Media Pendidikan Gizi dan Kuliner

Hedonic Test of Potato Donuts and Sweet Potato Donuts in an effort to Find Small and Medium Business Opportunities

(Case Study at SD Negeri Srogol 01 Kp. Cibandawa Bogor)

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A B S Ï R A C Ï' S

In an effort to assist the Indonesian government's program to fulfil a balanced nutritional adequacy in the community, especially the age of children, it is necessary to develop a diversification of food products containing energy sources. This is because the development of consumption patterns for staple foods (food sources of carbohydrates) in Indonesia is still dominated by grains, especially rice and wheat, while the contribution of tubers is still low. This study aims to offer children's snack products in the form of a popular snack, namely donuts which are generally made from wheat flour. Substitution of wheat with tubers in the form of sweet potatoes and potatoes which have many nutritional values higher than flour was tested on 53 elementary school students to see their perspective and determine the level of preference for the two types of diversification donut products. The results of the organoleptic test showed that potato-based donuts had a higher preference value than sweet potato donuts, by looking at the average value where potato donuts are superior in flavor, texture and aroma categories The results of calculations through the Kruskal- Wallis test showed that there was no difference between the products tested from all categories assessed, namely Flavor, Color, Texture and Aroma with a significant values more than 0.05.

A R Ï C L E I N Ï O

The findings obtained in this study can be used as a basis for community considerations to find small and medium business opportunities, especially donut products made from tubers with a target market of elementary school students.

1. INTRODUCTION

Fulfilment of nutrients in children who are still growth in school age (7-12) is very important in supporting the growth and development of children. One of the things we can do is to provide daily food consumption as a source of nutrients that play a major role in children's lives. Lack or excess consumption of nutrients will affect the physical and mental aspects of children (Briawan, 2016). In accordance with the Nutrition Coverage Figures (AKG) from the Indonesian Ministry of Health number 28 of 2019, school-age children ranging in age from 7-12 years require daily nutrition that must be met. School-age children (7-12) need a daily amount of nutrition that is greater than the nutritional needs of adults. Boys and girls need a balanced daily nutritional coverage, boys need more carbohydrates than girls in the range (220-300 g) and the energy content needed by boys and girls is (1650-2000 kcal) of energy, the protein content needed by boys and girls is (40-55gr) protein, and the fiber content needed by boys and girls is (23-28 g) fiber. In order to meet the daily nutrition of school-age children, researchers feel that the daily nutritional adequacy of these children needs to be considered.

One aspect that plays an important role in the growth process of school children is the intake of energy and other nutrients. School Snack Food (PJAS) is needed for children who do not or do not have breakfast and do not bring lunch to meet the energy and protein needs of school children. The contribution of nutrients, School Children Snacks (PJAS) to the fulfillment of daily nutritional adequacy should range between 15-20% (BPOM, 2013). Snack food is an important food for children's growth, because it contributes energy and nutrients needed for child growth (Nurbiyati, 2014). The problem is, not all of the street food that is circulating can be guaranteed safety or nutritional content so that it needs special attention in developing street food, because it can indirectly become one of the important obstacles in the development of Indonesian human resources in the future (Paratmanitya, 2016). Fulfilling children's nutritional needs can't just be with heavy food or fruit and vegetables, children will definitely feel bored and bored, it's good for us to also choose an alternative, namely by giving them snacks, maybe on the sidelines of their learning, but don't give any snacks , need snacks that contain vitamins and consist of good raw materials.

One example of a snack that is commonly found or liked is donuts. Donuts are fried snacks made from a mixture of flour, sugar, egg yolks, yeast, and butter. The most common donuts are donuts that are shaped like a ring and have a hole in the middle, usually sprinkled with Chocolate rice or powdered sugar. To obtain a better nutritional content, wheat flour can be

replaced or diversified with alternative ingredients from our natural resources, namely potatoes and sweet potatoes. Law No. 18 of 2012 on food and government regulation No. 17 of 2015 on Food Security and Nutrition, have also mandated food diversification to reduce dependence on rice and wheat consumption and switch to other carbohydrate sources, namely tubers. According to BPS Indonesia (2021) the National Prevalence of Undernourishment (PoU) in 2020 is 8.34%. This figure is influenced by the effects of the Covid-19 pandemic along with an increase in the poverty rate of 5.09%. According to the Food Security Agency of the Ministry of Agriculture (2021) during the 2015-2020 period, the development of consumption patterns of staple foods (food sources of carbohydrates) in Indonesia is still dominated by the grain group, especially rice and wheat, while the contribution of tubers is still low. Especially in West Java province during this period, people's consumption of rice ranged from 96.7 -104.2 kg/capita/year while for sweet potatoes only ranged from 1.9 to 3.2 kg/capita/year. (bkp.pertanian.go.id, 2021).

Donuts have nutritional content, such as protein, fat and so on, by using other alternative ingredients such as sweet potatoes and potatoes of course the nutritional content contained in the donuts will be different. The following is a comparison table between donuts made from wheat flour and donuts made from potatoes and donuts made from sweet potatoes.
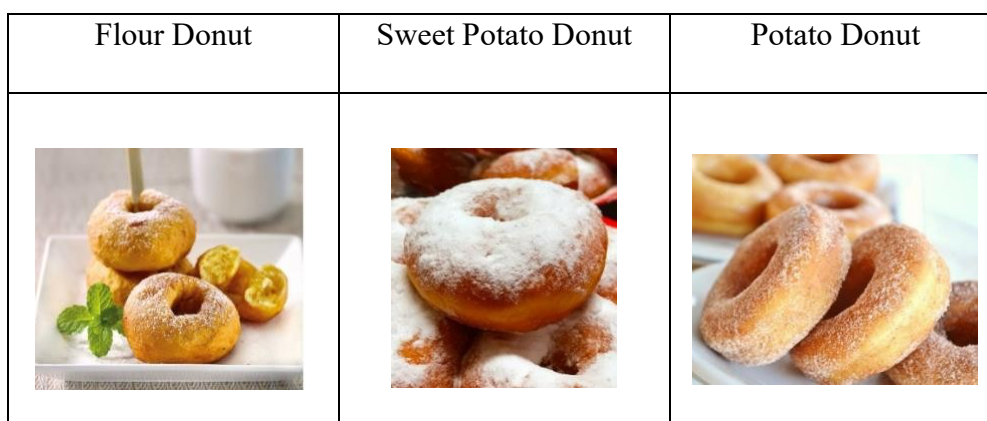
Flour Donut	Sweet Potato Donut	Potato Donut

Figure 1.1 Images of Flour Donuts, Sweet Potato Donuts and Potato Donut

Table 1.1 Nutritional Content of Flour Donuts, Sweet Potato Donuts and Potato Donuts

NUTRITION	DONUT with the basic ingredients of Wheat Flour 100 gr	DONUT with the basic ingredients of Sweet Potato 100 gr	DONUT with the basic ingredients of Potato 100 gr
ENERGY	357 Kkal	74 kkal	184.7 kkal
PROTEIN	2.35 gr	7.5 gr	2.36 gr
FAT	10.4 gr	6.2 gr	9.8 gr
CARB	56.5 gr	16.6 gr	21.9 gr

Source: http://www.organization.org (2022)

Based on table 1.1 above, it can be analysed that the energy content in wheat flour donuts is greater than sweet potato donuts/potato donuts, while donuts with 2 alternative ingredients of sweet potato/potato have a higher protein content than wheat flour donuts. Protein

content serves to build and repair body tissues, as a source of energy, forming antibodies, and much more. The ingredients for making donuts contain nutrients and vitamins, each ingredient has its own advantages and disadvantages. The following is a table comparing the nutritional content of wheat flour, and alternative ingredients of potatoes and sweet potatoes.

Table 1.2 Comparison of Contents of Wheat and Alternative Ingredients

NUTRITION	Flour	Sweet Potato	Potato
Energy	333 kcal	-	62 kcal
Vitamin A	-	709 mcg	-
Vitamin B1	0.10 mg	0.078 mg	0.11
Vitamin B2	0.07 mg	0.061 mg	0.02 mg
Vitamin B3	1 mg	0.557 mg	1.44 mg
Vitamin B5	-	0.8 mg	0.52 mg
Vitamin B6	-	-	0.3 mg
Vitamin B9	-	11 mcg	10 mcg
Vitamin C	-	12.8 mg	12.8 mg
Vitamin K	-	-	13.2 mcg
Vitamin E	-	0.26 mg	2.1 mg
Carbohydrate	77.20 gr	17.7 gr	17.7 gr
Protein	9 gr	1.37 gr	1.37 gr
Food Fiber	0.30 gr	2.5 gr	2.5 gr
Calcium	22 mg	27 mg	27 mg
Phosphor	150 mg	32 mg	32 mg
Sodium	2 mg	-	-
Potassium	-	230 mg	230 mg
Copper	-	-	-
Iron	1.30 mg	0.72 gr	0.72 gr
zinc	2.80 mg	0.3 mg	-
Water	11.80 gr	80.1 gr	80.1 gr
Ash	1 gr	-	-
Fat	1 gr	0.14 gr	0.14 gr
Sugar	-	5,74 gr	0.9 gr
Sodium	-	27 mg	27 mg
Magnesium	-	18 mg	18 mg
Choline	-	10.8 mg	10.8 mg
Beta carotene	-	9.440 mcg	9.440 mcg

Source: https://scienceumum.com/(2022)

Based on table 1.2 above, the comparison between wheat flour and other alternative ingredients, namely sweet potatoes and potatoes, has several advantages, namely more vitamins, choline, and beta carotene, potassium, calcium, vitamin content in alternative ingredients is greater than wheat. Alternative ingredients for potatoes and Sweet potatoes have less energy than wheat, they contain a large amount of beta carotene, where this beta carotene has benefits for maintaining lung health, maintaining eye health, slowing brain function decline, warding off free radicals and still much more. Potatoes and sweet potatoes also contain choline which is good for child development, maintaining brain health, maintaining heart health, maintaining liver function, helping metabolic processes and much more. Potatoes and Sweet Potatoes also contain potassium, potassium has a function to maintain bone health, prevent muscle cramps, and much more. They also contain of calcium which is good for the body, calcium functions to maintain heart health, healthy bones, strengthen bones, fulfilling calcium intake can help avoid osteoporosis, prevent colon cancer,

and so on. The vitamin c inside these two ingredients has several functions which are to increase endurance, reduce the risk of chronic diseases such as (cancer and heart disease) keep skin healthy, accelerate wound healing, reduce the risk of disease, eyes and so on. While wheat has a higher carbohydrate content compared to alternative ingredients of potatoes and sweet potatoes, carbohydrates have benefits for energy sources, optimizing protein function, but consuming too many carbohydrates also has side effects, namely obesity and can also cause hypertension, and so on.

Based on the data obtained regarding the nutritional content contained in potatoes and sweet potatoes, the authors intend to examine consumer preferences for donut products made from potatoes and sweet potatoes. The panellist are students of elementary school through a preference test with organoleptic analysis. The results found can be used as a basis or reference in developing the selected product.

2. METHODS

This research type is a descriptive quantitative research. The sampling technique used in this study used purposive sampling technique with a saturated sample method. The samples that will be panellists in this study are students in grades 5th and 6 of Elementary School SDN Srogol 01 Kp. Cibandawa Bogor, as many as 26 students and grade 6th as many as 27 students. The reason for using the entire population as a sample is the consideration of the author who believes that the ability of elementary school students at the age of 11-12 years is already able to provide answers that are in accordance with the questions posed by the authors in this study.

The method of descriptive sensory analysis and quantitative analysis that calculates preference values with the hedonic test of Kruskal-Wallis, mean, media, mode and standard deviation using organoleptic. Hedonic test parameters in this research activity were obtained through a questionnaire given to 53 untrained panellists with the aim of knowing the level of panellists' preferences on aspects of Flavor, Color, Texture and Aroma.

2.1. Hedonic Test of Potato Donuts and Sweet Potato Donut

The preference test is also known as the hedonic test. Panelists were asked for their personal responses about their likes or dislikes. In addition to the panelists expressed a happy response, like it or the opposite, they also expressed their level of preference. The plot in the picture above tells about the hedonic test process on two donut products whose basic ingredients consist of sweet potatoes and potatoes which will replace flour. At the start of the study, organoleptic tests were administered by assessing flour-based donuts as a product control. Panelists were given two other types of donuts at the same time to assess the taste, color, texture and Aroma (aroma). The data collected is processed to be able to interpret whether the two types of donuts have similarities or differences and overall, the product that has the highest value will be considered for further development.
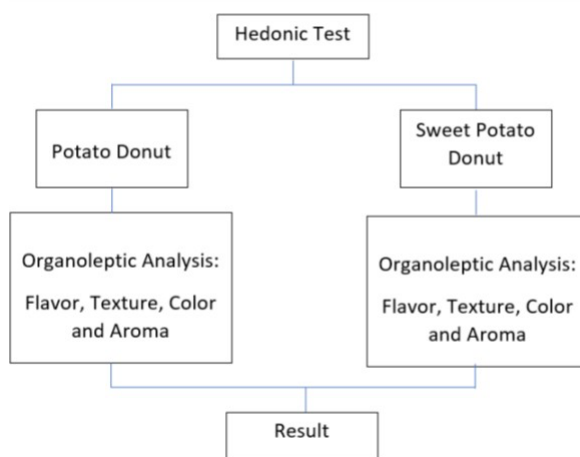
Figure 2.1. **Flowchart of Hedonic Test**

After the data is collected, then the average value of both the panelists is calculated and the value of each organoleptic category is calculated to see the differences between the three as illustrated in the table below.

Table 2.1 Organoleptic Test Results

Treatment	Flavor	Texture	Color	Aroma	Overall
Flour	3.02	3.28	3.23	3.17	3.11
Sweet Potato	3.09	3.34	3.32	3.28	3.26
Potato	3.15	3.32	3.34	3.42	**3.31**

From table 2.1 above, it can be seen that the organoleptic test results for three types of donuts showed that potato donuts were the panelists' choice with the highest overall score of 3.31, followed by sweet potato donuts with an overall score of 3.26. A more visible description can be seen in the following chart.
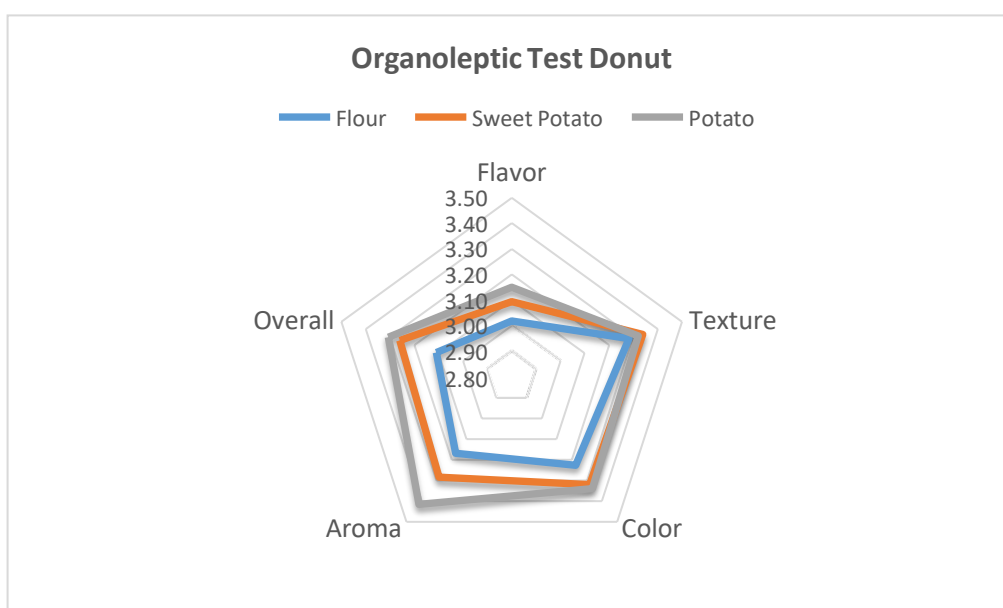

Figure 2.2. Organoleptic test Chart

2.2 Kruskal-Wallis Test

Non-Parametric Statistics is a distribution-free statistic (does not require the distribution of population parameters, whether normal or not). This study uses a social measurement scale, namely nominal and ordinal which are not normally distributed. Kruskal – Wallis Test or Kruskal Wallis Test is a nonparametric test that tests whether k independent samples come from the same population, which in this study is calculated to determine whether there are differences between the three products with different basic ingredients assessed from the acquisition of sensory test data. The data in this study is ordinal or continuous scale by using a Likert scale on graded answers, namely: Very Dislike – Dislike – Like – Really Like

3. RESULTS AND DISCUSSION
Below are explanations of descriptive statistical data and interpretation of the value of the differentiating test using the Kruskal-Wallis test for the categories of Taste, Color, Texture and Aroma assessment for each product that was organoleptically tested, namely flour-based donuts, sweet potato-based donuts and potato donuts.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Flavor	159	**3.09**	**.455**	2	4
Treatment	159	2.00	.819	1	3

Ranks

	Treatment	N	Mean Rank
Flavor	Flour	53	75.33
	Sweet Potato	53	80.29
	Potato	53	84.38
	Total	159	

Test Statistics[a,b]

	Flavor
Kruskal-Wallis H	2.011
df	2
Asymp. Sig.	**.366**

a. Kruskal Wallis Test
b. Grouping Variable: Treatment

Table 3.1. Descriptive Statistics and Significance Test with Kruskal-Wallis Test for Flavor Category

Table 3.1 shows that the test results of the three products obtained a mean value of 3.09 and a standard deviation of 0.455, which means that the panelist's assessment in terms of taste is in the like category. The significance value is 0.366 where this value is greater than the significance level of 0.05, meaning that there is no difference in flavor for the three products tested.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Color	159	**3.31**	**.505**	2	4
Treatment	159	2.00	.819	1	3

Ranks

	Treatment	N	Mean Rank
Color	Flour	53	78.49
	Sweet Potato	53	81.49
	Potato	53	80.02
	Total	159	

Test Statistics^{a,b}

	Color
Kruskal-Wallis H	.163
df	2
Asymp. Sig.	**.922**

a. Kruskal Wallis Test
b. Grouping Variable: Treatment

Table 3.2. Descriptive Statistics and Significance Test with Kruskal-Wallis Test for Color Category

Table 3.2 shows that the test results of the three products obtained a mean value of 3.31 and a standard deviation of 0.505, which means that the panellists' assessment in terms of color is in the like category. The significance value is 0.922 where this value is greater than the significance level of 0.05, meaning that there is no difference in color for the three products tested.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Texture	159	**3.30**	**.522**	2	4
Treatment	159	2.00	.819	1	3

Ranks

	Treatment	N	Mean Rank
Texture	Flour	53	75.26
	Sweet Potato	53	81.64
	Potato	53	83.09
	Total	159	

Test Statistics^{a,b}

	Texture
Kruskal-Wallis H	1.237
df	2
Asymp. Sig.	**.539**

a. Kruskal Wallis Test
b. Grouping Variable: Treatment

Table 3.3. Descriptive Statistics and Significance Test with Kruskal-Wallis Test for Texture Category

Table 3.3 shows that the test results of the three products obtained a mean value of 3.30 and a standard deviation of 0.522, which means that the panelist's assessment in terms of Texture is in the like category. The significance value is 0.539 where this value is greater than the significance level of 0.05, meaning that there is no difference in Texture for the three products tested.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Aroma	159	**3.29**	**.566**	2	4
Treatment	159	2.00	.819	1	3

Ranks

	Treatment	N	Mean Rank
Aroma	Flour	53	72.34
	Sweet Potato	53	79.09
	Potato	53	88.57
	Total	159	

Test Statistics[a,b]

	Aroma
Kruskal-Wallis H	4.458
df	2
Asymp. Sig.	**.108**

a. Kruskal Wallis Test
b. Grouping Variable: Treatment

Table 3.4. Descriptive Statistics and Significance Test with Kruskal-Wallis Test for Aroma Category

Table 3.4 shows that the test results of the three products obtained a mean value of 3.29 and a standard deviation of 0.566, which means that the panellists' assessment in terms of Aroma is in the like category. The significance value is 0.108 where this value is greater than the significance level of 0.05, meaning that there is no difference in Aroma for the three products tested.

3.1. Hedonic Test Mean Value

Hedonic test mean value is calculated based on each type of treatment with the number of samples that are not combined. This is to provide a more specific picture of each type of product under study by taking into account each parameter that you want to see the value gain. The following are the results of the hedonic test mean value with 53 panelists for each category to be studied.

Parameter	Hedonic Test Mean Value		
	Flour	Sweet Potato	Potato
Flavor	3.02 ± 0.455	3.09 ± 0.405	3.15 ± 0.411

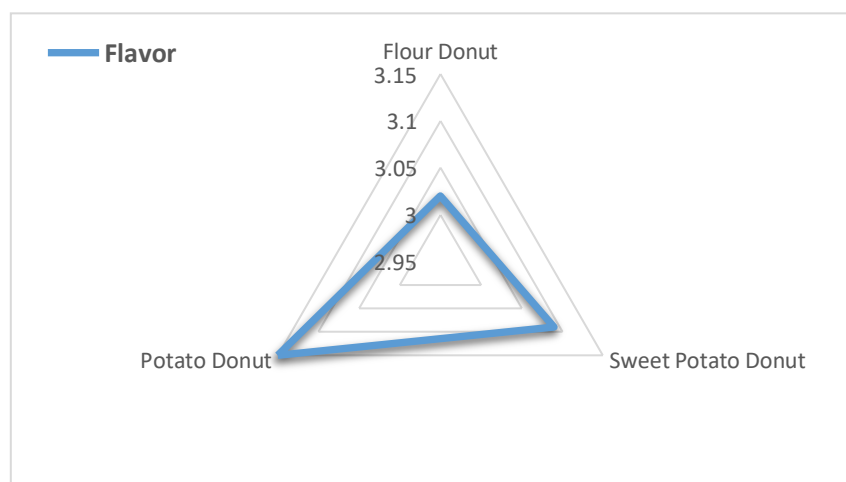**Table 3.5.** Hedonic Test Mean Value – Flavor Category

Figure 3.1 Graph Mean - Flavor category

The graph that shows the outermost position of the area shows the most favored. In this category, Potato Donuts are the most liked in the Flavor category.

The results of the Kruskal-Wallis test for the Flavor parameter showed the number 0.366> 0.05, H0 was accepted so that it could be interpreted that there was no significant difference in the treatment of replacing sweet potato and potato with the donut flavor.

Table 3.5. Hedonic Test Mean Value

Parameter	Hedonic Test Mean Value ± Deviation Standard		
	Flour	Sweet Potato	Potato
Color	3.28 ± 0.568ᵃ	3.34 ± 0.478 ᵃ	3.32 ± 0.471ᵃ

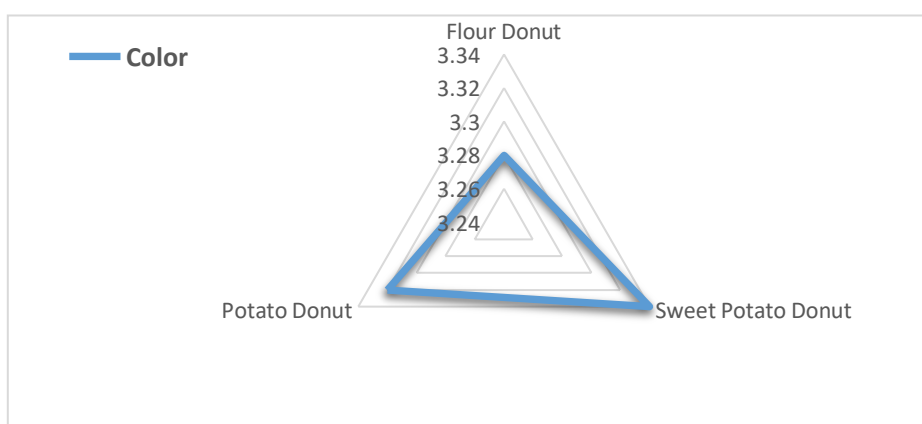**Table 3.6.** Hedonic Test Mean Value – Color Category

Figure 3.2 Graph Mean - Color category

The outermost position of the area shows the most favoured in Color category is Sweet Potato Donuts.

The results of the Kruskal-Wallis test for the Color parameter showed the number 0.922> 0.05, H0 was accepted so that it could be interpreted that there was no significant difference in the treatment of replacing sweet potato and potato with the donut Color.

Table 3.7. Hedonic Test Mean Value - Texture Category

| Parameter	Hedonic Test Mean Value ± Deviation Standard		
	Flour	Sweet Potato	Potato
Texture	3.23 ± 0.542ᵃ	3.32 ± 0.510ᵃ	3.34 ± 0.517ᵃ
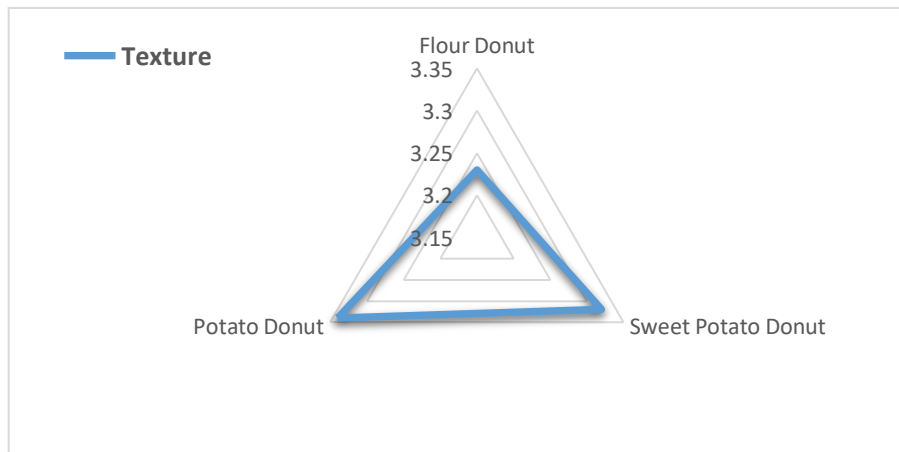
The outermost position of the area shows the most favoured in Texture category is Potato Donuts.

The results of the Kruskal-Wallis test for the Texture parameter showed the number 0.539> 0.05, H0 was accepted so that it could be interpreted that there was no significant difference in the treatment of replacing sweet potato and potato with the donut Texture.

Parameter	Hedonic Test Mean Value ± Deviation Standard		
	Flour	Sweet Potato	Potato
Aroma	3.17 ± 0.612^a	3.28 ± 0.533^a	3.42 ± 0.535^a

Table 3.8. Hedonic Test Mean Value - Aroma Category
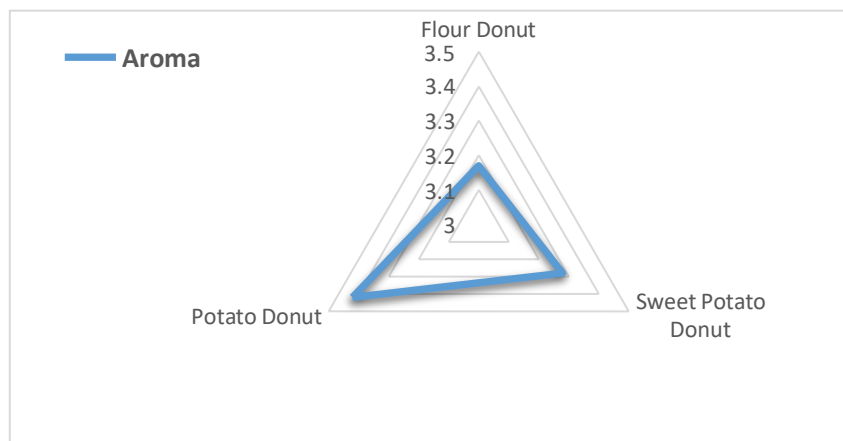
The outermost position of the area shows the most favoured in Aroma category is Potato Donuts.

The results of the Kruskal-Wallis test for the Aroma parameter showed the number 0.108> 0.05, H0 was accepted so that it could be interpreted that there was no significant difference in the treatment of replacing sweet potato and potato with the donut Aroma.

4. CONCLUSION

Hedonic Test Mean Value shows that Potato Donut has an average value advantage from the panelists' assessment in the category of flavor, texture and aroma. Meanwhile, in terms of color, sweet potato donuts are the most preferred. The results of the Kruskal-Wallis test for all parameters showed $P>0.05$, so it could be concluded that H0 was accepted, meaning that there was no significant difference in the treatment of Flour Donut, Sweet Potato Donut and Potato Donut on Flavor, Color, Texture and Aroma.

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