

SENSORY PROFILE OF CHILLED CHEESECAKE MADE FROM DALI NI HORBO CHEESE IN CONSUMER PERCEPTION

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ABSTRACT

This research is a contribution to the use of dali ni horbo in the making of cheesecake and all the variations, so that consumer-based sensory profile characterization can be carried out. The purpose of this study was to determine the characteristics of the sensory profile and accelerate the cheesecake product development process. The method used in this study is an experiment that uses a consumer-based sensory profile characterization method. Later, it was known that the ideal dali cheesecake product according to panelists is cheesecake which has creamy color, dense texture, cheesy aroma and umami flavor. Dali cheesecake variant which was added with durian is a product that is considered close to the ideal product. Meanwhile, the sensory attributes of umami, dense and sweet are sensory attributes that were close to consumer preferences, but it was possible to do dali cheesecake development with other flavor variants.

Keywords: Bagot Ni Horbo, Chilled cheesecake, Dali Ni Horbo

INTRODUCTION

Dali or Bagot ni Horbo or known as the Batak cheese is often equated with cheese originating from the Netherlands. Dali or bagot in Batak language means milk, while ni horbo means buffalo, thus dali or bagot ni horbo is buffalo milk. In contrast to common cheese making that uses cow's milk and coagulated by adding rennet enzyme, dali or bagot ni horbo is a buffalo milk that is coagulated by using papaya leaf juice or pineapple juice. Aside from being coagulated, the fishy taste and smell of the buffalo milk are also disappeared. The traditional manufacturing process without the addition of other chemicals makes dali or bagot ni horbo a signature traditional cheese of Tapanuli, North Sumatra. The amount of fat contained in buffalo milk is less than cow's milk and easier to digest as well as has higher protein than cow's milk (Hatta *et al.*, 2014).

There are several studies performed to develop traditional cheese-based food products into modern pastry products, like dangke to be cheesecake (Avianda *et al.*, 2014), then dali ni horbo in the making of tiramisu (Giarsyah and Furqon, 2017) and baked cheesecake and chilled cheesecake (Luthfi and Sanggramasari, 2018). The similarity of the three studies is the function of dali ni horbo which replaces dairy products in the form of cream cheese as a basic food ingredient.

However, these studies are still limited to the analysis of the effect of substitution of cream cheese with dali ni horbo on the sensory profile based on the perspective of the author and expert respondents as well as the storage capacity of these foods, not from the consumer's perspective. Meanwhile, for these products to be applied as new food variants, research on consumer perceptions of these products is much needed.

The sensory profile of a product is often seen merely from expert respondents' perspectives. Therefore, to be accepted by the community, further research is needed to determine consumer perceptions of the product to be marketed, so that the success of

developing new food products can be achieved (Adawiyah and Yasa, 2017). Of those three popular products, one of the products that is easy to make and can be added with a variety of flavors is chilled cheesecake. Based on the research results, it is known that there is no significant difference in terms of appearance and aroma, but there is a slight difference in terms of texture, where the texture of chilled cheesecake that used dali ni horbo feels a little gritty due to the higher fat content so it doesn't blend easily with the liquid.

Product flexibility in developing flavor variants is needed so that consumers have the freedom to choose the taste they like so that the target market share will be wider. In addition, the selected flavors can also be adopted from local ingredients, so that chilled cheesecake offered will be more authentic. Thus, the authors are interested in conducting further research on the sensory profile of the cheesecake product which is made of dali ni horbo in terms of consumer perception. Chilled cheesecake made from dali ni horbo will be matched with flavors derived from local food ingredients, namely durian, passion fruit, custard fruit and orange as the authentic commodity of food products originating from Medan, North Sumatra, with consumer respondents, namely tourists visiting Lake Toba.

METHODOLOGY

Materials

The main ingredients for this research can be seen in Table 1.

Table 1. Ingredients of Dali Chilled Cheesecake

Materials	Experiment A	Experiment B	Experiment C	Experiment D	Experiment (E)
Dali ni horbo	375 g	375 g	375 g	375 g	375 g
Sugar	165 g	165 g	165 g	165 g	165 g
Lemon juice	50 ml	50 ml	50 ml	50 ml	50 ml
Dairy cream	250 g	250 g	250 g	250 g	250 g
Gelatin	10 g	10 g	10 g	10 g	10 g
Water	50 g	50 g	50 g	50 g	50 g
Addition of Taste	-	Durian Puree	Orange Cream	Passion Fruit Sauce	Custard Fruit jam

Yield: 20 cups/type of product

Source: Data Processed, 2021.

Equipment

The tools used for this study were divided into two groups. The first group is a tool for making experimental-like products that are mixer, mixing bowl, scale, stove, saucepan, milk jug, blender and rubber spatula. The second group of tools for sensory analysis such as plastic cups, plastic spoons, stationery, tables, chairs and test questionnaires.

Research Design

The analysis of CATA (check-all-that-apply) and the panelists' preferences (hedonic test) to describe the sensory profile, analyze the panelist preferences mapping and identify what sensory attributes have the potential for internal development of various flavor of chilled cheesecake.

Research Stages

1. Manufacture of Experimental Products

The making of chilled cheesecake product which was made from dali ni horbo with the addition of flavor variants given by adding the dough in the form of durian puree, passion fruit sauce, custard fruit jam (a product of Roti Ganda, Medan), and orange cream. This additional flavored dough was then mixed into the dough of original chilled cheesecake with

marbled technique. Base used are ready-to-eat biscuits in vanilla-flavored without the addition of simple syrup

2. Experimental Product Testing

Panelists fill out the respondent's profile and ideal cheesecake product checklist based on their experience. After that, the panelists were given five experimental products to find out which flavor variant has the ideal sensory profile character according to the consumer. In addition, the panelists also gave preference ratings for each experimental product.

3. Data Analysis

Tabulate and analyze the CATA test results and hedonic test results.

Research methods

This experimental research used a consumer-based sensory profile characterization method so that it does not require trained panelists. However, it used a sufficient number of consumer panelists.

This consumer-based sensory profile characterization of products is contributing to business decisions and the development of products according to consumer needs and developing reference products (Varela and Ares, 2012). This method is the most important methodologies for innovation and application to ensure final product acceptance by consumers (Ruiz-Capillas and Herrero, 2021).

In general, the consumers needed in this technique are as many as 50 to 100 people. Samples are presented monadically and randomly, then consumers are asked to answer questions or statements by ticking as many boxes as provided (Varela and Ares, 2012).

The sensory attributes that will be used in this study will be presented in a checklist with simple terms to make it easier for consumers to understand. All possible sensory attributes contained in the chilled cheesecake product written in a checklist so that consumers can freely choose what sensory attributes are contained in the product.

Table 2. Chilled Cheesecake Sensory Attribute

Sensory Aspects	Sensory Attribute	Definition
Appearance	Shiny	The texture that appears on the surface and sides of the product
	White-colored	The brightness of the white color that is visible on the surface and sides of the product
	Cream-colored	The brightness of the cream color that is visible on the surface and sides of the product
Texture	Smooth	The visible texture on the surface of the product
	Firm	The texture of the product density when spooned
	Creamy	The texture of the product's softness when eaten
Flavor	Sweetness	The basic sweet taste of the product is like the sweetness of sugar
	Sour taste	The sour taste of the product, such as the sour taste of lemon or cheese
	Salty taste	The basic salty taste of the product is like the saltiness of salt
	Bitter taste	The basic bitter taste of the product is like bitter melon
	Savory taste	The basic savory taste of the product is like the taste of cheese
	Aroma of Milk	The distinctive taste and aroma of milk felt when the product is eaten
Cheese Aroma	The distinctive taste and aroma of cheese or cream cheese that is felt when the product is eaten	
Lemon Scent	The distinctive taste and aroma of lemon felt when the product is eaten	

Aftertaste Bitter The bitter taste that is felt when the product is eaten or the bitter taste that remains and tastes after the product is eaten

Source: Data Processed, 2021.

Analysis Procedure

Data analysis was performed using XLSTAT 2017 using CATA (check-all-that-apply) Analysis tools. This study involved a number of panelists to assess the five products using various sensory attributes in Table 2.

Panelist Selection

The number of consumer panelists who will be used in this study is 50 to 100 people. Panelist criteria are men and women who have consumed cheesecake and or consumed dali ni horbo before.

RESULTS AND DISCUSSION

The profile of panelists obtained from the results of this test is seen from gender, age, and previous experience in consuming dali and cheesecake in general, which will assist the author in analyzing the research results. The author found 150 prospective panelists who were local tourists, then after the further screening, namely panelists who had eaten dali, the number of prospective panelists decreased to 120, then a further screening process was carried out, namely panelists who had eaten dali and had eaten cheesecake. In order to obtain the final result, the number of panelists is 96 people.

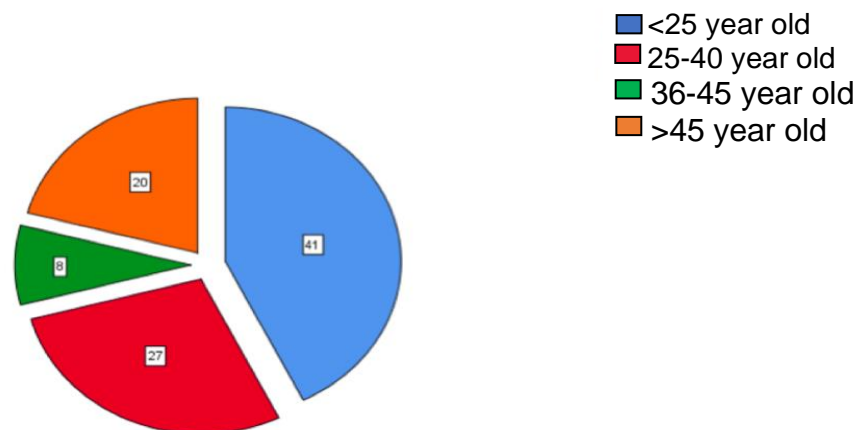


Figure 1. Profile of Respondents by Age (n = 96)

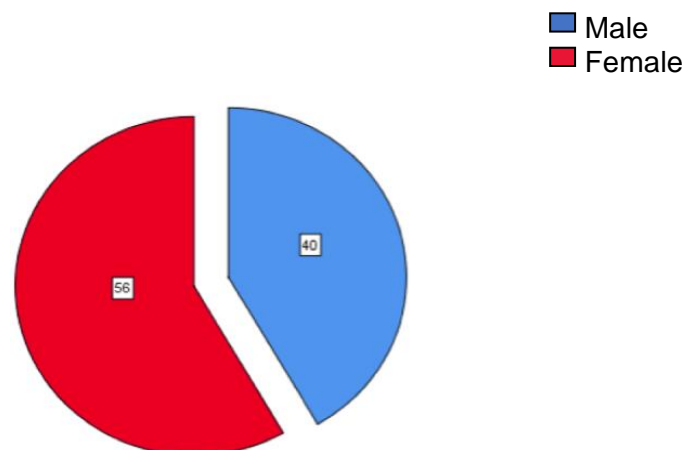


Figure 2. Profile of Respondents by Gender (n = 96)

1. Chilled Cheesecake Dali Sensory Profile with Various Flavors According to Panelists.

The results of the questionnaire obtained were then processed and analyzed the sensory profile using the XLSTAT 2017 application. In Table 3, it can be seen the results of the significance test of each experimental product.

Table 3. Result of Cochran's Q Test of Each Different Product Attributes with a Test Level of 5%

Attributes	p-Values	A	B	C	D	E
Smooth	0.000	0.77 ^(b)	0.42 ^(a)	0.44 ^(a)	0.70 ^(b)	0.75 ^(b)
Soft	-0.077	0.71 ^(a)	0.72 ^(a)	0.59 ^(a)	0.74 ^(a)	0.71 ^(a)
Solid	0.000	0.29 ^(a)	0.55 ^(b)	0.35 ^(a)	0.24 ^(a)	0.33 ^(a)
Salty	0.036	0.59 ^(a)	0.54 ^(a)	0.51 ^(a)	0.49 ^(a)	0.57 ^(a)
Sour	0.000	0.09 ^(a)	0.07 ^(a)	0.52 ^(b)	0.46 ^(b)	0.14 ^(a)
Sweetness	0.000	0.44 ^(c)	0.08 ^(a)	0.09 ^(a)	0.30 ^(bc)	0.15 ^(ab)
Bitter	0.000	0.42 ^(bc)	0.08 ^(a)	0.48 ^(c)	0.44 ^(c)	0.24 ^(ab)
Umami	0.000	0.37 ^(a)	0.56 ^(b)	0.27 ^(a)	0.25 ^(a)	0.41 ^(ab)
Lemon Scent	0.000	0.20 ^(a)	0.05 ^(a)	0.46 ^(b)	0.37 ^(b)	0.16 ^(a)
Cheese Aroma	0.000	0.30 ^(b)	0.28 ^(b)	0.35 ^(b)	0.06 ^(a)	0.22 ^(ab)
Aroma of Milk	0.000	0.46 ^(b)	0.16 ^(a)	0.26 ^(a)	0.20 ^(a)	0.45 ^(b)
Shiny	0.000	0.35 ^(bc)	0.17 ^(a)	0.54 ^(d)	0.45 ^(CD)	0.24 ^(ab)
white colors	0.007	0.41 ^(ab)	0.43 ^(b)	0.42 ^(b)	0.24 ^(a)	0.31 ^(ab)
Cream-colored	0.000	0.17 ^(a)	0.55 ^(c)	0.32 ^(ab)	0.47 ^(bc)	0.34 ^(ab)

Source: Data Processed, 2021.

Test results from Cochran's Q test by using multiple pairwise comparisons Marancuilo is to find out whether there are significant differences from the attributes that exist in the products tested (Meyners et al., 2013). At the 95% confidence level, attributes between products that are considered significantly different will have p-values smaller than 0.005. In addition to the p-value, this can be seen by the presence of product attributes that do not have the same letters, while sharing the same letters means that the attributes of the products tested are not significantly different (Santoso, 2014).

Based on Table 3, it is known that three attributes have a p-value greater than 0.005, namely the soft, salty and white sensory attributes. Thus, the existence of these three attributes in the five products tested does not have a significant difference according to consumer panelists.

Furthermore, the results of correspondence analysis, namely the analysis technique that presents the ideal product with experimental products presented in a biplot graph between products and attributes (Meyners *et al.*, 2013) is a map that shows the sensory profile of the ideal product based on consumer panelist perceptions. This can be seen in Figure 3.

According to consumer perceptions, the sensory profile of Dalí cheesecake's ideal product is: it has a creamy appearance, then has a dense texture, has a cheesy aroma and an umami flavor. The perception of the sensory profile of the ideal product influences the consumer's assessment of the Dalí cheesecake product which consists of various variants, where the variant which is considered to have a sensory profile such as the ideal product is the Dalí cheesecake product (B) in durian variant that has a creamy color, the slightly denser texture of the durian paste, a combination of savory and sweet flavors of durian and dali cheesecake produces a taste of umami which consumers think is one of the sensory attributes for an ideal product. Based on the map, it can also be seen that the product that is considered to be the closest to the ideal profile is product A, namely basic Dalí cheesecake which does not add any flavor. Where the attributes found by consumers are only the sweet taste and

aroma of milk. So basic dali cheesecake without any variants with only a sweet taste does not appeal to consumer panelists.

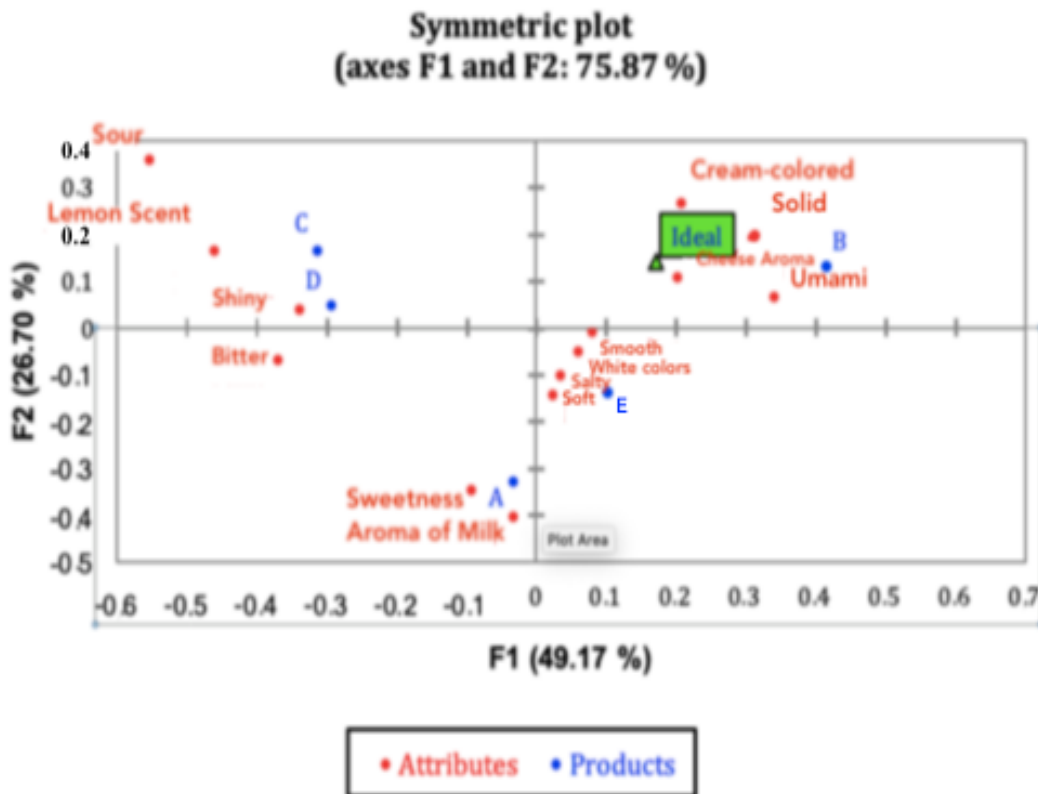


Figure 3. Ideal Product Sensory Profile Based on Consumer Panelist Perceptions

Then, E product is the dali cheesecake product with the addition of the custard fruit flavor variant, where considered close to the ideal product with a subtle sensory profile, has a salty taste, has a white and soft color. Meanwhile, products that are considered the farthest from the perception of ideal products are C and D products with a shiny sensory profile, have a lemon aroma, and have a sour taste. C product is dali cheesecake with the addition of orange variants and D product is dali cheesecake with additional passion fruit variants.

2. Consumer Preference Mapping to Dali Cheesecake Sensory Attributes with Various Flavors

To determine consumer preference mapping of dali cheesecake sensory attributes, principal coordinates analysis (PCoA) is used as a graph to describe the attributes that affect the level of consumer preference (Meyners et al., 2013) or it can be called Preference Mapping which will describe the relationship between sensory data and consumer acceptance. Therefore, it will produce a correlation between sensory attributes and consumer preferences, where a positive correlation will show that these sensory attributes affect consumer preferences and the negative correlation shows that these sensory attributes do not affect consumer preferences (Ramadhani et al., 2018). Through this analysis, the attributes that become consumers' favorite in Dalí cheesecake products will be identified.

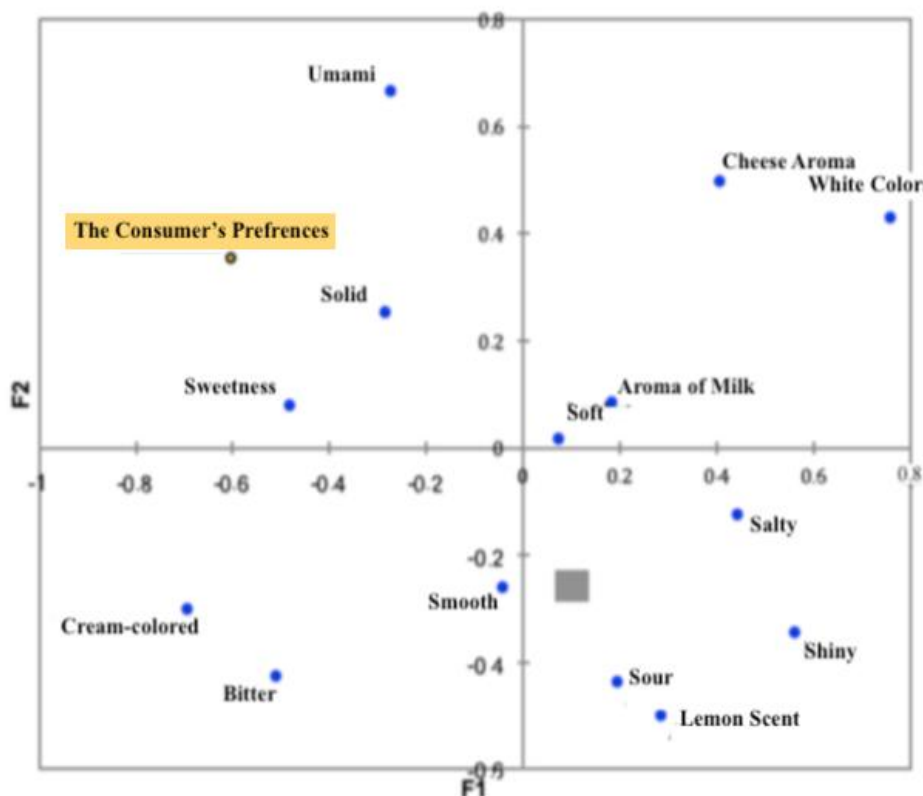


Figure 4. Principal Coordinate Analysis

From Figure 4, it was known that the sensory attributes which are the consumer's preferences are umami, solid and having sweet attributes. The three sensory attributes are in the same quadrant and are attributes that have significant differences between dali cheesecake products tested. From the three attributes, two of them are attributes that are also found in the ideal product profile based on consumer perceptions, namely umami and solid. Then, from the five products tested, the Dali cheesecake product which has these attributes other than sweet attribute is product B or product dali cheesecake which added with durian variant.

3. Identification of Sensory Attributes that Have Potential for the Development of Dali Cheesecake

In penalty analysis, theory based on the Pareto principle is used, which stated that “80% of outcomes result from 20% of all causes (Plaehn, 2012), the results of the analysis will divide the sensory attributes into several groups of attributes, namely the attribute group. must have, nice to have, does not influence, does not harm and must not have. Based on this curve, it is known that the sensory attributes fall into the must have group that consists of soft, umami and cream colors. The three sensory attributes are in the upper right quadrant. The higher the X coordinate value (P (No) (Yes) > 20%) and the Y coordinate value (positive mean drops) then the intended sensory attribute will be more and more above the right of the graph, which means it can increase the panelist's liking value to the dali cheesecake (Adawiyah and Yasa, 2017). The soft sensory attribute has an X value of 26.04% with a mean drop value amounting to 0.421 which means that the soft sensory attribute can increase the liking value by 0.421 points, and significantly gives a difference at the 5% test level. Similarly, umami which has an X value of 36.25% and a mean drop value of 0.488 and is significantly different at the 5% test level. Meanwhile, the cream color sensory attribute has an X value of 36.46% with a mean drop value of 0.483 and is also a sensory attribute that is significantly different between dali cheesecake products.

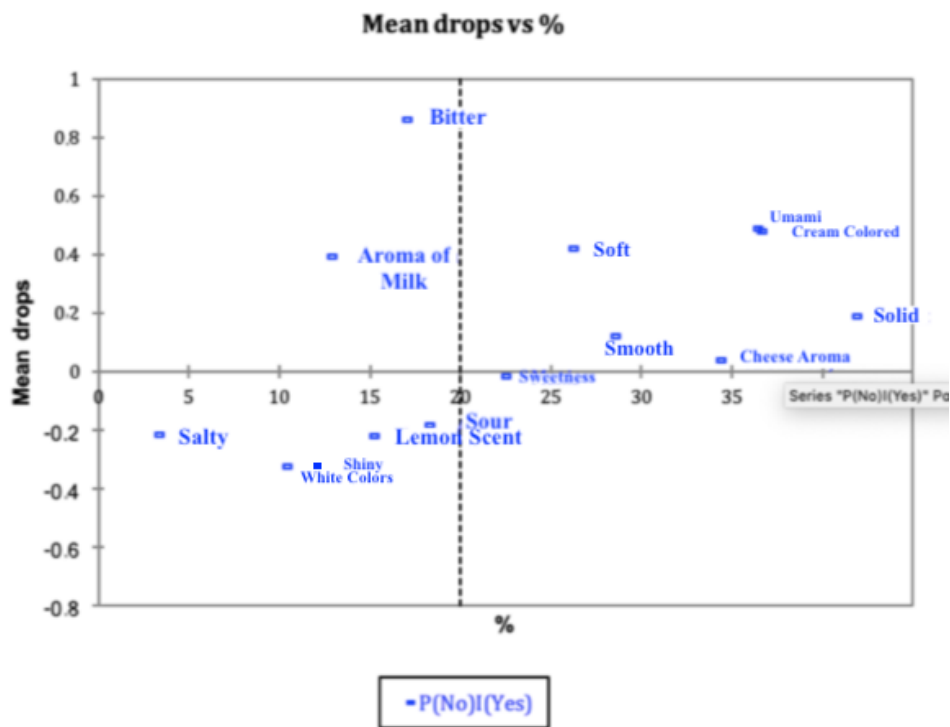


Figure 5. Must-Have Sensory Attribute Curve

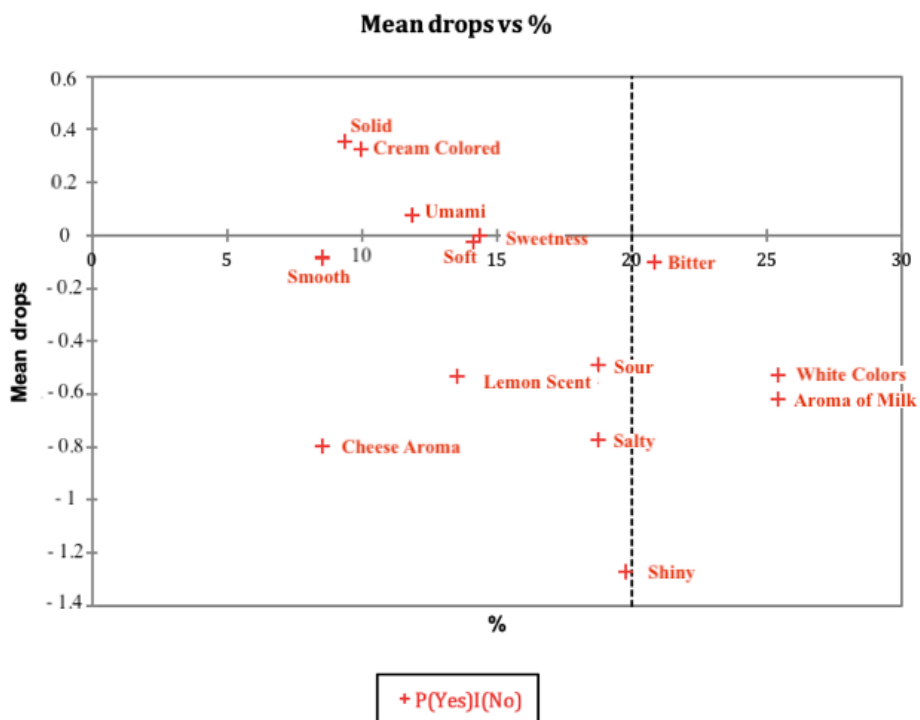


Figure 6. Nice to Have and Must Not Have Sensory Attribute Curve

From this curve, it can be seen that several sensory attributes have a value of > 20% but no attributes have positive mean drops. Thus, no sensory attributes are included in the nice to have group or has the potential to increase liking, but several sensory attributes fall into the must not have group namely the sensory attributes of the aroma of milk and the white color. The aroma of milk has 25.42% indigo with -4.223 of mean drops and significantly different at

the 5% test level, while white also has the same value of 25.42% with a mean drop of -3.645 and is significantly different. However, apart from these two groups, two other groups emerged, namely does not influence and does not harm groups that contain sensory attributes that are not included in the must-have, nice to have as well as must not have groups.

The sensory attributes that belong to the group does not influence is a subtle and dense sensory attribute that is on the far-left side of the curve even though it is a sensory attribute that has a significant difference in each dali cheesecake who were tested but the existence of these attributes did not have an effect on the level of preference for the panelists. Meanwhile, the other groups are does not harm, consisting of the sensory attributes of salty, sour, sweet, bitter and the aroma of lemon. From the five sensory attributes, only salty does not provide a significant difference at the 5% test level. These attributes are on the right side of the curve where their existence would not cause the consumers to dislike dali cheesecake.

CONCLUSIONS

According to a panelist of tourist consumers in Lake Toba, North Sumatra, an ideal Dali Cheesecake product has a cream-colored sensory profile, solid texture, a cheese aroma and a taste of umami. From the five variants tested, the Dalí cheesecake product which is considered to be close to the ideal product is product B, that added with the durian variant. Meanwhile, the sensory attributes of umami, solid and sweet are sensory attributes that are close to consumer preferences. In dali cheesecake product development, the sensory attributes that are considered a must-have are a cream color, soft texture and have an umami taste. Meanwhile, if the product is only white and has a milky aroma it should be avoided. Therefore, adding flavor variants that can provide additional salty, sour, bitter, sweet and lemon aroma will not make consumers dislike dali cheesecake. Thus, even though the durian variant in Dalí cheesecake is the ideal product, but the dali cheesecake with other variants can also be implemented.

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