information can be obtained more fully
but with the number of respondents are more limited. Kansei words expressed by the respondents who were captured through the interview as a whole looked more complete, technical, and detail making it possible to be used as input in the design of geometric shapes, types, and composition of the flavor of chocolate products. While the word Kansei is collected through social media is much simpler so it is more suitable when applied to the design of geometric shapes only.

From the results of testing the respondents’ temperament type, it appears that the respondent has both pure temperament type and the mixture of all four pure temperaments present. With these different temperament types causing differentiation of affection to the product so that by recognizing consumer temperament, chocolate producers can offer products that are more suited to the type of consumer temperament.

4. Conclusion
From this research, it can be concluded that social media can be collected more respondents than the method of interview. However, with interviews, it can obtain a more complete, technical, and detailed consumer affection as inputs in the design of geometric shapes, types, and chocolate product formations. Types of consumer temperaments can also be a consideration for the chocolate producer to produce products that are more suitable with consumer preferences.

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References
[1]. Beckett S T, Fowler M S, and Ziegler G R 2017 Beckett's industrial chocolate manufacture and use. West Sussex, UK:: Wiley Blackwell.
[2]. Ulrich K T and Eppinger S D 2004 Product architecture. Product design and development, 3, 163-186.
[3]. Nagamachi M and Lokman A M 2015 Kansei innovation: Practical design applications for product and service development (Vol. 32). CRC Press.
[4]. Gámbaro A and Ellis A C 2012. Exploring consumer perception about the different types of chocolate. Brazilian Journal of Food Technology, 15(4), 307-316.
[5]. Sukma N and Baihaqi A 2013 Analisis Persepsi Konsumen Terhadap Produk Cokelat Di Kota Banda Aceh. Jurnal Agrisep, 14(2), 54-64.
[6]. Mamaghani N K, Rahimian E, and Mortezaei S R 2014 Kansei engineering approach for consumer’s perception of the ketchup sauce bottle. In KEER2014. Proceedings of the 5th Kanesi Engineering and Emotion Research; International Conference; Linköping; Sweden; June 11-13 (No. 100, pp. 1487-1494). Linköping University Electronic Press.
[7]. Haryono M and Choirol Bariyah C 2014 The design of the concept of footwear products using the integration of the Kansei Engineering method and the Kano Model, Industrial Engineering Scientific Journal, 13 71-82.
[8]. Pitaktiratham J, Sinlan T, Anuntavoranich P, Sinthupinyo S 2012 Application of Kansei Engineering and Association Rules Mining in Product Design, Int. J. Economics and Management Engineering, 6 (9), pp. 2352-2357.
[9]. Wang W M et.al. 2018 Mining of Affective Responses and Affective Intentions of Products from Unstructured Text. Journal of Engineering Design.
[10]. Kittidecha C and Yamada K 2018 Application of Kansei Engineering and Data Mining in the Thai ceramic manufacturing, J. Industrial Engineering International, (https://doi.org/10.1007/s40092-018-0253-y)
[11]. Martin and Bobgan D 1992 A church unholy alliance with the four temperaments, California, Eastgate Publishers.

[12]. Dharma I B, Santosa Y, Djatna T, Arkeman Y 2015 A supply chain risk management modelling for Balinese aromatherapy product by pricing optimization, *Int. J. Of Innovation, Management, and Technology*, 6 (2), 118-121.