Research Article

Technology Process and Consumer Acceptability of Sweet Potato (Ipomoeae batatas L.) Pie

Ronald M. Ramirez

Faculty, College of Business and Mgt. Cebu Technological University, San Francisco Campus San Francisco, Cebu 6050 Philippines E-mail: ronamae1924@gmail.com

ABSTRACT

This study aimed to determine the technology process and consumer acceptability of sweet potato pie utilizing sweet potato (Ipomoea batatas L.) as the primary ingredient. Specifically, it described the standardized production process of Camote Pie, evaluated its sensory attributes in terms of aroma, texture, flavor, and general acceptability, and identified the most acceptable formulation among different treatments. An experimental research design was employed using four formulations of crust and filling preparations. Fifty-one (51) panelists composed of food experts, Hospitality Management students, and Technology and Livelihood Education students participated in the sensory evaluation using a 9-point Hedonic Scale. Results revealed that Treatment 1, consisting of 210 g all-purpose flour and 70 g camote flour for the crust, and 2 cups cooked camote with 1 cup evaporated milk for the filling, obtained the highest acceptability ratings. The overall mean acceptability rating was interpreted as "Like Very Much." Nutrient analysis further showed that the product contained appreciable amounts of carbohydrates, protein, and dietary fiber. Analysis of Variance (ANOVA) indicated significant differences among treatments in selected sensory attributes, while general acceptability showed no significant difference. The findings suggest that Sweet Potato Pie has strong potential for commercialization as a nutritious and acceptable value-added sweet potato product.

Keywords: Sweet Potato Pie, Technology Process, Consumer Acceptability, Sensory Evaluation, Product Development.

Introduction

Sweet potato (Ipomoea batatas L.), locally known as Camote in the Philippines, is one of the most important root crops cultivated in many Asian countries. It is recognized not only as a staple food crop but also as a rich source of essential nutrients such as carbohydrates, dietary fiber, vitamins A, C, and E, and important minerals including calcium, potassium, magnesium, iron, and zinc. Recent reviews have emphasized that sweet potato contains diverse bioactive compounds such as carotenoids, anthocyanins, flavonoids, and phenolic acids that contribute to its nutritional and functional properties, making it an important crop for food and nutrition security (Zhao et al., 2024; Guerra & Torres, 2025).

In the Philippines, sweet potato continues to play a significant role in agricultural production, food security, and rural livelihoods. The Philippine Statistics Authority (PSA) identifies sweet potato as one of the country's major root crops, contributing substantially to local food production and serving as an alternative staple food during periods of food shortage and natural disasters. PSA (2023) records show continued production across major producing regions such as Bicol, Eastern Visayas, and Central Luzon, highlighting its importance in the national food system. Furthermore, the Department of Science and Technology–Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) recognizes sweet potato as a strategic commodity with considerable potential for value addition, food security enhancement, and livelihood development. DOST-PCAARRD further emphasizes the crop's adaptability and growing market demand for processed products such as flour, confectioneries, and feed ingredients (PCAARRD-DOST, 2025).

The increasing global concern over climate change has further elevated the importance of sweet potato as a climate-resilient crop. Recent studies have identified sweet potato as a key food-security crop due to its drought tolerance, adaptability to marginal environments, and ability to produce high yields with relatively low agricultural inputs (Sapakhova et al., 2023). Its resilience under changing climatic conditions makes it a practical crop for sustainable agriculture and disaster recovery programs, particularly in developing countries (Sapakhova et al., 2023).

Despite its abundance and nutritional value, a considerable portion of sweet potato production remains underutilized for value-added processing. Globally, sweet potato has been transformed into a wide range of products including flour, bread, cakes, pastries, noodles, snack foods, beverages, and other functional food products. Recent

studies have demonstrated that sweet potato flour can partially substitute wheat flour in bakery products while improving nutritional composition through increased dietary fiber, antioxidants, vitamins, and essential minerals (Rosell et al., 2024; Shikder et al., 2025). Moreover, sweet potato flour has shown potential for enhancing food quality and shelf-life stability without adversely affecting consumer acceptability (Rossi, 2024; Mwangi, 2024).

Research has likewise shown that sweet potato-based products are generally well accepted by consumers and contribute to addressing micronutrient deficiencies, particularly vitamin A deficiency among vulnerable populations. Orange-fleshed sweet potato varieties are especially valued because of their high β-carotene content, while purple-fleshed varieties are recognized for their antioxidant-rich anthocyanins and other health-promoting phytochemicals (Alam, 2021; Zhao et al., 2024). These nutritional qualities create opportunities for developing innovative food products that simultaneously promote health, increase sweet potato utilization, and expand market opportunities for local farmers and food entrepreneurs (Guerra & Torres, 2025).

One promising value-added product is Camote Pie, a baked pastry that incorporates sweet potato flour into the crust and utilizes sweet potato-based filling combined with milk, sugar, and other ingredients. As a product innovation, Camote Pie offers both the desirable sensory characteristics of traditional baked pies and the nutritional benefits associated with sweet potato consumption. However, successful commercialization of such products requires the establishment of a standardized technology process as well as scientific evaluation of consumer acceptability. Sensory attributes such as aroma, flavor, texture, appearance, and overall acceptability are critical determinants of consumer preference and market success.

The technology process developed for Camote Pie includes the preparation of crust formulations containing varying proportions of sweet potato flour and all-purpose flour, preparation of sweet potato filling, baking, cooling, and packaging under controlled conditions. Standardization of these procedures is necessary to ensure consistency in product quality, maximize nutritional value, and facilitate commercial-scale production. DOST-PCAARRD and other food technology initiatives emphasize the importance of standardized processing technologies in enhancing product sustainability, market competitiveness, and enterprise development.

Given the increasing demand for functional foods, locally sourced ingredients, and value-added agricultural products, the development of Camote Pie presents an opportunity to enhance sweet potato utilization while generating potential livelihood and entrepreneurship opportunities. The findings may serve as a basis for future commercialization initiatives, technology transfer programs, food enterprise development, and further research on innovative sweet potato-based products.

Related Literature

Sweet Potato Flour in Bakery Products

Sweet potato flour has been widely utilized as a partial substitute for wheat flour in bakery products because of its nutritional advantages and functional properties. A recent study by Shikder et al. (2025) reported that sweet potato flour significantly improved the dietary fiber, vitamin A content, and overall nutritional quality of breads, cakes, and biscuits while maintaining acceptable sensory qualities. The study found that sweet potato flour-based products demonstrated good consumer acceptance and shelf-life stability, supporting its use as an alternative baking ingredient.

Similarly, Rosell et al. (2024) reviewed the application of purple-fleshed sweet potato in bakery products and emphasized its contribution to functional food development due to high concentrations of antioxidants, anthocyanins, carotenoids, and minerals. The study highlighted successful incorporation of sweet potato into breads, cookies, cakes, and pastries without compromising product quality.

Sweet Potato Cookies

Research conducted by Agustin (2025) evaluated cookies formulated from sweet potato and purple yam. Results revealed significant differences in sensory attributes among formulations, with the balanced sweet potato–yam combination receiving the highest ratings for appearance, aroma, taste, sweetness, and texture. The study concluded that root-crop-based cookies possess strong potential for commercialization and livelihood development.

Orange-Fleshed Sweet Potato (OFSP) Baked Products

A study by Wafula et al. (2022) investigated value-added products developed from orange-fleshed sweet potato puree, including bread, cakes, muffins, biscuits, buns, and cookies. Findings showed that OFSP products contained significant amounts of β-carotene and vitamin A, demonstrating their potential in combating vitamin A deficiency while providing nutritious alternative food products. Further research on OFSP value-added products reported that products such as chapati, mandazi, yogurt, and baked goods made with sweet potato puree were highly accepted by consumers and provided diversification opportunities for sweet potato utilization.

Sweet Potato Composite Bread

Evaluation of Nutrients, Antioxidants and Sensory Characteristics of Composite Bread (2025) demonstrated that bread formulated with orange-fleshed sweet potato flour exhibited improved antioxidant activity and nutrient content while maintaining favorable sensory scores from consumers. The study recommended sweet potato enrichment as a strategy for developing healthier baked products.

Sweet Potato Ice Cream Products

An innovation study on ice cream fortified with sweet potato and turmeric revealed that formulations containing sweet potato received high ratings for taste, texture, color, and overall acceptability among consumers. The researchers concluded that sweet potato serves as an effective functional ingredient capable of improving nutritional value without reducing consumer acceptance. Likewise, Estabillo et al. (2025) developed sweet potato-squash ice cream and found that formulations enriched with sweet potato were low in fat, higher in dietary fiber, and highly acceptable in terms of sensory characteristics.

Sweet Potato as a Functional Food Ingredient

Recent literature consistently identifies sweet potato as a promising functional food ingredient because of its high fiber, carotenoid, anthocyanin, and antioxidant contents. Reviews indicate that sweet potato has been successfully transformed into flour, chips, cakes, noodles, bread, pastries, cookies, muffins, beverages, and snack foods with generally high consumer acceptance (Chin and Obeso, 2025).

OBJECTIVES OF THE STUDY

This study aimed to determine the technology process and consumer acceptability of Sweet Potato Pie.

1. Describe the standardized technology process in the production of Sweet Potato Pie.
2. Determine the acceptability of Sweet Potato Pie in terms of:
    - Aroma
    - Texture
    - Flavor
    - General Acceptability.
3. Identify the most acceptable formulation of Camote Pie based on consumer evaluation.
4. Determine the nutrient composition of the most acceptable Camote Pie formulation.
5. Determine whether significant differences exist among treatments in terms of sensory attributes and overall acceptability.

MATERIALS AND METHODS

An experimental research design was employed to evaluate the different formulations of Sweet Potato Pie. Four treatments were developed using varying proportions of all-purpose flour and camote flour for the crust, and different combinations of cooked sweet potato, evaporated milk, and water for the filling. The production process followed a standardized technology procedure involving crust preparation, filling preparation, baking, cooling, and product evaluation.

A total of fifty-one (51) panelists participated in the sensory evaluation. The respondents consisted of food experts, faculty members, Hospitality Management students, and Technology and Livelihood Education students. Consumer acceptability was evaluated using a 9-point Hedonic Scale focusing on aroma, texture, flavor, and general

acceptability. The following scale was used to interpret the results: 8.12 - 9.00: Like Extremely 7.23 - 8.11: Like Very Much 6.34 - 7.22: Like Moderately 5.45 - 6.33: Like Slightly 4.56 - 5.44: Neither Like nor Dislike 3.67 - 4.55: Dislike Slightly 2.78 - 3.66: Dislike Moderately 1.89 - 2.77: Dislike Very Much 1.00 - 1.88: Dislike Extremely.

Nutrient analysis of the most preferred formulation was conducted by the First Analytical Services and Technical Cooperative (F.A.S.T.) Laboratories using standard AOAC procedures. One-Way Analysis of Variance (ANOVA) was employed to determine significant differences among treatments.

RESULTS AND DISCUSSIONS

Standardized Technology Process of Sweet Potato (Camote) Pie

The study successfully developed and standardized a technology process for the production of Sweet Potato Pie through a series of recipe trials, standardization procedures, sensory evaluations, and laboratory analyses. The standardized production procedure involved five major phases: preparation of the sweet potato pie formulations, recipe try-outs, recipe standardization, sensory evaluation, and product costing.

Table 1. Formulation of sweet potato pie CRUST

Formulation of CRUST	
Constant amount of ingredients in all treatments	Sugar- 3 teaspoons, Salt- ½ teaspoon Shortening- 70 grams, Butter-85 grams Egg- 1 pc, Ice water- 60 ml
Treatments	Amount of All-purpose flour (APF) and Sweet potato (camote) flour
1	All-purpose flour (APF) – 210 grams Camote flour- 70 grams
2	All-purpose flour (APF) – 140 grams Camote flour- 140 grams
3	All-purpose flour (APF) – 70 grams Camote flour- 210 grams
4	All-purpose flour (APF) –0 grams Camote flour- 280 grams

The production process began with the preparation of the pie crust using varying combinations of all-purpose flour and sweet potato flour. Four crust formulations were developed through blind baking. All treatments contained constant amounts of sugar, salt, shortening, butter, egg, and ice water, while the proportions of all-purpose flour and sweet potato flour varied. Treatment 1 consisted of 210 g all-purpose flour and 70 g sweet potato flour; Treatment 2 contained equal amounts of both flours (140 g each); Treatment 3 contained 70 g all-purpose flour and 210 g sweet potato flour; and Treatment 4 used 280 g sweet potato flour without all-purpose flour. The crust served as the pastry shell that enclosed the filling and contributed significantly to the appearance and texture of the pie.

Table 2. Formulation of sweet potato pie FILLINGS

Formulation of SWEET POTATO FILLINGS	
Constant amount of ingredients in all treatments	Sugar- 100 grams Camote flour- 60 grams Vanilla- 1 tsp, Eggyolk – 5 pcs
Treatments	Amount of cooked sweet potato (Camote), evaporated milk and water
1	Cooked Camote- 2 cups and Evaporated milk- 1 cup
2	Cooked Camote- 2 ½ cups

	Evaporated milk- 3/4 cup and Water- ¼ cup
3	Cooked Camote- 3 cups Evaporated milk- ½ cup and Water- ½ cup
4	Camote- 3 ½ cups Evaporated milk- ¼ cup and Water- ¾ cup

The filling formulation was likewise standardized using different proportions of cooked sweet potato, evaporated milk, and water. Constant ingredients in all treatments included sugar, sweet potato flour, vanilla, and egg yolks. Treatment 1 consisted of 2 cups cooked sweet potato and 1 cup evaporated milk; Treatment 2 contained 2½ cups cooked sweet potato, ¾ cup evaporated milk, and ¼ cup water; Treatment 3 contained 3 cups cooked sweet potato, ½ cup evaporated milk, and ½ cup water; while Treatment 4 contained 3½ cups cooked sweet potato, ¼ cup evaporated milk, and ¾ cup water. The formulation was designed so that as the amount of sweet potato increased, the amount of evaporated milk decreased and water was proportionally added to maintain the desired consistency. The standardized processing flow started with the preparation of the crust ingredients by combining all-purpose flour and sweet potato flour according to the formulation. The crust was blind-baked to form a stable shell. Simultaneously, the filling was prepared by combining sugar, evaporated milk, and cooked sweet potato in a saucepan and heating the mixture over low fire until thick. Eggs and vanilla were then incorporated into the mixture and continuously stirred until a uniform consistency was achieved. The filling was cooled before being poured into the prepared pie crust. The assembled pie was subsequently baked at 350°F for 25 minutes until fully cooked and developed the desired texture and appearance.

Observations during recipe standardization revealed that increasing the proportion of sweet potato flour in the crust resulted in a firmer and heavier texture. Treatments containing higher amounts of all-purpose flour exhibited a moderately shiny surface and lighter texture, whereas crusts made entirely of sweet potato flour were denser and firmer.

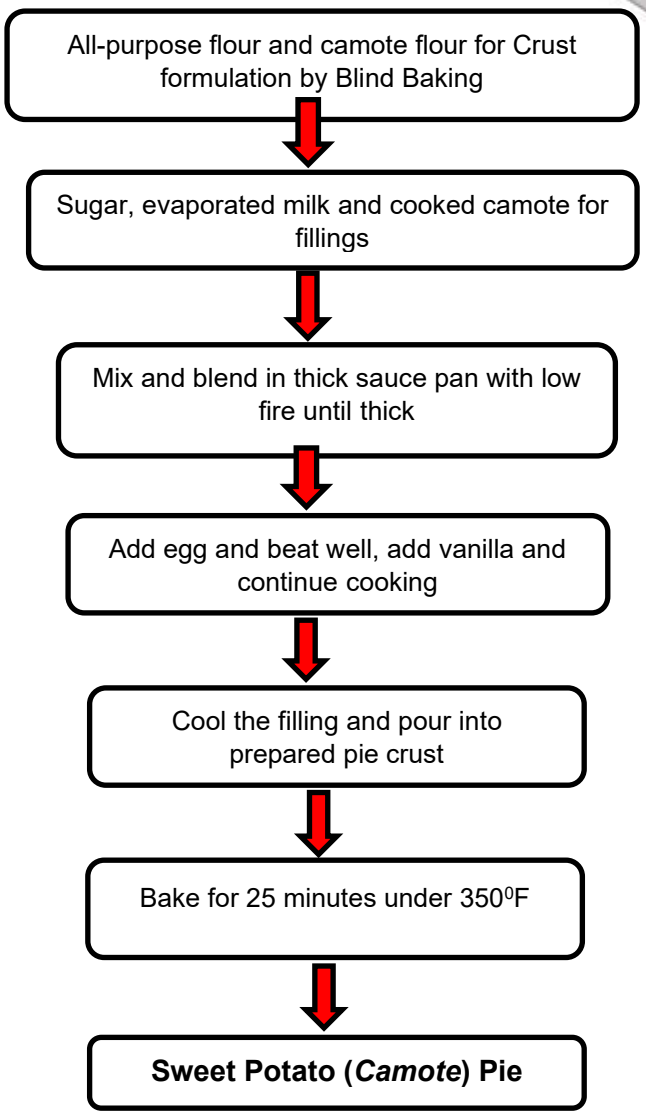

Figure 1. Diagram on the Sweet Potato Pie Processing

Similarly, increasing the amount of sweet potato in the filling produced a heavier and moister product due to the natural starch and moisture content of sweet potato.

Among all formulations, Treatment 1 emerged as the most acceptable product based on sensory evaluation. The preferred formulation consisted of a crust made from 210 g all-purpose flour and 70 g sweet potato flour, combined with a filling composed of 2 cups cooked sweet potato and 1 cup evaporated milk. Panelists described this formulation as having a pleasing aroma, distinct sweet potato flavor, moderately light texture, and moderately shiny surface. The treatment obtained the highest acceptability ratings and was selected as the standardized formulation for nutrient analysis and future production.

Consequently, the standardized technology process developed in this study established a systematic and replicable procedure for producing Sweet Potato Pie, encompassing crust preparation, filling formulation, controlled baking, and product evaluation. The process demonstrated that appropriate proportions of sweet potato flour and sweet potato filling can produce a highly acceptable value-added product with desirable sensory characteristics and nutritional potential.

ACCEPTABILITY OF THE FORMULATED SWEET POTATO PIE

The acceptability level of the formulated recipe as to different food attributes was determined in a sensory evaluation by the 51 panelists. The attributes include the aroma, taste, texture and general acceptability of the product.

Table 3. Aroma Attribute of the Sweet Potato Pie Treatments

Crust	**Mean**	**Interpretation**
Treatment 1	7.63	Like very much
Treatment 2	7.49	Like very much
Treatment 3	6.86	Like moderately
Treatment 4	7.02	Like moderately
Average	**7.25**	**Like very much**
Filling		
Treatment 1	7.84	Like very much
Treatment 2	7.84	Like very much
Treatment 3	7.12	Like moderately
Treatment 4	6.73	Like moderately
Average	**7.38**	**Like very much**

Table 5. Texture Attribute of the Sweet Potato Pie Treatments

Crust	**Mean**	**Interpretation**
Treatment 1	7.33	Like very much
Treatment 2	7.31	Like very much
Treatment 3	6.51	Like moderately
Treatment 4	6.88	Like moderately
Average	**7.01**	**Like moderately**
Filling		
Treatment 1	7.88	Like very much
Treatment 2	7.55	Like very much
Treatment 3	7.02	Like moderately
Treatment 4	6.55	Like moderately
Average	**7.25**	**Like very much**

Table 6. Flavor Attribute of the Sweet Potato Pie Treatments

Crust	**Mean**	**Interpretation**
Treatment 1	7.31	Like very much
Treatment 2	7.43	Like very much
Treatment 3	6.71	Like moderately
Treatment 4	7.08	Like moderately
Average	**7.13**	**Like moderately**
Filling		
Treatment 1	7.96	Like very much
Treatment 2	7.82	Like very much
Treatment 3	7.14	Like moderately
Treatment 4	6.39	Like moderately
Average	**7.33**	**Like very much**

Table 7. General Acceptability Attribute of the Sweet Potato Pie Treatments

Crust	Mean	Interpretation
Treatment 1	7.57	Like very much
Treatment 2	7.51	Like very much
Treatment 3	6.80	Like moderately
Treatment 4	7.08	Like moderately
Average	**7.24**	**Like very much**
Filling		
Treatment 1	8.02	Like very much
Treatment 2	7.80	Like very much
Treatment 3	7.10	Like moderately
Treatment 4	6.55	Like moderately
Average	**7.37**	**Like very much**

Results revealed that both the crust and filling formulations were generally well accepted, with most treatments receiving ratings ranging from **"**Like Moderately" to "Like Very Much**."** Across all evaluated attributes, Treatment 1 and Treatment 2 consistently obtained the highest mean scores, indicating greater consumer preference compared to Treatments 3 and 4.

Aroma attribute

The overall aroma acceptability of the Sweet Potato Pie was favorably rated by the panelists. The crust obtained an average mean of 7.25, interpreted as **"**Like Very Much**,"** while the filling received a slightly higher average mean of 7.38, also interpreted as **"**Like Very Much**."** Among the treatments, Treatment 1 registered the highest aroma score for both the crust (7.63) and filling (7.84), suggesting that its formulation produced a more appealing and pleasant aroma. Treatments 3 and 4 were rated lower and interpreted as **"**Like Moderately**,"** indicating that the modifications in these formulations may have slightly reduced the aromatic appeal. The findings imply that aroma played a significant role in consumer acceptance, with panelists preferring formulations that retained a stronger and more desirable sweet potato scent.

Texture attribute

Table 5 shows the acceptability ratings for texture. The crust recorded an average mean of 7.01, interpreted as **"**Like Moderately**,"** while the filling obtained a higher average mean of 7.25, interpreted as **"**Like Very Much**."** The highest texture ratings were again observed in Treatment 1, with mean scores of 7.33 for the crust and 7.88 for the filling. These results indicate that the texture of Treatment 1 was perceived as more desirable, possibly due to an appropriate balance between firmness and softness. Treatments 3 and 4 received lower ratings, suggesting that their formulations may have affected the product's consistency and mouthfeel. Overall, the favorable ratings demonstrate that the Sweet Potato Pie possessed acceptable textural properties, particularly in the filling component, which contributed positively to consumer satisfaction.

Flavor attribute

Flavor is one of the most important determinants of food acceptability. As shown in Table 6, the crust achieved an average mean rating of 7.13, interpreted as **"**Like Moderately**,"** while the filling obtained a higher average mean of 7.33, interpreted as **"**Like Very Much**."** Treatment 1 yielded the highest flavor rating for the filling (7.96), closely followed by Treatment 2 (7.82). These findings suggest that the formulations in Treatments 1 and 2 provided a more desirable taste profile that appealed to the panelists. The lower ratings for Treatments 3 and 4 indicate that higher levels or variations of ingredients may have affected flavor balance and overall palatability. Nevertheless, all treatments remained within the acceptable range, demonstrating that sweet potato can be effectively utilized in pie production without compromising flavor quality.

General Acceptability

The overall acceptability ratings shown in Table 7 reflect the combined sensory perception of the panelists toward the Sweet Potato Pie. The crust obtained an average mean of 7.24, while the filling attained an average mean of 7.37, both interpreted as **"**Like Very Much.**"** Notably, Treatment 1 received the highest general acceptability score for both crust (7.57) and filling (8.02), indicating the strongest overall preference among the panelists. Treatment 2 also achieved high ratings, whereas Treatments 3 and 4 were generally rated as **"**Like Moderately**."** These results suggest that the formulations used in Treatments 1 and 2 were more successful in meeting consumer expectations regarding sensory quality. The high ratings further indicate the potential marketability and consumer acceptance of the Sweet Potato Pie.

Most Acceptable Formulation of Sweet potato Pie Based on Consumer Evaluation

Based on the sensory evaluation conducted among the 51 panelists, Treatment 1 (crust is All purpose flour is 210 g and camote flour-70 g; filling is 2cups cooked camote and 1 cup evaporated milk) emerged as the most acceptable formulation of Sweet potato Pie. This treatment consistently obtained the highest mean scores across the four sensory attributes evaluated: aroma, texture, flavor, and general acceptability, for both the crust and filling. The findings indicate that Treatment 1 provided the most desirable sensory characteristics and was the formulation most preferred by consumers.

The sensory evaluation findings clearly demonstrate that Treatment 1 is the most acceptable formulation of Camote Pie among the four treatments tested. Its consistently high ratings across aroma, texture, flavor, and general acceptability indicate that consumers strongly preferred its sensory characteristics. Treatment 2 ranked second, receiving similarly favorable evaluations, while Treatments 3 and 4 generally obtained lower ratings and were only assessed as **"**Like Moderately**"** for several attributes. The results suggest that the ingredient proportions used in Treatment 1 produced the most desirable combination of aroma, texture, and flavor, leading to greater consumer satisfaction and acceptance.

Thus, Treatment 1 is the optimum formulation for Camote Pie and has the greatest potential for commercialization due to its high consumer acceptability**.** The consistently positive evaluations indicate that it effectively meets consumer preferences and expectations for a quality sweet potato pie product.

Table 8. Nutrient Composition of Camote Pie

Parameters	Unit	Test Method	Results
Moisture	g/100g	Vacuum Oven Drying	48.82
Ash	g/100g	Ignition	0.73
Fat	g/100g	Acid Hydrolysis – Mojonnier Extraction	11.11
Protein (N x 6.25)	g/100g	Kjeldahl	4.28
Carbohydrates	g/100g	By Computation	35.06
Calories/100g	-	By Computation	257
Total Sugar	g/100g	Lane Eynon	13.14
Total Dietary Fiber	g/100g	Enzymatic - Gravimetry	6.05
Saturated Fat	g/100g	Gas Chromatography (FID)	6.85
Unsaturated Fat	g/100g	Gas Chromatography (FID)	4.07
Transfat	g/100g	Gas Chromatography (FID)	0.016
Sodium*	mg/100g	Flame AES	51.8
Cholesterol*	mg/100g	Gas Chromatography	73

Results are those obtained at the time of examination and relate only to the sample/s tested.
Note: Subcontracted to F.A.S.T. Laboratories recognized subcontractor.*

Reference: Official Method of Analysis of AOAC International 19th ed. 2012

Treatment 1 with formulations of 210 grams all-purpose flour and 70 grams camote flour with filling formulation of 2 cups cooked camote and 1 cup evaporated milk was analyzed using the different methods for nutrient analysis. Moisture content was determined through vacuum oven drying, ash is by means of ignition, fats were measured by

acid hydrolysis with the use of Mojonnier extraction, protein is by Kjeldahl, total sugars is by the use of Lane Eynon method, the total dietary fiber is by enzymatic-gravimetry, the saturated fats, unsaturated fats and transfats and also cholesterol were measured with Gas Chromatography while sodium is through flame AES. All these methods were done by the First Analytical Services and Technical Cooperative (F.A.S.T.) Laboratories in which their reference is the Official Method of Analysis of AOAC International 19th edition of 2012 by the licensed chemists.

Result showed as to laboratory analysis of the nutrient composition of Camote Pie that the moisture content of the product is 48.82 g/100g compared when it is raw is 77.28 per 100g (USDA, 2009). Ash contains 0.73 and in raw camote the ash is 0.99. The protein content of sweet potato when raw is 1.57 but increased in the Camote Pie which is 4.28 while for carbohydrates is 20.12 and in Camote Pie 35.06 g. The total dietary fiber in raw camote is 3.00 g while for camote pie increased to 6.05g. Results implied that upon processing of the camote and with the introduction or mixture of other ingredients, some of the nutrients of camote increases and other decreases. Total sugar was found in the formulation of Camote Pie due to the addition of milk. Moisture content of raw sweet potato is greater than in the Camote Pie that indicates the decrease of the moisture due to the processing method of baking the pie. Moreover, the lesser moisture content adds the shelf life of the product. Heat processing with the use of baking is one of the important methods used in food processing to extend the shelf-life of foods by removing water to inhibit water activity that causes deterioration (Fellows, 2000).

Table 9. Nutritional Facts of Sweet Potato "Camote" Pie

CAMOTE PIE
Net Contents: 900 g

Nutrition Facts		
Serving size: 125 grams		
No. of Servings per container/pack: about 7		% RENI*
Amount per Serving		
Calories (kcal)	322	13%
Calories from Fat	125	-
Total Fat (g)	14	21% **
Sat. Fat (g)	8.6	43% **
Unsat. Fat (g)	5.1	-
Trans Fat (g)	0	-
Cholest. (mg)	91.3	30% **
Sodium (mg)	65	13%
Total Carb. (g)	44	15% **
Fiber (g)	8	33%
Sugar (g)	16	-
Total Protein (g)	5	8%

* Percent RENI values are based on 2015 RENI PDRI reference adult requirement of 19-29 years old male.
** % DAILY VALUE, U.S. FDA (used if no RENI)
- No recommended % Daily Value for these nutrients/elements are provided in the USFDA Guideline for Nutrition Labeling.

Reference No.: SP1711-11164 / CQ1711-11164
Date Reported: January 16, 2018

Nutrition facts of camote pie for 900g content based on 2015 RENI PDRI adult requirements of 19-29 years old male showed that calories (kcal) is 13%, cholesterol (mg) is 30%, total carbohydrate is 15% and protein is 8%. As indicated in the recommended energy and nutrient intakes for Filipinos 2002 revealed that the energy contained in

Camote Pie can really be a good source of minerals, vitamins and other nutrients desirable in the human diet and recommended for being part of a healthy diet.

Table 10. Significant Mean Differences for Camote Pie Crust & Fillings

Component	Attribute / Treatment	F-value	Sig. / p-value	Interpretation
Crust	T1 Odor	2.02	0.143	Not Significant
	T2 Odor	0.93	0.401	Not Significant
	T3 Odor	0.30	0.740	Not Significant
	T4 Odor	0.17	0.846	Not Significant
	Average Crust Odor	0.78	0.466	Not Significant
Crust	**T1 Texture**	**19.08**	**<0.001**	**Significant**
	T2 Texture	1.16	0.321	Not Significant
	T3 Texture	1.40	0.257	Not Significant
	T4 Texture	0.96	0.389	Not Significant
	Average Crust Texture	2.38	0.103	Not Significant
Crust	**T1 Flavor**	**6.23**	**0.004**	**Significant**
	T2 Flavor	0.75	0.479	Not Significant
	T3 Flavor	1.15	0.327	Not Significant
	T4 Flavor	0.00	0.998	Not Significant
	Average Crust Flavor	1.48	0.237	Not Significant
Crust	**T1 General Acceptability**	**8.39**	**0.001**	**Significant**
	T2 General Acceptability	0.99	0.379	Not Significant
	T3 General Acceptability	1.20	0.310	Not Significant
	T4 General Acceptability	0.23	0.799	Not Significant
	Average Crust General Acceptability	1.68	0.197	Not Significant
Filling	T1 Odor	0.39	0.680	Not Significant
	T2 Odor	**3.99**	**0.025**	**Significant**
	T3 Odor	0.88	0.423	Not Significant
	T4 Odor	2.53	0.090	Not Significant
	Average Filling Odor	2.84	0.068	Not Significant
Filling	**T1 Texture**	**3.77**	**0.030**	**Significant**
	T2 Texture	1.45	0.245	Not Significant
	T3 Texture	0.40	0.670	Not Significant
	T4 Texture	0.16	0.857	Not Significant
	Average Filling Texture	0.08	0.923	Not Significant
Filling	**T1 Flavor**	**3.52**	**0.037**	**Significant**
	T2 Flavor	2.72	0.076	Not Significant
	T3 Flavor	0.96	0.392	Not Significant
	T4 Flavor	0.19	0.825	Not Significant
	Average Filling Flavor	0.48	0.623	Not Significant
Filling	**T1 General Acceptability**	**3.45**	**0.040**	**Significant**
	T2 General Acceptability	2.58	0.086	Not Significant

Component	Attribute / Treatment	F-value	Sig. / p-value	Interpretation
	T3 General Acceptability	2.56	0.088	Not Significant
	T4 General Acceptability	0.31	0.733	Not Significant
	Average Filling General Acceptability	2.05	0.140	Not Significant
Overall	Attributes Grand Mean	0.60	0.551	Not Significant

Results revealed that for the Camote Pie crust, significant differences were observed only in Treatment 1 in terms of texture ($F = 19.08$, $p < 0.001$), flavor ($F = 6.23$, $p = 0.004$), and general acceptability ($F = 8.39$, $p = 0.001$). This indicates that the respondent groups differed in their evaluation of Treatment 1 crust, particularly on how they perceived its texture, taste, and overall acceptability. However, the odor of the crust and the other treatments did not show significant differences, suggesting that the respondents had generally similar perceptions of these attributes.

For the filling, significant differences were found in Treatment 2 odor ($F = 3.99$, $p = 0.025$), as well as in Treatment 1 texture ($F = 3.77$, $p = 0.030$), flavor ($F = 3.52$, $p = 0.037$), and general acceptability ($F = 3.45$, $p = 0.040$). These results suggest that the respondent groups varied in their assessment of the odor of Treatment 2 filling and the texture, flavor, and overall acceptability of Treatment 1 filling. This means that some sensory qualities of the Camote Pie were perceived differently depending on the respondent group.

However, when the average scores per attribute and the overall grand mean were considered, the results showed no significant differences. The attributes grand mean obtained an F-value of 0.60 with a p-value of 0.551, which is higher than the 0.05 level of significance. This means that, overall, the perceptions of the panelists toward the acceptability of the Camote Pie were statistically similar.

In summary, the findings indicate that there were significant differences only in specific attributes, mainly in Treatment 1 crust and filling, and in the odor of Treatment 2 filling**.** Nevertheless, the overall acceptability of the Camote Pie did not significantly differ among the respondent groups. Therefore, the Camote Pie was generally acceptable across groups, supporting the result that the product was liked by the respondents.

CONCLUSIONS

The study successfully developed a standardized technology process for the production of Camote Pie suitable for commercialization. The process incorporated sweet potato flour and cooked sweet potato into both the crust and filling, resulting in a value-added food product with improved nutritional benefits and consumer appeal. The findings demonstrated that Camote Pie is highly acceptable to consumers, particularly the formulation containing 210 g all-purpose flour, 70 g camote flour, 2 cups cooked camote, and 1 cup evaporated milk. This formulation achieved the highest sensory ratings and exhibited desirable characteristics in terms of aroma, flavor, texture, and general acceptability.

Furthermore, the most preferred Camote Pie formulation contains essential nutrients that contribute to a healthy diet. Consequently, Camote Pie has strong potential as a nutritious local delicacy, value-added sweet potato product, and enterprise opportunity for communities engaged in sweet potato production.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed:

1. Conduct further studies on shelf-life evaluation, packaging systems, and microbial analysis of Camote Pie products.
2. Promote Camote Pie as a commercially viable local delicacy and potential pasalubong product.
3. Utilize the developed technology process in entrepreneurship and livelihood programs for local communities and small-scale food processors.

REFERENCES

1. Agustin, R. (2025). Assessing the sensory qualities and acceptability of sweet potato (Ipomoea batatas) and purple yam (Dioscorea alata) cookies: Opportunities for livelihood development. Journal of Applied and Natural Science, 17(1).

2. Alam, M. K. (2021). A comprehensive review of sweet potato (Ipomoea batatas [L.] Lam): Revisiting the associated health benefits. Trends in Food Science & Technology, 115, 512–529.
3. AOAC. (2023). Guidelines for Standard Method Performance Requirements. In G. W. Latimer (Ed.), Official Methods of Analysis of AOAC International (22nd ed., pp. 1– 108). Oxford University Press. https://doi. org/10.1093/9780197610145.005.006
4. Department of Science and Technology–Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD). (2025). Sweetpotato Industry Strategic Science and Technology Plans (ISP) Platform. Los Baños, Laguna, Philippines.
5. Guerra, M., & Torres, A. (2025). Sweet potato (Ipomoea batatas L.), nutritious and healthy tuber: A review. Archivos Latinoamericanos de Nutrición, 75(1), 65–77. https://doi.org/10.37527/2025.75.1.007
6. Hossain, M. M., Rahaman, E., Chanda, D., Heck, S., Mahmood, S., Mohammad, & Kabir, H. (2022). Improving Nutritional Content of Bakery Products by Using Orange- Fleshed Sweet Potato Puree. EC Nutrition, 12, 13–24.
7. Ijah, U. J. J., Auta, H. S., Aduloju, M. O., & Aransiola, S. A. (2014). Microbiological, Nutritional, and Sensory Quality of Bread Produced from Wheat and Potato Flour Blends. International Journal of Food Science, 2014(671701), 1–6. https://doi. org/10.1155/2014/671701
8. Ivane, N. M. A., Wang, W., Ma, Q., Wang, J., & Sun, J. (2024). Harnessing the health benefits of purple and yellow-fleshed sweet potatoes: Phytochemical composition, stabilization methods, and industrial utilization-A review. Food Chemistry: X, 23(2596), 101462. https:// doi.org/10.1016/j.fochx.2024.101462
9. Olaitan Daniel, O. (2022). Evaluation of Bread Made From Wheat and Composite Flours of Sweet Potato. International Journal of Sciences, Engineering & Environmental Technology (IJOSEET), 7(14), 128–136. www.repcomseet.org
10. Otálora, A., García-Quintero, A., Mera-Erazo, J., Lerma, T. A., Palencia, M., & Mercado, T. (2024). ' Sweet potato, batata or camote'
 (Ipomoea batatas): An overview
 about its crop, economic aspects and
 nutritional relevance. Journal of Science with Technological Applications
11. Philippine Statistics Authority. (2023–2025). Sweet potato production statistics. Quezon City, Philippines: PSA.
12. Rosell, M. A., Quizhpe, J., Ayuso, P., Peñalver, R., & Nieto, G. (2024). Proximate composition, health benefits, and food applications in bakery products of purple- fleshed sweet potato (Ipomoea batatas L.) and its by-products: A comprehensive review. Antioxidants, 13(8), 954. https://doi.org/10.3390/antiox13080954
13. Sapakhova, Z., Raissova, N., Daurov, D., Zhapar, K., Daurova, A., Zhigailov, A., Zhambakin, K., & Shamekova, M. (2023). Sweet potato as a key crop for food security under the conditions of global climate change: A review. Plants, 12(13), 2516. https://doi.org/10.3390/plants12132516
14. Shikder, M. F. H., Jany, M. N. H., & Uddin, M. B. (2025). Application of sweet potato flour in bakery products: Development, sensory evaluation, and shelf-life stability. American Journal of Interdisciplinary Research and Innovation, 4(2).
15. Wafula, E. N., Malavi, D., Mbogo, D., Mwaura, L., Moyo, M., & Muzhingi, T. (2022). Proximate composition and vitamin A contribution of biofortified orange-fleshed sweet potato value-added products. African Journal of Food, Agriculture, Nutrition and Development, 22(4), 20215–20230.
16. Zhao, S., Zhong, L., Li, X., Qin, L., Zhou, Y., Lei, X., Zheng, X., Jin, K., Pu, Z., Hou, X., Song, J., Lang, T., Zhang, C., & Feng, J. (2024). Comparative analysis of nutrients, phytochemicals, and minerals in colored sweet potato (Ipomoea batatas L.) roots. Foods, 13(22), 3636. https://doi.org/10.3390/foods13223636