

Consumer Acceptance of "Pie Susu" with Variations of Cocoa Skin Substitution For Bali Souvenirs (Culinary)

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Abstract. This study aimed to determine the acceptance of milk pie with cocoa husk substitution (*Theobroma Cacao L.*) as Balinese souvenirs. This research method is experimental with an organoleptic test. The subject is consumers in Buleleng tourist attractions. Data were analyzed by t-test. Variation of cocoa husk substitution with the formula 15% (A), 10% (B), and 5% (C). The study results: (1) Formula A:B with a larger texture of 2.03, meaning there is a difference in acceptance. At the same time, the taste criteria obtained 1.07, color 1.09, and aroma 1.17. This means that there is no difference in favor. (2) Formula A:C with texture 8.18, taste 11.1, color 5.43, and aroma 3.80. This result means that there are differences in consumer acceptance. (3) Formula B:C with texture 4.45, taste 9.66, color 7.33, and aroma 5.07. This result means that there are differences in acceptance of the four criteria.

Keywords: Pie Susu, Cocoa Husk, Organoleptic, Acceptance Test

1 Introduction

Cocoa (*Theobroma Cacao L.*) is a cultivated plant in plantations in South America and is widely found in tropical areas such as Indonesia [1]. Cocoa has a rough, thick, and problematic skin texture, but cocoa husk has thin, soft, and slightly slimy skin. Cocoa processing obtains pulp, juice, cocoa beans, and husk [2]. The Indonesian Central Statistics Agency BPS [3] stated that the annual cocoa production in Bali province in 2018 was 4,813 tons; in 2019, it was 4,951 tons, and in 2020, it was 4,997 tons.

Noviyaty et al. [4] explained that cocoa husk is a waste produced when the cocoa bean fermentation process takes place, which is about 15% of the total weight of cocoa beans. It is used as animal feed, charcoal, and also as compost. Pradnyawati et al. [5] explained that the content in the cocoa husk is not much different from the content in cocoa beans, which contain low water content and fat content ranging from 42-52% and have a distinctive strong chocolate taste. So, the cocoa husk can be used as a substitute for cocoa powder, reducing product prices.

A cocoa husk, a waste, can be used as a substitute for cocoa powder in making 'pie susu' as Balinese souvenirs.

The cocoa husk is a potential food waste because it can be developed into functional food with a high content of antioxidants that are beneficial for health [6]. Table 1. shows the comparison of the nutritional content of cocoa husk with cocoa powder. The superiority of nutritional content of cocoa husk is 8.82 grams of fat and 16.60 grams of protein, which means that it is two times higher than cocoa powder. The nutritional content contained in the cocoa husk has benefits for the body's health because it is an antioxidant, anti-cancer, relieves stress, prevents dental caries, anti-diabetes, anti-hypertensive, and anti-inflammatory. It also increases resistance to hemolysis, cognitive ability, healthy heart, and as an aphrodisiac [7]. **Table 1.** Nutrient contents of epidermis cocoa powder and cocoa powder per 100 grams.

No	Nutritional Content	Cocoa Husk	Cocoa Bean Powder
1.	Ash	6.64 gr	15.4 gr
2.	Fat	8.82 gr	4.0 gr
3.	Protein	16.60 gr	8.0 gr
4.	Crude fiber	25.10 gr	32.6 gr
5.	Carbohydrates	47.34 gr	48.9 gr

Source: Indonesian Food Composition Data, 2018.

Several studies on cocoa husk flour have been carried out using it as an additional ingredient in food products such as cookies and brownies. Cookies, or pastries, are one of the pastry doughs favored by the public because they can be stored for a long time and taste good [8]. Balinese souvenir "pie susu" are included in the pastry, which consists of crust and topping. Pie crust is a pastry dough with a dense and crumbly texture made of low-protein flour, margarine, refined sugar, and egg yolks [9]. Substitution is made using cocoa husk flour as a "pie susu" variation on the pie crust. In addition, it also reduces the use of wheat flour in pie crusts by giving variations in the substitution of cocoa husks.

Based on observations and interviews with the "Bali Varenyam Store" owner in Sanur Kaja, South Denpasar, this shop sells herbal and natural ingredients, including cocoa beans. They process and sell around 33 kg of fermented cocoa beans every month, but the cocoa husk is left as a pile of garbage. In addition, PT Bali Cokelat Cokelat (POD) or "Pod Chocolate Bali" is located in Mengwi District, Badung Regency. The owner stated that producing cocoa beans as an ingredient for making chocolate could cost approximately 1 ton per month. This finding means that it has 150 kg of cocoa bean husk waste per month, which is not utilized. Therefore, this research uses cocoa husk, which will be used as flour and in making "pie susu". This study aims to gain consumer acceptance of the "pie susu" formula with variations of cocoa husk flour substitutions.

2 Research Methods

This type of research is quantitative research using experimental methods. The practical approach is a research activity that aims to assess the effect of a particular action or treatment under controlled conditions [10]. The experimental method used in this study is quasi-experimental, which aims to obtain information by conducting actual experiments in situations that do not allow manipulation or control of all variables [11]. Thus, in this research, only one

variable is considered the most dominant: the variation of cocoa husk substitution on "Pie Susu" acceptance in terms of texture, taste, color, and aroma aspects.

In this study, the reference to using cocoa powder as an additive is an average of 5% to 15% of the primary ingredients used [12]. In this study, the variation of substitution of cocoa husk flour used to make pie crusts with a percentage of Formula A is 15%, formula B is 10%, and formula C is 5%. The use of this percentage is because cocoa husk flour is only an additional food ingredient that gives the taste and aroma of chocolate but cannot be used in large quantities. After all, it can cause a bitter taste [6].

The criteria for "pie susu" in this study are as follows: (a) The texture of the pie crust can be assessed by touching the surface of the food or feeling it is tender and easy to chew. "Pie Susu" has a dense and crumbly texture, meaning that when eaten, the shape of the "Pie Susu" does not crumble, and the "Pie Susu" is not moist/mushy. This is due to the ingredients used: flour, butter, and eggs. Thus, the texture of the "Pie Susu" crust of cocoa bean husk, which is expected in the study, is dense and brittle. (b) Pie crust taste is a sensory response to nervous stimuli such as sweet, bitter, sour to the sense of taste, or hot, cold, and painful to the sense of taste. "Pie Susu" has a sweet, savory taste and no bitter taste. The pie crust has a savory taste obtained from the constituent ingredients, namely the use of salt. "Pie Susu" filling has a sweet taste typical of the constituent ingredients. Thus, the expected taste of the cocoa bean husk flour pie milk in the research is sweet and savory (pastry), typical of chocolate. (c) The color of the pie crust can be assessed using the sense of sight, namely the eye. "Pie Susu" has a bright color or is not dull according to the constituent ingredients. In the basic pie recipe, use butter so that it has a golden yellow color. In this study, researchers used an additional component of cocoa bean husk flour with a light brown color. Thus, the color of the cocoa bean husk flour "Pie Susu" that is expected in the study is chocolate. (d) The smell of pie can be detected through the sense of smell, namely the nose. "Pie Susu" has a distinctive pastry aroma according to its constituent ingredients, such as flour, butter, eggs, sugar, and salt, that can be felt by the sense of smell (nose). In this study, researchers used an additional cocoa bean husk flour ingredient with a distinctive chocolate aroma. Thus, the expected scent of the cocoa husk flour "Pie Susu" in the study is a typical chocolate pastry flavor.

The organoleptic instrument used in this study was a preference test sheet to obtain consumer acceptance according to the texture, taste, color, and aroma criteria. The panelists used in this study were consumer panelists totaling 51 people who were local tourists. The sampling technique used is purposive sampling consisting of local tourists aged 17-50 years. Panelists were asked to score 5 levels ranging from 1 to 5 on a hedonic scale. The criteria for assessing the organoleptic test of cocoa bran flour "Pie Susu" can be seen in Table 2.

Table 2. Hedonic scale 5 levels.

Criteria	Hedonic Scale	Score
Texture	Really like it	5
	Really like	4
	Like	3
	Do not like	2
	Very dislike	1

Criteria	Hedonic Scale	Score
Flavor	Really like it	5
	Really like	4
	Like	3
	Do not like	2
	Very dislike	1
Color	Really like it	5
	Really like	4
	Like	3
	Do not like	2
	Very dislike	1
Scent	Really like it	5
	Really like	4
	Like	3
	Do not like	2
	Very dislike	1

Source: Ariani & Masdarini (2020)

In this study, three formula variations were tested and coded randomly so that the panelists did not know the ratio of the flour used so that credible data were obtained. The formula consists of formula A, which is 85% wheat flour and 15% cocoa husk flour, formula B, which is 90% wheat flour and 10% cocoa husk flour, and formula C, which is 95% wheat flour and 5% cocoa husk flour. The data analysis technique is descriptive and quantitative using the t-test formula (t-test). The data obtained from the organoleptic test results were analyzed using the t-test formula to determine the difference in consumer acceptance of the substitution variation of the use of additional ingredients for cocoa husk in "pie susu" products according to a predetermined percentage.

The formula for obtaining the t-count value with the t-test formula is as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} - 2r \left(\frac{S_1}{\sqrt{n_1}} \right) \left(\frac{S_2}{\sqrt{n_2}} \right)}} \quad (1)$$

Where as

\bar{X}_1 = sample mean 1

\bar{X}_2 = sample mean 2

S_1 = sample standard deviation 1

S_2 = sample standard deviation 2

S_1^2 = sample variance 1

S_2^2 = sample variance 2

r = correlation between two samples [13]

The calculated t value is compared with the t value in the table with degrees of freedom (dB) =. Then look for the value of the t table by using a significance level of 5% (If it is known that the t count is greater than the t table or vice versa so that conclusions are obtained regarding differences in consumer tastes on the use of cocoa husk flour in the manufacture of "pie susu" from each formula used according to the criteria.

3 Research Result

The data obtained in this study based on 51 panelists are tabulated in Table 3. As follows

Table 3. Tabulation of research data.

	FORMULA A			
	Texture	Flavor	Color	Scent
Amount	185	178	185	192
Mean	3.63	3.49	3.63	3.76
Standard Deviation	0.6	0.64	0.63	0.68
Variance	0.36	0.41	0.4	0.46
	FORMULA B			
	Texture	Flavor	Color	Scent
Amount	199	185	179	185
Mean	3.9	3.63	3.51	3.63
Standard Deviation	0.73	0.66	0.5	0.49
Variance	0.53	0.44	0.25	0.24
	FORMULA C			
	Texture	Flavor	Color	Scent
Amount	231	242	224	221
Mean	4.53	4.75	4.39	4.33
Standard Deviation	0.54	0.48	0.72	0.82
Variance	0.29	0.23	0.52	0.67

Based on the results of the study, it was found that the panelists liked the product of cocoa bran flour pie milk by giving a score of 5, 4, and 3, meaning that they Really like it, Really like and Like.

3.1 Differences in consumer acceptance of “pie susu” formulas A and B

This difference can determine the difference in consumer acceptance of "pie susu" with variations in cocoa husk substitution between formula A (15 %) and formula B (10 %); obtained the calculation results as follows (a) texture criteria, got t count of 2.03 with t table of 1.98. This result means that the t count is greater than the t table. There are differences in consumer acceptance of the texture of formulas A and B. (b) taste criteria, obtained t count of 1.07 with t table of 1.98. Because the t count is smaller than the t table, there is no difference in consumer acceptance of the flavors of formulas A and B. (c) color criteria obtained a t count of 1.09 with a t table of 1.98. Because the t count is smaller than the t table, there is no difference in consumer acceptance of the color formula A and B. (d) aroma criteria obtained a t count of 1.17 with a t table of 1.98. Because the t count is smaller than the t table, it means that there is no difference in consumer acceptance of the aroma of formulas A and B

3.2 Differences in consumer acceptance of “pie susu” formulas A and C

The results showed that 51 panelists scored 5, 4, and 3 for each criterion of the two recipes. For consumer acceptance of “pie susu” with variations in cocoa husk substitution between formula A (15 %) and formula C (5 %), the following calculations were obtained: (a) texture criteria, got a t value of 8.18 with t table of 1.98. This result means that the t count is greater than the t table, and there are differences in consumer acceptance of the texture of formulas A and C. (b) taste criteria, the t count value is 11.1 with a t table of 1.98. It means that the t count is greater than the t table, there are differences in consumer acceptance of the taste of formulas A and C. (c) color criteria, the t count value is 5.43 with a t table of 1.98. This means that the t count is greater than the t table. There are differences in consumer acceptance of the color formula A and C. (d) aroma criteria. The calculation results obtained a t count value of 3.80 with a t table of 1.98. It means that the t count is greater than the t table. There is a difference in consumer acceptance of the aroma of formulas A and C.

3.3 Differences in consumer acceptance of "pie susu" formula B and C

In the data from this study, the panelists also gave a score of 5, 4, and 3 for each criterion. It's just that in the aspect of aroma, no one gave a score of 5, which means that the panelists could not distinguish the scent of the "pie susu". For the difference in consumer acceptance of "Pie Susu" with variations in cocoa husk substitution between formula B (10%) and formula C (5 %), the following calculations were obtained: (a) texture criteria, and the t-value was 4.45 with a t-value table of 1.98. The value of the t count is greater than the t table, which means that there are differences in consumer acceptance of the texture of formulas B and C. (b) taste criteria, obtained a t count of 9.66 with a t table of 1.98. The value of the t count is greater than the t table, meaning that there are differences in consumer acceptance of the flavors of formulas B and C. (c) color criteria obtained a t count of 7.33 with a t table of 1.98. The value of the t count is greater than the t table, meaning there are differences in consumer acceptance of the color formula B and C. (d) aroma criteria. The calculation results obtained a t count of 5.07 with a t table of 1.98. Because the t count is greater than the t table, there are differences in consumer acceptance of the aroma of formulas B and C.

Table 4. Recapitulation of research data.

FORMULA A : B (15% : 10%)			
	Flavor	Color	Scent
Texture	1.07 > 1.98	1.09 > 1.98	1.17 > 1.98
There is a difference	No difference	No difference	No difference
FORMULA A : C (15% : 5%)			
	Flavor	Color	Scent
Texture	11.1 > 1.98	5.43 > 1.98	3.8 > 1.98
There is a difference	There is a difference	There is a difference	There is a difference
FORMULA B : C (10% : 5%)			
	Flavor	Color	Scent
Texture			

4.45 > 1.98	9.66 > 1.98	7.33 > 1.98	5.07 > 1.98
There is a difference	There is a difference	There is a difference	There is a difference

4 Discussion

Based on the data obtained in this study, the panelists liked the "Pie Susu" product with variations of cocoa husk substitution. In formulas A, B, and C, all panelists scored 5, 4, and 3, meaning that the panelists could accept "pie susu", with a level of preference between very, very like, and like. Formula C is the most preferred texture, taste, color, and aroma by consumer panelists compared to other formulas. In comparison, formula A selects color and scent from formula B. But formula B preferred texture and taste.

Differences in consumer tastes for "Pie Susu" products with variations in cocoa husk substitution between formula A and formula B. Panelists can distinguish one texture criterion so that the texture of formula A with the substitution of 15% cocoa husk flour is denser and slightly less brittle than the characteristics of the pie milk formula B with 10% cocoa husk flour substitution. This is because the use of flour in formula B (90% wheat flour) is more than in formula A (85% wheat flour). Low-protein flour has a protein content of between 5% and 8%, affecting the pie crust dough texture formation. The less use of cocoa husk flour, the more brittle the pie crust will be. While on the criteria for taste, color, and aroma caused by adding cocoa husk flour, the results showed no difference between formula A and formula B. The panelists liked the two formulas because they could not distinguish the taste, color, and aroma. Both formulas have a distinctive chocolate pastry taste from the cocoa husk on the pie crust. The taste of the pastry is still sweet and savory because of the mixture of sugar and margarine, which is added with the distinctive taste of chocolate. The color of the pastry (pie skin) is brownish yellow, which is caused by the anthocyanin content in cocoa husk flour [6]. While the typical chocolate pastry aroma is in both formulas. The aroma of pastry comes from pastry ingredients such as margarine and eggs, then the distinctive aroma of chocolate comes from the cocoa husk on the pie shell.

In formula C, compared to formula A or formula B, there are differences in consumer preference on the criteria of texture, taste, color, and aroma. Pie crust (crust) is the most important thing in the success of pie making as a determinant of consumer interest in buying "Pie Susu" [14]. Formula A and Formula B, substituting 15% and 10% cocoa husk flour, have a strong chocolate taste. The taste was caused by adding more cocoa husk flour than formula C with a 5% cocoa husk substitution. Although the average preference of Formula A and Formula B is between the levels of very like and like, formula C is preferred. Because formula C obtains an intermediate level of preference between very much like and very like. The texture gives a pressure impression that can be felt using the mouth and felt when bitten, chewed, swallowed, or touched using the sense of touch, namely the finger [15]. So that the texture in formula C with the substitution of 5% cocoa husk flour is preferable to other formulas because it has the same texture as pie in general. The taste criteria for cocoa husk flour's 5% substitution formula differ in different recipes. The result is due to the difference in adding cocoa husk flour in the other two recipes.) The cocoa husk contains tannins which can cause a bitter taste (strong chocolate taste) when used in cooking. more numbers [4]. In the 5% formula, the use of cocoa husk flour

is less so that the distinctive flavor of chocolate is less pronounced. In the research data, it is known that the 5% formula of cocoa husk flour is preferred in terms of color which has a light brown color. The main cause of the color difference is the amount of use of cocoa husk flour, so if you use more cocoa husk flour, it will give a more brown color effect. Although color preferences vary, attractive colors can arouse consumers' appetite to buy or taste food products [15].



Fig. 1. Pie susu with cocoa husk (15%, 10% & 5%)

Cocoa husk, like cocoa beans, can be a functional food because it has several nutritional advantages that are beneficial for health, including antioxidant, anti-cancer, anti-diabetic, anti-

hypertensive, anti-inflammatory, relieving stress, preventing dental caries, anti-diabetes, anti-hypertensive, anti-inflammatory, and healthy heart [7].

5 Conclusions and Recommendations

Based on the research results, it is known that consumer panelists like all "Pie Susu" formulas with variations of substitution of cocoa husk flour with a range of preferences between very much like and like.

"Pie Susu" crust Formula A and Formula B on the criteria of texture (solid and brittle), there are differences in consumer preferences. Meanwhile, there is no difference in consumer preferences on the criteria for a typical chocolate pastry taste, chocolate color, and typical chocolate pastry aroma. In formula C, there are differences in consumer preferences on all criteria (texture, taste, color, and aroma) with formula A or formula B. The conclusions obtained in this study, consumers, can accept all "Pie Susu" formulas with variations in substitution of cocoa husk flour (15 %, 10%, and 5%. However, Formula C, with the substitution of 5% cocoa husk flour, was the most preferred "pie susu", based on the differences in preferences between formula C and formula A or formula B.

Suggestions for chocolate users to utilize the cocoa husk, which is considered as waste into flour, as an additional ingredient to substitute chocolate and flour in making "pie susu". Furthermore, further research needs to be done on new innovations in food products that use cocoa husk flour.

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