



Analysis of consumers' preference on taro-flavored UHT Ultra milk using conjoint method in Malang City

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KEYWORDS

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ABSTRACT

One of the processed milk products is Ultra Taro UHT milk. The aim of this research was to analyze Ultra Taro UHT milk's importance level of attributes and combinations of the attributes which are preferred based on consumer preferences. This study was quantitative correlational using a questionnaire with a full profile presentation method. The study was conducted for one month, with 60 respondents determined by the purposive sampling method. Data was processed using the conjoint method. In this research, 4 product attributes were used, there are flavor with 3 levels, volume with 3 levels, fat content with 2 levels, and type of packaging with 2 levels. The results showed the level of importance value, attribute flavor with a relative value of 34.44%, volume and packaging types have similar relative value of 27.79%, and fat content with a relative value of 9.97%. The combination of attributes favored by consumers was the fifth stimuli with a total use value of 3.8283 consisting of taro balanced milk flavor attributes, 200 ml volume contents, low fat, and tetra pack packaging types. The results of the conjoint have significant correlation with the opinion of respondents with a positive Kendall Tau correlation value of 0.889.

Introduction

According to the data of the Central Statistics Agency of Indonesia (BPS, 2020), fresh milk is one of the food commodities with production levels reaching approximately 909,638 tonnes in 2018. The high production level of fresh milk in Indonesia has resulted in various processed products manufactured. Ultra-High Treatment (UHT) is one of the processed products of fresh milk.

UHT milk product was made by heating milk at a temperature of 138 – 150 °C for 2 seconds. UHT processing of milk destroys all of the microorganisms capable of growing under the normal conditions of product storage. Under these conditions (i.e. very high temperature for a short time), the chemical, physical and organoleptic changes are kept to a minimum (Datta et al., 2002). There are several reputable companies producing UHT milk; one of them is PT. Ultrajaya Milk Industry, a company engaged in the consumer goods industry. PT. Ultrajaya Milk Industry has produced various products, namely Ultra milk full cream, Ultra milk low fat hi-calcium, Ultra mimi

and Ultra milk, which comes in several flavor variants such as mocha, strawberry, and chocolate. Also, their latest flavor variants launched in 2018, caramel and taro.

Taro-flavored UHT Ultra milk is one of the innovations developed by PT. Ultrajaya Milk Industry. High consumption of milk products in Indonesia, particularly in Indonesia, has brought a significant number of manufacturers to produce processed milk products, especially UHT milk. This condition requires PT. Ultrajaya Milk Industry to create certain innovations for its product to compete in the market successfully. Manufacturers are demanded to be more consumers' preference oriented to develop a product following the consumers' needs.

Consumers' preference is one likes or dislikes toward certain goods or services. Consumers' preference shows consumers' likeness based on the existing product choices (Utami, 2011). In this research, the consumers' preference is obtained through the conjoint method. According to Suyanto and Darmawan (2020), conjoint analysis is based on the value combination assessment of each

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attribute. The results of conjoint analysis are presented in the form of quantitative information that can be used to model consumers' preference for some attribute combinations. This method was used as it was in compliance with the objective of the research, which was to figure out the importance levels of each attribute for consumers and the most liked attribute combination of taro-flavored UHT Ultra milk.

Research Methods

This research was conducted in Malang City, East Java, from May until June 2019. The data analysis was performed in Agro-industrial Management Laboratory, Department of Agro-industrial Technology, Faculty of Agricultural Technology, Universitas Brawijaya, Malang.

Respondents of the research were taken by purposive sampling technique, and the amount of the sample referred to the literature of Santoso (2010), which stated that the suggested amount of the sample for conjoint correlation research was between 50 up to 100 samples. The criteria of respondents chosen were 17-40 years old people who have consumed taro-flavored UHT Ultra milk at least twice in the last month.

The research used the questionnaire instrument presented in the full profile method. According to Ikemoto et al. (2010), the full profile is a combination method completed with stimuli containing all attributes and its level combination. This research was a correlational quantitative descriptive. The type of data used in this research was secondary and primary data. Secondary data is data used as a reference for the research, which is obtained from the literature review of previous studies and data published by the official agency of the government. Primary data is data taken directly from the respondents. In this research, primary data was obtained from the questionnaire distributed to the respondents.

The data analysis method used in this research was the conjoint analysis. Conjoint analysis is a technique that is specifically used to comprehend consumers' preference against a product or service by measuring utility level and relative importance value of an attribute (Sulaimon et al., 2018).

Results and Discussion

Company profile

PT. Ultrajaya Milk Industry is one of the private companies engaged in the consumer goods industry. This company was established on 2nd November 1971 and started its first commercial production in

March 1975. This company is located in Jalan Raya Cimareme 131, Padalarang, West Java, and has distributed its products to various regions abroad and domestically. One of the areas is Malang, with its domestic market target as many as 90% and the export market target as many as 10%. Fresh milk ingredients used for producing UHT Ultra milk were obtained from cow's milk from dairy farming of PT. Ultrajaya Milk Industry in Pangalengan, Jawa Barat.

Respondent's Demographic and Characteristics

For around one month of the research process, 60 respondents met the required criteria. Based on their age, 55 respondents were 17-25 years old, three respondents were 25-30 years old and two respondents were 30-40 years old. Teenagers dominate the consumers of taro-flavored UHT Ultra milk. Based on gender, there were 48 female respondents and 12 male respondents. In Malang, taro-flavored UHT Ultra milk was consumed more by female respondents than male respondents. Furthermore, 53 respondents were students/college students, four respondents were employees, one respondent was a private-sector worker, one respondent was a consultant and one respondent was co-assistant. The consumers of taro-flavored UHT Ultra milk in Malang were mostly students or college students. This might happen as in Malang, there are a lot of universities and the students need to consume high protein products to keep their balanced diet. Forty-five respondents were high school graduates, and 15 respondents were college graduates. Most respondents were high school graduates, as they still went to college. Based on the questionnaire <IDR,500,000, 23 respondents had monthly income of IDR1,500,000 – IDR3,000,000 and 4 respondents had monthly income of >IDR3,000,000. Respondents who had a monthly income of <IDR1,000,000 – IDR1,500,000 were able to buy taro-flavored UHT Ultra milk at least twice in the last one month.

Validity Test

Validity test used *Pearson's R* correlation since the questionnaire applied the scoring scale. According to Kimberlin and Winterstein (2009), a validity test is performed to gauge the accuracy of the measurement instrument. A questionnaire can be considered as valid if it is able to solve the measured problems. The results of the test are shown in Table 1.

Table 1. Validity test of the questionnaire

Attribute Level	Sig.	Description
<i>Flavor</i>		
Stronger milk flavor	0.000	Valid
Balanced flavor between milk and taro	0.000	Valid
Taro flavor is stronger	0.020	Valid
<i>Volume</i>		
125 mL	0.002	Valid
200 mL	0.000	Valid
250 mL	0.006	Valid
<i>Fat Content</i>		
Fat	0.000	Valid
Low fat	0.000	Valid
<i>Packaging Type</i>		
<i>Tetrapack</i>	0.003	Valid
Plastic bottle	0.000	Valid

The significance of all attribute levels examined was <0.05 , indicating that the data was valid or was considered successfully solving the existing problems. According to Taber (2018), a variable is considered as valid if its score correlates significantly with its total score.

Reliability Test

In this research, the reliability test used *Cronbach's Alfa* technique with *SPSS 17.0* software. According to Cho et al. (2015), reliability testing with *Cronbach's Alfa* technique is performed for

interval/essay data type. According to Ursachi et al. (2015), reliability means how trusted a measurement result is. The results of the reliability test are shown in Table 2.

Cronbach's alpha value is 0.606. Based on the criteria of reliability test, this value is included in high criteria so that the data obtained is trusted. According to Prasetyawati and Ramli (2012), the result of the reliability test is considered reliable if *Cronbach's alpha* value of x and y variable is positive and above 0.6.

Table 2. Result of questionnaire reliability test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.606	.623	10

Table 3. Consumers' preference result based on attribute level

Attribute Level	The Average Score	Description
<i>Flavor</i>		
Stronger milk flavor	3.100	Neutral
Balanced flavor between milk and taro	3.483	Like
Taro flavor is stronger	3.717	Like
<i>Volume</i>		
125 mL	2.917	Neutral
200 mL	3.950	Like
250 mL	3.633	Like
<i>Fat Content</i>		
Fat	3.450	Like
Low fat	3.567	Like
<i>Packaging Type</i>		
<i>Tetrapack</i>	4.083	Like
Plastic Bottle	3.200	Neutral

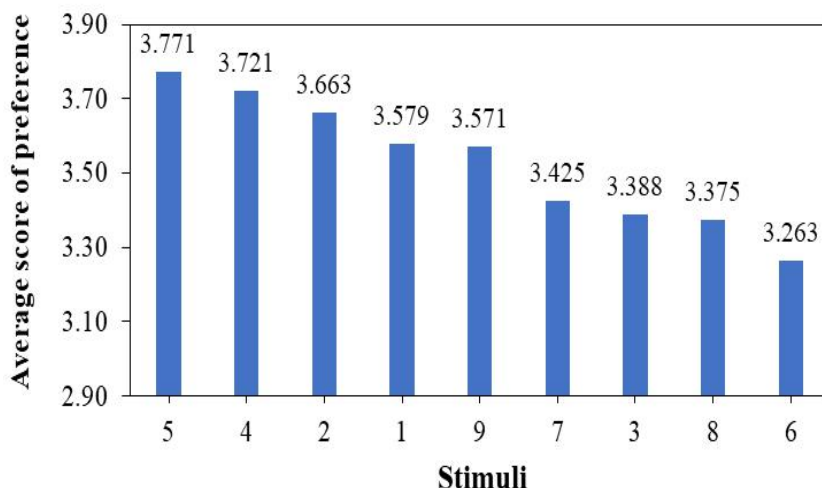


Figure 1. Score average of stimuli assessment

Consumer Preference Against Taro-Flavored UHT Ultra milk

Consumers’ preference is consumers’ assessment of a product based on things they like. The product attribute of this research consists of flavor, the volume, fat content and packaging type. Those four attributes were combined so that it forms stimuli. Nine main stimuli were generated. Total data and the average questionnaire results based on the attribute level are shown in Table 3 and based on stimuli are shown in Figure 1.

According to Pelsmaecker et al. (2017), stimuli 3, stimuli 6 and stimuli 8 are considered as “neutral” or in another word, consumers have no preference towards those stimuli since their average score was in the range of 2.61 - 3.41. Meanwhile, consumers’ preference of other 6 stimuli was “like” as its average score was ranged from 3.41 - 4.21. The average score of consumers’ preference was then processed along with the *dummy* variable of formed stimuli to generate multiple regression equation.

Multiple Regression

Formed regression value functions to interpret the data of conjoint analysis by creating multiple regression equations to find the utility value of each attribute, the total utility value of each attribute, the importance value and relative attribute importance. Multiple regression equation formed is as follows:

$$Y_{ij} = 3.603 - 0.228 X_1 - 0.058 X_2 - 0.179 X_3 + 0.005 X_4 - 0.066 X_5 + 0.184 X_6 \dots\dots\dots(1)$$

Description:

Y_{ij} = score of preference result for each stimulus

- x_1 and x_2 = *dummy* variable for flavor attribute
- x_3 and x_4 = *dummy* variable for the volume attribute
- x_5 = *dummy* variable for fat content attribute
- x_6 = *dummy* variable for the packaging type attribute

The calculation result based on the multiple regression equation was called prediction value. Prediction value indicates the amount of total utility value of each stimulus in the questionnaire. By knowing the total utility value, consumers’ preference against attribute combination of taro-flavored UHT Ultra milk (9 stimuli) can be figured out. Sumargo and Wardoyo (2008) argued that the formed regression equation would be used to calculate the value of each stimulus.

Data Processing Using Conjoint Method

1. Utility value of each attribute level

Utility value was obtained from the calculation using the regression coefficient in multiple regression equations. The calculation result of utility result of each attribute is as follows:

a. Flavor attribute

Flavor attribute is inspected using three-level samples; those are stronger milk flavor, balanced flavor between taro and milk and stronger taro flavor. The results of the research are shown in Figure 2.

Stronger taro flavor attribute level has the highest utility value of 0.095, which shows that consumers prefer strong taro flavor. However, the utility value of stronger milk flavor attribute level was -0.1327, which means that consumers dislike

stronger milk flavor in taro-flavored UHT Ultra Milk. According to McCarthy et al. (2017), consumers dislike *plain* flavor in milk that tends to be fishy, too thick, too heavy, flavor and texture like cream, too fatty, and looks like half and half without any flavor. For this reason, specific kinds of flavor are added to remove that fishy flavor.

b. The volume attribute

Research of consumers' preference on the volume of content was performed under the volume of 125 mL, 200 mL, 250 mL. The results of the research are shown in Figure 3.

In Figure 3, it can be seen that the respondents prefer milk in 200 ml and dislike milk in 125 mL. This might happen as the respondents think that 125 mL is too little and unsatisfied when they consume it. For this reason, taro-flavored Ultra milk in volume of 200 mL was much preferred since they felt satisfied enough when consuming milk in this size. Meanwhile, drinking 250 mL of milk is too overwhelming for them. The calories it contains can influence consumers' satisfaction levels in consuming taro-flavored UHT Ultra milk. Each package of 200 mL of taro-flavored UHT Ultra milk may contain 130 kcal. Human's calorie intake is different depending on their gender. Our body's energy use will depend on how active we are, how

efficiently our body uses the energy, and our age. According to the 2015-2020 Dietary Guidelines for Americans, women are likely to need between 1,600 and 2,400 calories a day, and men from 2,000 to 3,000 calories. However, this depends on their age, size, height, lifestyle, overall health, and activity level (Ismail, 2017).

c. Fat content attribute

To examine consumers' preference on the fat content attribute, fat and low fat chocolate-flavored UHT Ultra milk were used. The samples did not use taro-flavored UHT Ultra Milk since this variant is not available in low fat. The results of the research are shown in Figure 4.

For fat content levels, the respondents prefer low fat and dislike fatty levels. This might happen as the respondents feel that full fat milk tastes slightly sweeter than low fat milk. Different sweetness levels occur as low fat and full-fat milk has a different percentage of certain substance composition. Based on Frøst et al. (2001), a combination of thickener, whitener and cream aroma in 0.1% fat milk was approximately successful in mimicking sensory properties of 1.3% fat milk. It means that the taste of *full-fat* milk tends to be sweeter than *low-fat* milk.

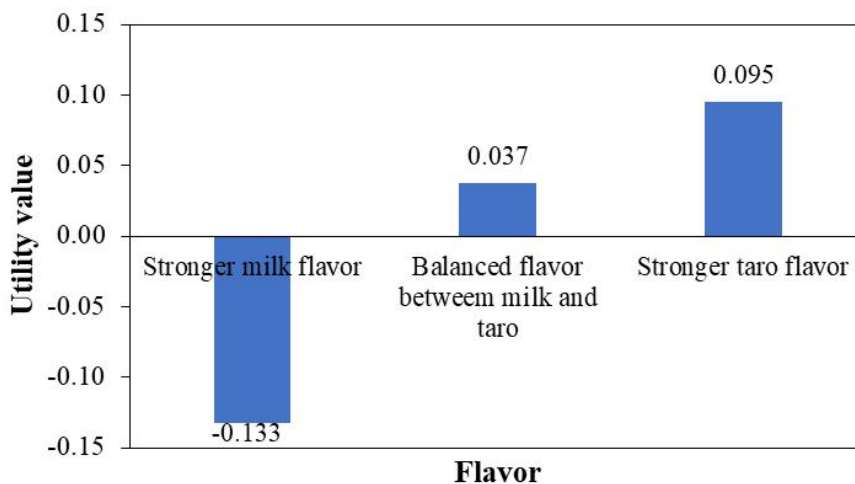


Figure 2. Utility values of flavor attribute

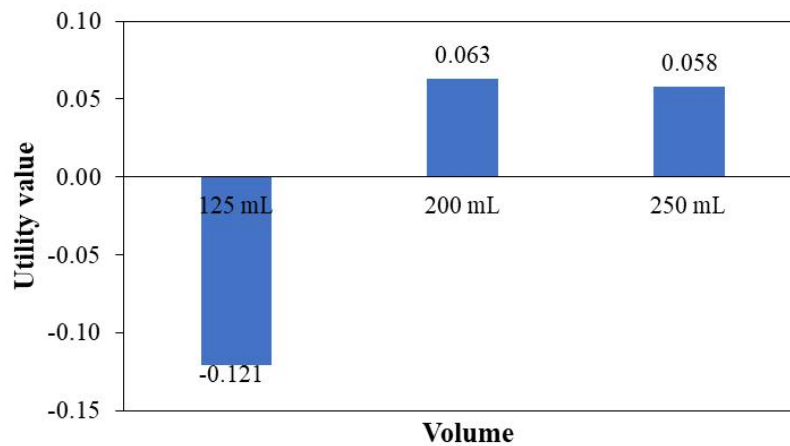


Figure 3. Utility values of volume attribute

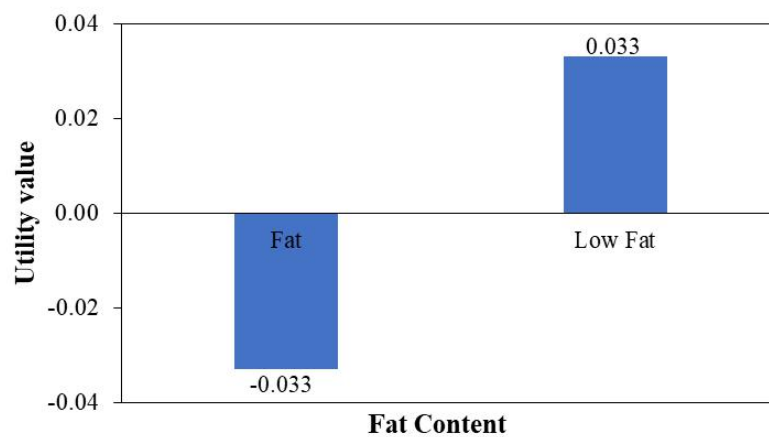


Figure 4. Utility values of fat content attribute

d. Packaging type attribute

To examine consumers' preference on packaging type attribute, taro-flavored UHT Ultra Milk in *tetrapack* package and plastic bottle of other brands' milk products were used. The results of the research are shown in Figure 5.

Consumers prefer *tetrapack* packaging with a positive utility value of 0.092. Consumers dislike the use of plastic bottles. Perhaps, *tetrapack* was chosen by the consumers because it is eco-friendly and more aseptic than a plastic bottle. Kontominas (2010) stated that packaging is a major factor contributing to the quality and safety of milk because milk is a product which can spoil easily. Therefore, packaging technology plays an important part in extending its shelf-life.

2. Importance level and relative importance weight of each attribute

Attribute importance level is used to figure out the consumers' preference for a product attribute. From

the importance level, relative importance weight can be obtained to figure out the attribute of taro-flavored UHT Ultra milk, which becomes consumers' priority. The calculation results of the relative importance weight of each attribute are shown in Figure 6.

The importance weight of flavor attribute is relatively high, that is 34.44%. This indicates that consumers give more attention and prioritize flavor attributes in purchasing taro-flavored UHT Ultra milk products. The volume and packaging type attributes have the same relative importance weight that is 27.79%. Since these attributes have the same relative importance weight, both are considered important for consumers. The third priority attribute for consumers is the fat content, which is around 9.97%. It is because consumers purchasing taro-flavored UHT Ultra milk products are mostly students or college students who prioritize taste, the volume of contents and affordable price rather than fat contents.

Total Utility Value of Each Stimuli of Taro-Flavored Uht Ultra Milk

The total utility value of each stimulus was calculated using the conjoint basic equation. Stimuli utility value was used to find out consumers' most preferred stimuli of 9 stimuli examined. Therefore, the conjoint basic equation formed is stated as follows:

$$U = 3.603 - 0.1327 p_{11} + 0.0373p_{12} + 0.0953p_{13} - 0.121 p_{21} + 0.063 p_{22} + 0.058 p_{23} - 0.033 p_{31} + 0.033 p_{32} + 0.092 p_{41} - 0.092p_{42}.....(2)$$

Description:

p_{11} = flavor level variable of stronger milk flavor

p_{12} = flavor level variable of balanced flavor between milk and taro

p_{13} = flavor level variable of stronger taro flavor

p_{21} = level variable of the volume of contents of 125 mL

p_{22} = level variable of the volume of contents of 200 mL

p_{23} = level variable of the volume of contents of 250 mL

p_{31} = level variable of full-fat contents

p_{32} = level variable of low-fat contents

p_{41} = level variable of *tetrapack* packaging type

p_{42} = level variable of plastic bottle packaging type

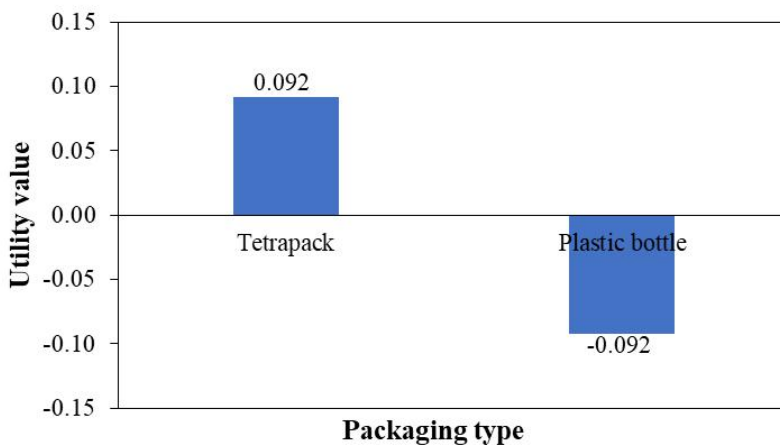


Figure 5. Utility values of packaging type attribute

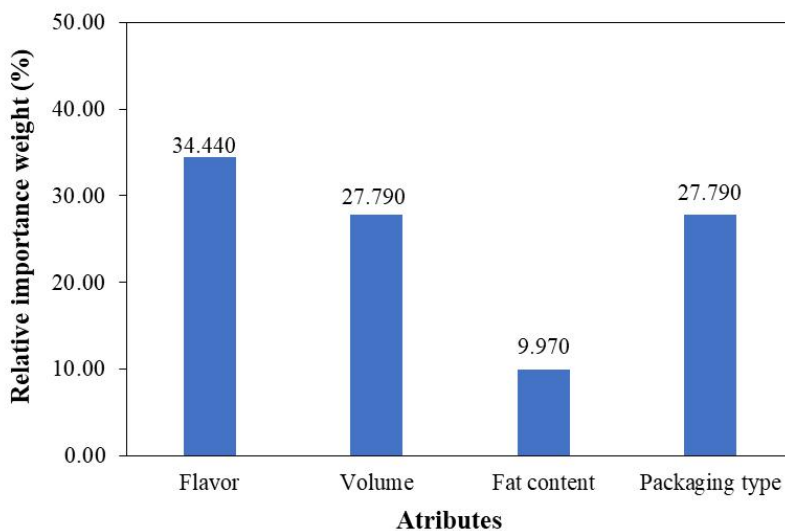


Figure 6. Attribute relative importance weight

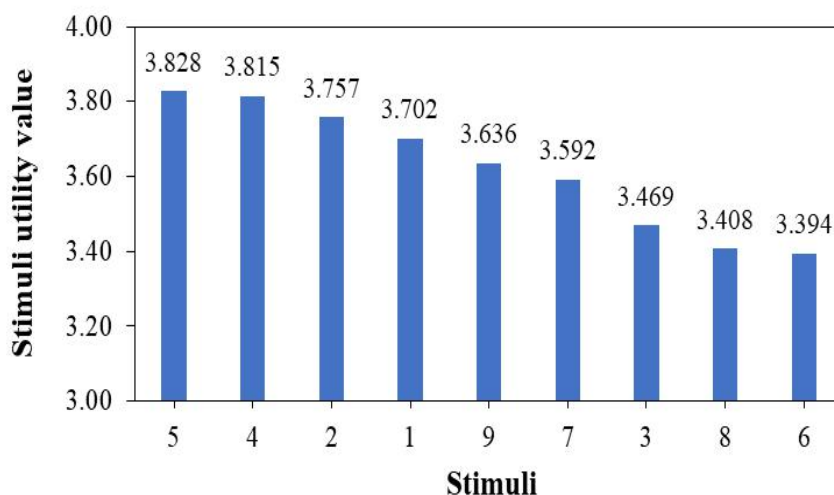


Figure 7. Utility values of stimuli

From Figure 7, it can be seen that the highest utility value of total stimuli was found in the fifth stimuli by 3.828. This showed that stimuli 5 was consumers' preferred stimuli. Stimuli 5 consisted of the combination of balanced flavor between milk and taro, the volume of 200 mL, low-fat content and *tetrapack* packaging. Overall, this stimuli combination is similar to the stimuli combination of taro-flavored UHT Ultra milk, which recently has spread over the current market. The difference is only on fat content.

Final validation of conjoint result

Final validation of the conjoint result used to draw the correlation between utility and actual utility. Final validation of the conjoint result was performed by using *Kendall Tau correlation*. Validation result is shown in Table 4.

The result of the table shows that the *Kendall Tau correlation* is as many as 0.889. The conjoint result has a real correlation with the respondents' opinion since it has a positive correlation. According to Kuzmanovic et al. (2011), if the correlation is positive, then there will be a positive correlation between conjoint results and respondents' opinions. According to Akoglu (2018), correlation result *R. Pearson's and Kendall Tau* is getting closer to 1. It is proven that there is a strong relationship between predicted utility and actual utility.

Table 4. Actual value correlation and estimated value of conjoint analysis

<i>Kendall's Tau</i>	Value
Value	0.889
Sig.	0.000
N	9

Consumers' preference result on taro-flavored UHT Ultra Milk was obtained based on the attribute and stimuli level with the highest utility value. Based on the stimuli, consumers like stimuli 5 with the total utility value of 3.828. The results of consumer's preference are shown in Table 5. From 9 total utility value of each stimulus, the estimated average value was 3.623. According to Jervis et al. (2012), the result of the estimated average value interprets that the respondents "like" the formed stimuli.

There are some differences in the flavor attribute in the chosen stimuli attribute levels and chosen attribute levels as it can be seen on Table 5. As a matter of fact, both levels were preferred by the respondents as they have positive utility value. Nonetheless, as a consequence of the simplification process in the stimuli formation using orthogonal arrays method, some attributes are not used in the research. As a result, some stimuli liked by the respondents are not included in the research. Sweet flavor also affects consumers' preference against milk flavor.

Table 5. Consumer preference result

Attribute	Level	
	Level Utility Value	Total Stimuli Utility Value
Flavor	Stronger taro flavor	Balanced flavor between milk and taro
Volume	200 mL	200 mL
Fat Content	<i>Low fat</i>	<i>Low fat</i>
Packaging Type	<i>Tetrapack</i>	<i>Tetrapack</i>

Conclusions

Based on the result and the data analysis of the research, it is concluded that the attribute importance level is sorted based on attribute relative importance weight. Therefore, the highest relative weight of the attribute becomes consumers' priority in buying taro-flavored UHT Ultra milk in Malang City, which is flavor with a relative weight of 34.44%. Furthermore, the attribute of volume of contents and packaging type, which has a similar relative weight, that is 27.79%. Consumers' last priority was fat content with its relative weight of 9.97%. Combination of consumers' most preferred attribute (stimuli) of 9 formed stimuli was found in the fifth stimuli with the total utility value of 3.828 which consists of balanced flavor between milk and taro with volume of contents of 200 ml, low in fat (*low fat*) and packaged in *tetrapack*. Consumers are interested in the latest innovation of the attribute combination of taro-flavored UHT Ultra milk. This condition indicates an opportunity for the company to improve its product with a new attribute combination.

Conflict of interest

The authors declare that there is no conflict of interest in this publication.

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