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PROXIMATE COMPOSITION AND ACCEPTABILITY OF CASSAVA-BASED PANCAKE FOR COLLEGE STUDENTS

Alyssa Tabor Fajardo[1*], Martina Delos Reyes- Peñalber, Ed.D.[2]
[1]Central Graduate School, Isabela State University- Echague Campus, Philippines
[2]College of Education, Isabela State University- Echague Campus, Philippines

[*]Corresponding Author

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ABSTRACT

This study is an experimental research about the proximate composition and acceptability of Cassava-Based Pancake. The study was conducted on the S.Y. 2023-2024 at Isabela State University-Main Campus, Food Processing Center, College of Education. The products were subjected to sensory evaluation using the 9-point Hedonic Scale acceptability test in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability. A sensory evaluation was conducted to untrained panel composed of fifty (50) individuals, who were randomly selected from among the students, teachers, and staff of Isabela State University-Main Campus, whose age ranges from 18-60 years old. Result showed that in terms of color/appearance, and odor/aroma T1 obtained the highest degree of acceptability. Of the five treatments, T4 had the highest mean score in terms of taste/flavor and general acceptability, and T3 obtained the highest acceptability in texture. The result on the Acceptability Consumer Index (ACI) revealed that setting aside the T1 (control), T4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) got the highest rank among the treatment. The treatments were subjected to nutrient analysis which includes the amount of crude protein, crude fiber, crude fat, moisture, and ash. The reports of analysis show that T2 had the highest percentage in Crude Protein, Crude Fat, and Ash. T5 had the highest Crude fiber content while T4 had the highest Moisture content. The Return-on-Investment per production of the product shows that T1 achieved the highest percentage followed by T4, T3, T2, and T5.

KEYWORDS: *Acceptability, Decent Work and Economic Growth, Pancake, Sagip, Zero Hunger*

INTRODUCTION

One of the biggest problems in the world is poverty. Families who are in the lower class do not have enough money to provide their basic needs especially food. Due to poverty there are a lot of children who are suffering from hunger and that may lead them to malnutrition.

In the news provided by Compassion International (2023), in 2023, the world is hungrier than ever, and poor children are among the most vulnerable. According to the World Food Program, up to 828 million people will go to bed hungry each night, indicating a lot of number of people affected by the food crisis. Moreover, hunger causes malnutrition because one of the primary sources of energy is proper nutrition, which people obtain from the foods they consume. According to The World Bank (2021), among the countries from East Asia and Pacific region, the Philippines ranked fifth in the highest prevalence of stunting and is included on the 10 countries in the world with the most stunted children. One in every three children (29%) under the age of five is stunted (2019) or undersized for their age. Some regions have stunting rates that reach 40% of the population. In Bangsamoro Autonomous Region in Muslim Mindanao with 45%, in Southwestern Tagalog Region (MIMAROPA) with 41%, Bicol Region, Western Visayas, and South-Central Mindanao Region (SOCCKSARGEN) with 40%. Based on these findings, the researcher doesn't want its community to have this kind of number of stunted children.

On the other hand, nutrition is the process of giving or receiving the food required for health and growth. It is an essential component of health and development. Malnutrition, in any form, poses a severe threat to human health. Brazier (2023) stated that malnutrition occurs when a person's diet does not provide enough nutrients or the right balance for optimal health or an imbalance in dietary intake. There are various types of malnutrition, including scurvy due to lack of vitamin C. People who are older adults, young children, heavy drinkers, and people with certain mental health issues are at risk of scurvy. Marasmus is a deficiency of protein and overall energy intake. Another cause of malnutrition is inadequate vitamins or minerals, many children develop vision problems due to lack of Vitamin A, and under nutrition (wasting or stunting). Vinmec International Hospital identified dietary inadequacies

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as the primary causes of stunting in children under the age of five, particularly those under the age of three. The primary causes include a shortage of energy, protein, lipids, and micronutrients such as iron, zinc, vitamins A, D, and Calcium.

On the other hand, breakfast is the first meal of the day and gives children with the energy they need to get the day started. Breakfast kick-starts the metabolism, allowing to burn calories throughout the day. It also provides the energy required to complete tasks and helps people focus at work or school. According to Edwards (2022), students who do not have breakfast may experience problems concentrating. They are more easily distracted by their friends and struggle to recall information compared to students who have breakfast.

With the hectic schedule, especially of those people who are working and students who are away from their parents and alone in an apartment students can't cook their breakfast due to lack of time. Rushing to get out the door, they just prepare some instant foods like cup noodles, easy open can or buy some street foods without considering the nutrients that consumers can get from those foods.

On the other hand, cassava is gluten-free, grain-free and nut-free and has fiber, anti-oxidants content and a high-carb food. Therefore people, who follow a balanced diet, should also eat foods that have Protein, Fats, Vitamins and Minerals. As an outcome, Isabela State University- Main Campus, College of Education developed a product; Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay and Turmeric Powder which is composed of the key ingredient Cassava with other ingredients of Mung Bean, Sesame, Malunggay, Turmeric and Cacao Pod Husk Powder (CPHP) that is already complete and balanced. Additionally, this research-based product is in partnership of the Barangay Integrated Development Approach for Nutrition Improvement (BIDANI), a developed project of Isabela State University- Main Campus dedicated to the 15 adopted Barangays of Echague, Isabela. Collaborating with this project will ensure the success in combating malnutrition. According to Medrano (2018), in revival of BIDANI in ISU, "reviving BIDANI will greatly help in solving the problem of malnutrition." Dr. Pedrita Medrano also quoted, "BIDANI is one of the proven development [strategies], tool *na nakakatulong sa pagre-reduce ng ating malnutrition rate…* we embrace the idea that we need, really, to revive and strengthen BIDANI as a program."

As a result with the above mentioned problems, the researcher utilized the research-based product of the Isabela State University-Main Campus, College of Education; Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder, that is scientifically proven to as a great source of nutrients as abovementioned to innovate an existing popular breakfast food; Pancake due to its characteristic that it is thin, flat shape, which makes it cook quickly and easy to prepare. Since pancake is made out of pure all-purpose flour as Kresser (2019) stated that it can increase the risk of many health conditions including weight gain or obesity, metabolic syndrome, diabetes, hypertension, heart disease, cognitive decline, food addiction, depression, cancer and acne. Therefore, the researcher made it more nutritious yet affordable food as it will help the consumers to have balance diet and have a complete source of nutrients that the body needs to start the day, function optimally and mitigate those aforementioned forms of malnourishment.

Additionally, this study is a great help in attaining the 17 Sustainable Development Goals (SDGs). Particularly in addressing the SDG numbers 1, 2, 3, and 8: 1, "No Poverty"; this product can be sold and help the farmers to promote their local crop product as abovementioned that Cagayan Valley Region is one of the top producers of cassava, thus, it can be a source of income. 2. "Zero Hunger"; the ingredients of this product are available in the locality and easy to prepare, hence it will be sold in an affordable price and so many can afford to prepare and buy it. Given the fact that it will be made using healthy and nutritious ingredients it aids the SDG no. 3, "Good Health and well-being", and by conducting an extension program, providing trainings about utilizing the local crop and indigenous products of the locality, aligned with the BIDANI program, the people of the community will have the knowledge in utilizing their local crop products such as cassava turning it into a nutritious food by innovating food products like pancake and sell it instead of being left rotten. Simply turning waste into wealth can lead them to SDG no. 8 "Decent Work and Economic Growth".

STATEMENT OF THE PROBLEM

This study was conducted to determine the Proximate Composition and Acceptability of Cassava-Based Pancake for College Students.

Specifically, this study aimed to answer the following questions:

1. Which among the five treatments is more acceptable in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability?
2. What is the Acceptability Consumer Index (ACI) of the different treatments?
3. What is the nutritive value of each treatment of cassava-based pancake?
4. What is the Return-on-Investment (ROI) computed for the different treatments?

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METHODOLOGY

Ingredients

Table 9 shows the ingredients and its proportion in the preparation of Cassava-Based Pancake used in the study.

Table 9. Proportion of Ingredients used in Making Cassava-Based Pancake.

Ingredients	T1	T2	T3	T4	T5
Cassava-Based Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder	0g	750g	500g	250g	1000g
All-Purpose Flour	1000g	250g	500g	750g	0g
Baking Powder	90g	90g	90g	90g	90g
Baking Soda	27g	27g	27g	27g	27g
Egg	900g	900g	900g	900g	900g
Milk	2696.4g	2696.4g	2696.4g	2696.4g	2696.4g
Salt	27g	27g	27g	27g	27g
Sugar	225g	225g	225g	225g	225g
Vanilla	39.60g	39.60g	39.60g	39.60g	39.60g
Vegetable Oil	244.8g	244.8g	244.8g	244.8g	244.8g

Collection and Preparation of the Material

Cassava Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder was bought in Isabela State University- Main Campus in collaboration with the BIDANI program and all other ingredients was bought from Santiago City market, before measuring the different proportions for the treatments. The flowchart for making hotcake is shown in Figure 5.

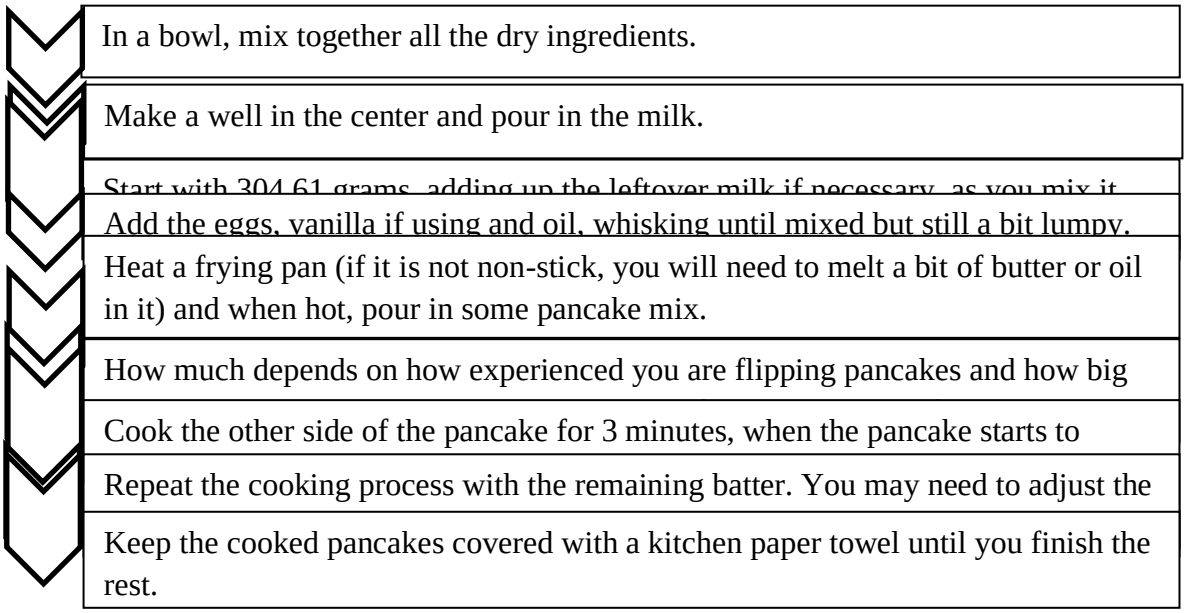


Figure 5. Flow Chart in Making Cassava-Based Pancake.

Treatment of the Study

The proportions of ingredients of Cassava-Based Pancake in this study were the same except for the main ingredient which is the all-purpose flour. Different ratio of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder were used as the main ingredients in making Pancake.

The treatments of this study are as follows:

T1 = Commercial Hotcake

T2 = 75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (750 grams), 25 % All-Purpose Flour (250 grams)

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T3 = 50% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (500 grams), 50% All-Purpose Flour (500 grams)
T4 = 25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (250 grams), 75% All-Purpose Flour (750 grams)
T5 = 100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (1000 grams), 0% All-Purpose Flour (0 grams)

Nutrient Analysis
The treatment products of Hotcake samples were subjected to nutrient analysis conducted at the Regional Food Technology Development and Incubation Center, Integrated Laboratory Division of the Department of Agriculture Regional Government Center, Carig Sur, Tuguegarao, City, Cagayan.

Sensory Evaluation
Sensory Evaluation was conducted at the Food Processing Laboratory Room, CEd Cafeteria, Isabela State University, Echague Campus, Echague, Isabela to determine the acceptability of the experimental product in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability of Cassava-Based Pancake. The instrument for data gathering will make use of score sheet using the 9-Point Hedonic Scale.
The range of scale is interpreted as follows:

Scale	Range	Descriptive Rating
9	8.50 – 9.00	Like Extremely
8	7.50 – 8.49	Like Very Much
7	6.5 – 7.00	Like Moderately
6	5.5 – 6.49	Like Slightly
5	4.5 – 5.49	Neither Like or Dislike
4	3.5 - 4. 49	Dislike Slightly
3	2.5 - 3.49	Dislike Moderately
2	1.5 - 2.49	Dislike Very Much
1	1.0 - 1.49	Dislike Extremely

A sensory panel were composed of fifty (50) individuals who were randomly selected from among the students, teachers and staff. The qualification of the panelists in terms of age should be 18 to 60 years old. They were screened to be non-smokers, not liquor drinkers, and in good health during the sensory evaluation.

The treatment samples of 1 piece of Pancake were subjected to sensory evaluation by the panellists. The panellists were requested to evaluate keenly and rate the treatment samples as to its color/appearance, odor/aroma, taste/flavor, texture, and general acceptability following the Hedonic scale ratings. All the respondents were requested to rinse their mouth before tasting each sample. This was strictly observed as a standard procedure to ensure the credibility and validity of the result of the study.

Cost and Return Analysis
Cost analysis was performed to determine the economic feasibility of the product if it will be sold in the market. This will be done by listing down all the cost incurred in producing the different proportion of Cassava-Based Pancake and computing the unit cost and the return on investment (ROI) per treatment.

Statistical Data Analysis
Results of the sensory evaluation were statistically analyzed using descriptive statistics specifically mean to get the general evaluation of the respondents on each treatment.

RESULT AND DISCUSSION
This study was conducted to determine the proximate composition and consumers' acceptability of Cassava-Based Pancake.

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Table 10. Profile Distribution of Respondents by Age

Age Bracket	Frequency	Percentage
18-22	43	86.00
33-37	2	4.00
38-42	1	2.00
43-47	2	4.00
53-57	1	2.00
58-62	1	2.00
Mean	23.50	

It can be gleaned from table that ages from 18-22 are dominant with 43 or 86.00%. This was followed by age brackets of 33-37 and 43-47 with a frequency count of 2 or 4.00%. The least of them were from the age range of 38-42, 53-57, and 58-62 with a frequency count of 1 or 2.00%.

Table 11 shows the profile of respondents by sex.

Table 11. Profile Distribution of Respondents by Sex

Sex	Frequency	Percentage
Male	22	44.00
Female	28	56.00
Total	50	100.00

As shown from the table, there were more female respondents, 22 or 44%, compared to male respondents with a frequency count of 28 or 56%, a total 50 respondents or 100%.

Degree of Acceptability

Color/Appearance. Table 12 shows the degree of acceptability of Cassava-Based Pancake in terms of color/appearance.

Table 12. Degree of Acceptability in terms of Color or Appearance

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	8.36	Like extremely
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.60	Like very much
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	6.78	Like moderately
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	6.46	Like moderately
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	5.58	Like slightly
SD	1.07	
CV (%)	15.4	

(t = 14.57, P 0.00)

The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the color or appearance of the product with approximately by 1.07. There is strong evidence (t =14.57, P 0.00) that cassava affected the color of the product thus influenced its acceptability.

This revealed that among treatments wherein Treatment 1and Treatment 2 exhibited more appealing color/appearance with comparable mean values of 8.36 and 7.60, respectively. This was followed by Treatment 3 with a mean value of 6.78, Treatment 4 with a mean value of 6.46 and Treatment 5 with a mean value of 5.58. Treatment 1 had the highest score perceived by the panelist with a qualitative description of "Like Extremely". Treatment 5 had the lowest score with a mean of 5.58 and a qualitative description of "Like Slightly". This means that the higher ratio of Cassava- Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder the darker the color and treatment with Pure All-Purpose Flour had the vibrant color/appearance.

Odor/Aroma. Table 13 shows the data on odor/aroma of cassava-based pancake.

Table 13. Degree of Acceptability in terms of Odor or Aroma

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	7.74	Like very much
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.16	Like moderately
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	6.88	Like moderately

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T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	6.88	Like moderately
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	6.60	Like moderately
SD	1.07	
CV (%)	15.13	

(t = 36.45, P 0.00)

The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the odor or aroma of the product with approximately by 1.07. There is strong evidence (t =36.45, P 0.00) that cassava affected the odor of the product thus influenced its acceptability.

The statistical procedure revealed that Commercial Flour (T1) and 75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (T2) had more aromatic smell with means of 7.74 and 7.16, followed by Treatment 3 and treatment 4 with means of 6.88 and treatment 5 with a mean of 6.60. Treatment 1 with a mean of 7.74 and qualitative description of "Like Very Much" had the highest score perceived by the panelists. Treatment 5 had the lowest score with a mean of 6.60 and a qualitative description of "Like Moderately". Indicating that adding a Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder reduced the acceptability of odor/aroma due to the strong smell of the ingredients of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder.

Taste/Flavor**.** Table 14 presents the taste/flavor of cassava-based pancake.

Table 14. Degree of Acceptability in terms of Taste or Flavor

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	7.24	Like very much
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	6.70	Like moderately
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	7.04	Like moderately
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	7.72	Like very much
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	6.60	Like moderately
SD	0.45	
CV (%)	6.37	

(t = 35.09, P 0.00)

The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the taste or flavor of the product with approximately by 0.45. There is strong evidence (t =35.09, P 0.00) that cassava affected the taste of the product thus influenced its acceptability.

Among treatments it was revealed that Treatment 4 (25% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) and Treatment 1 (Commercial Flour) obtaining number of respondents with respect to its flavor/taste with mean values of 7.72 and 7.24, respectively. This was followed by Treatment 3 (50% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.04, Treatment 2 (75% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 6.70 and Treatment 5 (100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder). Treatment 4 had the highest score perceived by the panelist with the qualitative description of "Like Very Much". Treatment 5 had the lowest score with a mean of 6.60 and a qualitative description of "Like Moderately". Indicating that higher ratio of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder content were less preferred due to the bitterness in after taste of the Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder.

Texture. The texture of cassava-based pancake is presented in Table 15.

Table 15. Degree of Acceptability in terms of Texture

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	7.68	Like very much
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.24	Like very much
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	7.72	Like very much
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	6.98	Like moderately
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	7.00	Like moderately

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SD	0.36
CV (%)	4.89

(t = 45.68, P 0.00)
The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the texture of the product with approximately by 0.36. There is strong evidence (t =45.68, P 0.00) that cassava affected the texture of the product thus influenced its acceptability.

It recorded that the 50% Cassava-Based Sagip Nutri Pack Fortified with Malunggay, and Turmeric Powder (T3) had the highest score with a mean of 7.72 and a qualitative description of "Like Very Much", followed by T1 (Commercial Flour) with a mean of 7.68 and a qualitative description of "Like Very Much", T2 (75% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.24 or "Like Very Much", T5 (100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.00 or "Like Moderately" and T4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the lowest score with a mean of 6.98 and a qualitative description of "Like Moderately" due to its light and airy texture compared to T3 which has soft or fluffy texture. Therefore, using the same amount of all-purpose and Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder improves texture satisfaction.

General Acceptability. Table 16 presents the general acceptability of cassava-based pancake.

Table 16. Degree of Acceptability in terms of General Acceptability

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	7.70	Like very much
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.12	Like moderately
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	7.20	Like moderately
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	7.88	Like very much
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	6.46	Like moderately
SD	0.56	
CV (%)	7.66	

(t = 29.19, P 0.00)
The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the general acceptability of the product with approximately by 0.56. There is strong evidence (t =29.19, P 0.00) that cassava affected the general acceptability of the product thus influenced its acceptability.

Significant variations among treatments are evident with Treatment 4 (25% Cassava-Based Sagip Nutri Pack Powder Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) and Treatment 1 (Commercial Flour) as the most accepted treatments with mean values of 7.88 and 7.70, respectively. However, statistical analysis showed that the latter treatment (T1) is comparable with Treatment 3 (50% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.20, Treatment 2 (75% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.12 and Treatment 5 (100% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 6.46 with the same qualitative descriptions of "Like Moderately". Treatment 4 had the highest score perceived by the panelists with qualitative description of "Like Very Much". This means that panelists prefer pancake with a higher ratio of all-purpose of flour. The 75% of All-Purpose Flour and 25% of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder was the most acceptable.

Acceptability Consumer Index (ACI). Table 17 shows the Acceptability Consumer Index (ACI) of the sensory evaluation result of different proportions of treatments.

Table 17. Acceptability Consumer Index (ACI)

	Appearance		Aroma		Texture		Taste		ACI	RANK
T1	8.36	1.84	7.74	1.47	7.68	1.50	7.24	2.86	7.67	1
T2	7.60	1.67	7.16	1.36	7.24	1.41	6.70	2.65	7.09	3
T3	6.78	1.49	6.88	1.31	7.72	1.51	7.04	2.78	7.09	3
T4	6.46	1.42	6.88	1.31	6.98	1.36	7.72	3.05	7.14	2
T5	5.58	1.23	6.60	1.25	7.00	1.37	6.60	2.61	6.45	4

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As indicated in the table, Treatment 1 ranked first with ACI of 7.67, followed by Treatment 4 (25% of Cassava-based Sagip Nutri-Pack Fortified with Malunggay and Turmeric Powder) with ACI of 7.14, while Treatment 2 (72% of Cassava-Based Sagip Nutri-Pack Fortified Cacao Pod Husk (CPH), with Malunggay, and Turmeric Powder) and Treatment 3 (50% of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) obtained the third ranked with an ACI of 7.09 and Treatment 5 received the lowest ranked indicating the least desirable option with an ACI of 6.45. The table implies that setting aside the Treatment 1 (control), Treatment 4 got the highest rank among the treatment utilizing the Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder.

Same result on the study of Adonu et. al. (2022), on Proximate Composition and Consumer Acceptability of Pancakes made with Wheat and Soybean Flour Blends that pancake made with 100% wheat flour served as the control and received the highest ratings, though did not differ from the fortified pancake samples AA1 and AA2. It is observed that substituting wheat flour partially with soybean flour with up to 10% and 20% could be used to produce acceptable pancake or pastry products without affecting the sensory quality.

Nutrient Analysis on the Different Treatments of Cassava-Based Pancake. Table 18 shows the nutrient analysis of each Treatment.

Table 18. Nutrient Analysis on the Different Treatments of Cassava-Based Pancake

TREATMENT	Crude Protein (%)	Crude Fiber (%)	Crude Fat (%)	Moisture (%)	Ash (%)
T_1 – Commercial Pancake	5.93	0.57	15.11	50.11	1.72
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.00	1.15	19.42	45.76	2.10
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	5.93	1.08	16.15	48.46	1.93
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	5.75	0.93	15.14	50.69	1.72
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	5.83	1.46	18.65	48.88	1.97

Treatment 2 (75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the highest percentage in crude protein with 7.00 compared to the Commercial Pancake (T1) with 5.93 the same with T3 (50% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) while T5 (100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with 5.83 and T4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the lowest crude protein percentage with 5.75. Result indicates that the higher the ratio of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder had the highest Crude Protein Content.

On the other hand, T5 had the highest percentage in terms of crude fiber with 1.46, followed by T2 with 1.15, T3 with 1.08, T4 with 0.93 compared to the Commercial Pancake (T1) with lowest crude fiber percentage of 0.57. This implies that increasing the Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder in pancake resulted in a corresponding increase in the crude fiber content.

In terms of crude fat percentage Commercial Pancake (T1) had the lowest percentage with 15.11 compared to the other treatments with 15.14 (T4), 16.15 (T3), 18.65 (T5), and 19.42 (T2). This means that T2 (75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the highest percentage of crude fat with 19.42% compared to the Commercial Pancake (T1) with the lowest percentage of 15.11%.

This showed that higher ratio of fat content increased as Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder increased.

In moisture content, T4 had the highest percentage with 50.69% followed by the Commercial Pancake (T1) with 50.11%, T5 with 48.88%, T3 with 48.46%, and T2 had the lowest percentage with 45.76%.

Result showed that when the ratio of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder was increased, the moisture content decreased in all fortified pancakes.

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In terms of Ash content, Commercial Pancake (T1) and T4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the lowest ash content with 1.72% compared to T3 (50% Cassava-based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with 1.93%, T5 (100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) and T2 (75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with the highest ash content of 2.10%. This means that T2 had the highest ash content with 2.10% than the commercial pancake (T1) with 1.72%.

This implies that increasing the Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder in pancake resulted in a corresponding increase in the ash content.

Summary of Cost and Return Analysis of Cassava-Based Pancake. As shown in Table 19, the cost of Cassava-Based Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder used in fortifying the four treatments differed.

Table 19. Summary of Cost and Return Analysis of Cassava-Based Pancake

Particulars	T1 (Commercial pancake)	T2 (75% Cassava-Based Sagip)	T3 (50% Cassava-Based Sagip)	T4 (25% Cassava-Based Sagip)	T5 (100% Cassava-Based Sagip)
Ingredients					
Cassava-Based Nutri-Pack Powder	0.00	18.75	12.5	6.25	25.00
All-Purpose Flour	4.00	1.00	2.00	3.00	0.00
Baking Powder	2.00	2.00	2.00	2.00	2.00
Baking Soda	0.20	0.20	0.20	0.20	0.20
Egg	7.00	7.00	7.00	7.00	7.00
Milk	15.00	15.00	15.00	15.00	15.00
Salt	0.20	0.20	0.20	0.20	0.20
Sugar	4.50	4.50	4.50	4.50	4.50
Vanilla	1.00	1.00	1.00	1.00	1.00
Vegetable Oil	2.00	2.00	2.00	2.00	2.00
Subtotal	35.90	51.65	46.40	41.15	56.90
ADDITIONAL EXPENSES					
Packaging	5.00	5.00	5.00	5.00	5.00
Label	3.00	3.00	3.00	3.00	3.00
Subtotal	8.00	8.00	8.00	8.00	8.00
Other Operating Expenses					
Gas	20.00	20.00	20.00	20.00	20.00
Fare	8.00	8.00	8.00	8.00	8.00
Subtotal	28.00	28.00	28.00	28.00	28.00
Total Cost (Php)	71.90	87.65	82.40	77.15	92.90

As for Treatment 1 (100% All-Purpose Flour), the amount of All-Purpose flour is Php 4.00, for Treatment 2 (Pancake with 75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder), the amount of Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder is Php18.75; Treatment 3 (50%

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Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder), the amount of Cassava-based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder is Php 12.25; Treatment 4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) the amount of Cassava-based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder is Php 6.25; and for Treatment 5(100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) the amount of Cassava-Based Sagip Nutri Pack Fortified with Malunggay, and Turmeric Powder is Php 60.00.

For the All-Purpose Flour used in Three treatments differed: For Treatment 2 (25% All-Purpose Flour) the amount of All-Purpose Flour is Php 1.00; Treatment 3 (50% All-Purpose Flour) the amount of All-Purpose Flour is Php 2.00; and for Treatment 4 (75% All-Purpose Flour) the amount of All-Purpose Flour is 3.00.

The same amount or the other ingredients was alloyed for the five treatments; Baking Powder, Php 2.00; Baking Soda, Php 0.20; Egg, Php 7.00; Milk, Php 15.00; Salt, Php 0.20; Sugar, Php 4.50; Vanilla, Php 1.00; and Vegetable Oil, Php 2.00.

Considering all the above expenses for the ingredients, the subtotal for Treatment 1; Treatment 2, Treatment 3, Treatment 4, and Treatment 5 were Php 35.90; Php 51.65, Php 46.40, 41.15, and Php 56.90, respectively.

Additional expenses for all treatments amounted to Php 5.00 which includes Packaging Material and Label at Php 3.00. In addition, other operating expenses such as Gas at Php 20.00, and Fare at Php 8.00 totaled to Php 28.00.

Summing up all of the above expenses, the cost incurred in producing the products amounted to Php 71.90, Php 87.65, Php 82.40, Php 77.15 and Php 92.90, for T1; T2, T3, T4 and T5, respectively.

Table 20. Summary Computation of Return and Investment

PARTICULARS	Treatments				
	T1	T2	T3	T4	T5
Total Production Cost (Php)	71.90	87.65	82.40	77.15	92.90
No. of tub	4	4	4	4	4
Selling Price	30.00	30.00	30.00	30.00	30.00
Total Sale	120.00	120.00	120.00	120.00	120.00
Income	48.10	32.35	37.60	42.85	27.10
ROI	66.90%	36.91%	45.63%	55.54%	29.17%

The table presents the Summary Computation of Return and Investment of five different treatments or products. Each treatment is evaluated in terms of its total production cost, number of tub produced, selling price per unit, total sales, income generated, and return on investment (ROI) percentage. The total production costs for treatments T1 to T5 are Php 71.90, Php 87.65, Php 82.40, Php 77.15, and Php 92.90, respectively, with all treatments producing 4 tubs each. The selling price per tub is consistent across all treatments at Php 30.00, resulting in total sales of Php 120.00 for each treatment. The income generated, calculated by subtracting the total production cost from the total sales, varies among the treatments: T1 yields Php 48.10, T2 yields Php 32.35, T3 yields Php 37.60, T4 yields Php 42.85, and T5 yields Php 27.10. The ROI percentages further illustrate the profitability of each treatment relative to its production cost, with T1 achieving the highest at 66.90%, followed by T4 at 55.54%, T3 at 45.63%, T2 at 36.91%, and T5 at 29.17%.

In conclusion, Treatment 1offers the highest profitability and ROI making it the best option for maximizing returns. Treatment 4 also presents a strong case with a significant ROI. Treatments 2 and 3, while profitable, provide moderate return, and Treatment 5, despite being profitable, is the least favorable due to its low ROI. This analysis helps in identifying the most efficient and profitable treatments for pancake production.

Developed Information, Education, and Communication (IEC) material

The Information, Education, and Communication (IEC) Material contains the name, ingredients, and procedure of the product. It also gives information about the health benefits and other facts of the product. The contact persons are also included in the material.

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This is done to easily give information and promote the product to the school, community and to the public. It is one way of educating the consumers as well as to easily disseminate and advertise the dish which can help in attaining good health and wellness.



Figure 7. Developed Information, Education, and Communication (IEC) material

CONCLUSION

Based on the result of the study the following conclusions are derived:

1. In terms of color/appearance, and odor/aroma treatment 1 is the most acceptable. In terms of texture, treatment 2 is more acceptable and among of the five treatments, treatment 4 is more acceptable in terms of taste/flavor and general acceptability;
2. In terms of Acceptability Consumer Index treatment 1 ranked first, treatment 4 being the second, treatment 2 and treatment 3 ranked third and treatment 5 ranked fourth.
3. Among the five treatments, Treatment 2 had the highest Crude Protein, Crude Fat, and Ash Content. Treatment 4 had the highest Moisture content and Treatment 5 had the highest Crude Fiber content; and
4. As to net profit, the production of the different treatments of pancake, treatment 1 achieved the highest, followed by treatment 4, treatment 3, treatment 2 and treatment

RECOMMENDATIONS

Based on the results of the study, the following recommendations are given:

1. Treatment 4 is recommended to be introduced as a new fortification of pancake to the consumers since it was rated the most liked in terms of taste and general acceptability among the other treatments. However, since it was rated "Like Moderately" as to its color/appearance, garnishing the product is recommended to mask its color/appearance and odor/aroma, enhancing the odor/aroma of the product by adding lemon grass or other food aroma is recommended in all treatments to mask the odor/aroma.
2. Microbial analysis is encouraged to be conducted to determine the microbial content of the finished product;
3. Shelf-life analysis is advised to be conducted to determine the stability of the products; and
4. Conduct further analysis and market testing to validate these findings and explore any potential improvements in production processes or ingredient sourcing that could enhance profitability and ROI across all treatments.

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