JOURNAL OF INTERDISCIPLINARY PERSPECTIVES

ISSN Print: 2984-8288, ISSN Online: 2984-8385
Vol. 3 No. 11, pp. 143-150, November 2025

Taro Kropek: Its Commercial Viability

Rocky F. Granada Jr., Olive G. Gomez*
Sultan Kudarat State University-Bagumbayan Campus, Bagumbayan, Sultan Kudarat, Philippines

*Corresponding Author Email: olivegomez@sksu.edu.ph

Date received: September 1, 2025
Date revised: October 10, 2025
Date accepted: October 23, 2025

Originality: 92%
Grammarly Score: 99%
Similarity: 8%

Recommended citation:
Granada Jr., R., & Gomez, O. (2025). Taro kropek: Its commercial viability. *Journal of Interdisciplinary Perspectives*, *3*(11), 143-150. https://doi.org/10.69569/jip.2025.652

Abstract. This study investigated the development, sensory acceptability, and financial viability of taro-based kropek as an alternative snack product. Despite taro's nutritional value and abundance, it remains underutilized compared to other root crops. The study was conducted to generally determine the commercial viability of taro kropek made with taro flour, based on six (6) parameters: appearance, texture, taste, aroma, color, and general acceptability. Financial analysis to determine profitability, return on investment (ROI), and the break-even point was also conducted. Fresh taro was manually turned into flour and then made into kropek. The finished product was evaluated by 100 consumer panelists using a 9-point Hedonic Scale and randomly distributed across five (5) treatments in a Completely Randomized Design (CRD). Results revealed that flour ratio levels significantly influenced appearance ($F = 13.33$, $p < 0.01$), color ($F = 70.07$, $p < 0.01$), texture ($F = 6.50$, $p < 0.01$) and overall acceptability ($F = 17.11$, $p < 0.01$), but not aroma ($F = 2.90$, ns) and taste ($F = 0.21$, ns). Numerically, 1000 g rice flour (control) scored highest in appearance (mean = 8.59) and color (8.47), while 1000 g taro flour achieved the highest scores in taste (8.15) and texture (8.19). All treatments were rated "liked very much" to "liked extremely," with overall acceptability ranging from 7.77 to 8.17. Financial analysis showed decreasing ROI as taro substitution increased. Findings highlight taro's potential as a functional, locally sourced ingredient for diversifying snacks. Based on the results, moderate taro incorporation (250–500 g) is recommended to balance consumer acceptability and profitability. At the same time, future studies should include nutritional profiling, shelf-life, and market testing to support large-scale commercialization.

Keywords: Acceptability; Financial analysis; Food innovation; Sensory evaluation; Taro kropek

1.0 Introduction

Food processing was defined as the transformation of fresh goods into food products (Monteiro et al., 2010). This involves processes such as chopping, pasteurizing, freezing, fermenting, packaging, and cooking (Floros et al., 2010). Tubers are a source of carbohydrates and are used as staple foods in tropical and subtropical countries. These tubers are generally processed into different forms before consumption to make them digestible and palatable. Processing of these tubers also extends the shelf life and reduces post-harvest losses (Kaushal et al., 2015). Taro root (*Colocasia esculenta L.*) is a tuber used in a variety of cuisines around the world. It has a mild, nutty taste, starchy texture, and nutritional benefits. It is commonly added to savory dishes or fried as a snack, and it also adds creaminess and purple color to sweet recipes (Zelman, 2022). It is said to have a greater culinary diversity and more easily digestible recipes than other root crops (Fufa et al., 2021). Nutritionally, taro has a protein content of 11% on a dry-weight basis and a low-fat content. Vitamin C and the vitamin B complex are also found in corms and leaves of taro (Nigussie, 2025). However, taro remains underutilized and undervalued despite its abundance and affordability. Compared to other root crops, taro stands out as a low-cost option; thus,

it is essential to address food insecurity by developing improved food products derived from it (Ferdaus et al., 2023).

Kropek is a dried product traditionally made from ground rice, with shrimp or fish added. The procedure usually uses rice flour and cornstarch because rice exhibits wide variability in its types, which can affect the quality of the product being produced (Espejo-Hermes, 1998). In the Philippines, kropek is a popular snack served at every occasion and is known as "Pika–pika". It is easy to prepare or cook, and people can also make their own version in different sizes, colors, and flavors, depending on their preferences. People of all ages, including future generations, widely enjoy this type of snack, which holds cultural significance (Estrella, 2022).

However, the kropek industry currently faces challenges, including rising costs of raw materials such as shrimp and fish, and an inconsistent supply of starch sources. Given these challenges, taro presents a promising alternative raw material for kropek production. Meanwhile, consumer trends show increasing demand for healthier, plant-based, and locally sourced snacks. Investigations into kropek formulations using alternative root crops provide early evidence, such as recent studies on root-crop kropek from cassava, sweet potato, and taro, which were compared for sensory acceptability, with cassava kropek rated highest. However, taro kropek was "liked very much" in most sensory attributes (Dolorico, 2025). A similar study was also conducted in Bali by the Wanagiri Taro Processing Group, which developed taro chips and is working to improve product variation, packaging, and marketing as part of local enterprise development (Suriati, Mardewi, Sukmadewi, et al., 2023; 2024).

Despite these opportunities, limited studies have examined the development and commercialization potential of taro kropek. While research exists on traditional kropek formulations, there is a clear gap in exploring taro as a primary ingredient, particularly regarding consumer acceptability, market potential, and financial viability. Addressing this gap is essential if taro kropek is to be a commercially viable, healthier alternative in the snack industry. Therefore, this study focuses on the development, acceptability, and financial aspects of taro kropek to assess its potential for commercialization and contribution to local food innovation.

2.0 Methodology

2.1 Research Design

The study utilized a Completely Randomized Design (CRD) with five treatments, each replicated three times to ensure the accuracy and reliability of the results. The treatments were formulated by varying the proportions of taro flour and commercial flour as follows:

Treatment 1 – 1000 g Rice Flour (Control)
Treatment 2 – 250 g Taro Flour + 750 g Rice Flour
Treatment 3 – 500 g Taro Flour + 500 g Rice Flour
Treatment 4 – 750 g Taro Flour + 250 g Rice Flour
Treatment 5 – 1000 g Taro Flour

2.2 Participants and Sampling Technique

The sensory evaluation was conducted with 100 consumer panelists, who served as judges in the product assessment. Consumer panelists were selected using convenience sampling. Inclusion criteria were: (a) residents of the community aged 18 years and above, (b) familiarity with everyday snack products, and (c) absence of allergies to taro or rice-based foods. Exclusion criteria included: (a) minors below 18 years old, (b) individuals with known food allergies to tubers or starches, and (c) those unwilling to provide consent. This ensured that panelists could provide reliable and relevant feedback on product quality.

2.3 Research Instrument

The study used a structured evaluation sheet as the primary research instrument. The sheet used a 9-point Hedonic Scale (Johnson, 2021) to evaluate the sensory qualities of the kropek, specifically appearance, aroma, color, taste, texture (crunchiness), and overall acceptability. The scale ranged from 1 = Dislike Extremely to 9 = Like Extremely, with 5 = Neither Like nor Dislike as the midpoint.

2.4 Data Gathering Procedure

Prior to evaluation, consumer panelists were briefly oriented about the procedure, scoring method, and the meaning of the Hedonic Scale. Evaluations were conducted in a neutral room to minimize bias. Each kropek sample (10 g per treatment) was served on coded white disposable plates at room temperature, presented in random order. Drinking water was provided for palate cleansing between samples. Consumer panelists were given approximately 10 minutes to complete their evaluations. The panelists were given rating sheets to evaluate the samples. After the review, the rating sheets were collected, recorded, tallied, and summarized. The data were then prepared for statistical analysis.

2.5 Data Analysis Procedure

The data gathered were statistically analyzed using Analysis of Variance (ANOVA) under a Completely Randomized Design (CRD) to determine significant differences among treatments.

2.6 Financial Analysis

The financial analysis was carried out to assess the commercial viability of taro kropek. Gross income was determined based on projected product sales, while total expenses included the costs of raw materials, labor, packaging, and other production-related inputs. The difference between sales and expenses was considered the net profit. The return on investment was assessed by comparing net profit with capital invested, expressed as a percentage, to determine the product's profitability. Net profit was calculated as:

Net Profit = Gross Income – Total Expenses

Return on investment (ROI) was determined using the formula:

$$\text{ROI (\%)} = \frac{\text{Net Profit}}{\text{Total Investment}} \text{ x } 100$$

A break-even analysis was conducted to determine the minimum number of kropek pieces that must be sold to cover production costs.

2.7 Ethical Considerations

The study was conducted in accordance with ethical standards. Approval was secured from the Campus Research Office and formally endorsed by the Campus Director. Consumer panelists were fully informed of the objectives and purpose of the study, procedures, and their voluntary participation, including their right to withdraw at any time without consequences. Both written and verbal informed consent were obtained from all panelists prior to their involvement in the sensory evaluation. They were assured that their responses would remain confidential and would be used only for academic purposes. No physical, psychological, or social risks were involved in conducting the study.

3.0 Results and Discussion

3.1 Appearance of Taro Kropek

Table 1 illustrates the appearance of taro kropek. The statistical analysis showed a significant result at the 1% level. 1000 g of rice flour (T1) had the highest mean of 8.59, interpreted as "liked extremely," indicating a stronger preference among consumer panelists than for the taro-substituted treatments. This was followed by 250 g taro flour + 750 g rice flour (T_2) with the mean of 8.04 and is comparable with 500 g taro flour + 500 g rice flour (T_3), 1000 g taro flour (T_5) and 750 g taro flour + 250 g rice flour (T_4) with mean scores of 7.81, 7.77 and 7.74, respectively, which were interpreted as "liked very much."

Table 1. *Sensory Evaluation of the Appearance of Taro Kropek*

Treatments	Replication			Total	Mean	Interpretation
	I	II	III			
T_1- 1000 g Rice Flour (Control)	8.65	8.59	8.53	25.77	8.59[a]	Liked Extremely
T_2- 250 g Taro Flour + 750 g Rice Flour	8.12	8.18	7.81	24.11	8.04[b]	Liked Very Much
T_3- 500 g Taro Flour + 500 g Rice Flour	7.82	7.74	7.88	23.44	7.81[b]	Liked Very Much
T_4- 750 g Taro Flour +250 g Rice Flour	7.44	7.74	8.03	23.21	7.74[b]	Liked Very Much
T_5- 1000 g Taro Flour	7.68	7.85	7.78	23.32	7.77[b]	Liked Very Much
Grand Total/Mean				**119.84**	**7.99**	**Liked Very Much**

Based on the results, pure rice flour (T_1) exhibits the numerically highest results and appears to be favorable to the panelists due to its distinctive brownish appearance. A study by Dolorico (2025) shows a clear gap in sensory evaluation between taro kropek and other root crops, such as cassava. Taro kropek, though acceptable and interpreted as "liked very much", falls behind compared to cassava kropek due to its less distinctive appearance and texture. Hutchings (1997) also emphasized that various factors contribute to the overall perception of a product's appearance, which is built up from all the visual sensations experienced when a product is viewed on the shelf, especially when prepared and presented on the plate.

The analysis of variance (ANOVA) for the sensory evaluation of taro kropek revealed statistically significant differences among treatments for appearance (Table 8). The computed F-value (Fc = 13.33) was considerably higher than the tabular values at both the 5% (3.48) and 1% (5.99) levels of significance, indicating that the observed differences in appearance ratings were highly significant at the 1% level. This confirms that the formulation type had a substantial effect on the visual qualities of the kropek samples. The significant variation in appearance scores may be attributed to differences in flour composition. Taro flour has a naturally darker color than other starchy crops such as rice and cassava, which may influence the overall appearance of the finished product (Kaushal, Kumar & Sharma, 2012).

3.2 Aroma of Taro Kropek

Table 2 shows the aroma evaluation of taro kropek. Although the statistical analysis showed no significant difference, the numerical values revealed that 1000 g taro flour (T_5) obtained the highest mean of 7.84, followed by 1000 g rice flour (T_1) with 7.66, 500 g taro flour + 500 g rice flour (T_3) with 7.60, 750 g taro flour + 250 g rice flour (T_4) with 7.59, and 250 g taro flour + 750 g rice flour (T_2) with 7.40. All treatments were consistently rated within the "liked very much" category.

Table 2. *Sensory Evaluation of the Aroma of Taro Kropek*

Treatments	Replication I	II	III	Total	Mean	Interpretation
T_1- 1000 g Rice Flour (Control)	7.53	7.88	7.56	22.97	7.66	Liked Very Much
T_2- 250 g Taro Flour + 75% Rice Flour	7.50	7.13	7.56	22.19	7.40	Liked Very Much
T_3- 500 g Taro Flour + 500 g Rice Flour	7.41	7.65	7.75	22.81	7.60	Liked Very Much
T_4- 750 g Taro Flour +250 g Rice Flour	7.59	7.59	7.59	22.77	7.59	Liked Very Much
T_5- 1000 g Taro Flour	7.74	7.85	7.94	23.53	7.84	Liked Very Much
Grand Total/Mean				**114.27**	**7.62**	**Liked Very Much**

The result implies that taro flour-made kropek has no distinctive aroma compared to commercial flour-made kropek. The sensory evaluation of taro kropek by Nuñez et al. (2023) also revealed that odor perception was consistently rated in the "neither liked" category. Statistical analysis indicated that the differences among treatments were not significant, suggesting that varying the ratios of taro and all-purpose flour did not markedly alter its olfactory profile. This result is due to the taro's starchy aroma, which may not strongly appeal to consumers. Moreover, Wang et al. (2020) stated that aroma compounds significantly influence flavor, which in turn affects the overall assessment of food.

The Analysis of Variance (ANOVA) on the sensory evaluation of odor for taro kropek formulations is presented in Table 8. Results revealed that the computed F-value (Fc = 2.90) was lower than the tabular values at both the 5% (3.48) and 1% (5.99) significance levels. This indicates that the observed variations in aroma scores across treatments were not statistically significant. In other words, modifying the formulation ratios did not produce a measurable difference in the product's aroma perception. Overall, the data indicate that taro flour can be successfully incorporated into kropek without compromising the aroma. This supports the potential of taro as a viable alternative flour in snack production.

3.3 Color of Taro Kropek

Table 3 illustrates the sensory assessment of taro kropek's color. The statistical analysis showed a significant result at the 1% level. 1000 g of rice flour (T1) had the highest mean of 8.47, interpreted as "liked extremely," indicating that panelists strongly preferred the color of kropek made purely from rice flour. It was followed by 250 g taro flour + 750 g rice flour (T_2), 500 g taro flour + 500 g rice flour (T_3), 750 g taro flour + 250 g rice flour (T_4) and 1000 g taro flour (T_5), and with a mean of 7.79, 7.64, 7.48 and 7.43, respectively, and were rated by the panelists as "liked very much."

Table 3. *Sensory Evaluation of the Color of Taro Kropek*

Treatments	Replication I	II	III	Total	Mean	Interpretation
T_1- 1000 g Rice flour (Control)	8.44	8.50	8.47	25.41	8.47[a]	Liked Extremely
T_2- 250 g Taro Flour + 750 g Rice Flour	7.91	7.71	7.75	23.37	7.79[b]	Liked Very Much
T_3- 500 g Taro Flour + 500 g Rice Flour	7.76	7.59	7.56	22.91	7.64[bc]	Liked Very Much
T_4- 750 g Taro Flour +250 g Rice Flour	7.59	7.39	7.47	22.45	7.48[cd]	Liked Very Much
T_5- 1000 g Taro Flour	7.41	7.50	7.38	22.29	7.43[d]	Liked Very Much
Grand Total/Mean				**116.43**	**7.76**	**Liked Very Much**

Results revealed that the consumer panelists positively accepted all samples. While rice flour alone (T_1) was most visually appealing in terms of color, the gradual substitution with taro flour did not significantly diminish its acceptability, as all treatments remained within the "liked very much" range. This suggests that taro flour can be incorporated into kropek formulations without negatively affecting the appearance, making it a viable alternative to rice flour in kropek production. This means the four treatments were acceptable to the panelists because of their light-to-dark colors. Color is one of the most important sensory attributes influencing consumer acceptance of snack products such as kropek. This was supported by Stich (2016), who said that throughout history, food color has been an important trait of sensory quality.

Studies show that taro flour generally exhibits moderate brightness (L* values around 91.4), slightly lower than cassava and white rice flour but higher than banana flour (Hasmadi et al., 2023). This makes taro flour slightly darker, while rice flour yields a brighter, more appealing base color for products like kropek. This explains why rice flour formulations often score higher in appearance, as the light, neutral color aligns with consumer expectations for snack foods.

The analysis of variance (ANOVA) for the appearance of taro–rice flour kropek (Table 8) revealed a highly significant difference ($p < 0.01$) among the different treatments. The computed F-value of 70.07 was markedly higher than the tabular values at both the 5% (3.48) and 1% (5.99) significance levels, indicating that variations in flour proportions strongly influenced the appearance scores of the kropek samples. These findings imply that the proportion of taro flour incorporated into rice-based kropek significantly affected its appearance. Increasing the taro flour level likely led to a color change, resulting in perceptible differences for the panelists.

3.4 Taste of Taro Kropek

Table 4 presents a sensory evaluation of the taste of taro kropek. The statistical data showed that the results were not significant but numerically, 1000 g taro flour (T_5) got the highest mean of 8.15 and was interpreted as "liked extremely," followed by 500 g taro flour + 500 g rice flour (T_3) that is comparable with 750 g taro flour + 250 g rice flour (T_4), 25% taro flour + 75% rice flour (T_2) and 1000 g rice flour (T_1) with a mean of 8.04, 8.03, 8.03 and 8.00, respectively, and were interpreted as "liked very much." Results suggest that using taro flour alone enhanced the taste of kropek compared to rice flour or blended formulations.

Table 4. *Sensory Evaluation of the* Taste *of Taro Kropek*

Treatments	Replication I	II	III	Total	Mean	Interpretation
T_1- 1000 g Rice Flour (Control)	8.06	8.21	7.72	23.99	8.00	Liked Very Much
T_2- 250 g Taro Flour + 750 g Rice Flour	8.21	7.91	7.97	24.09	8.03	Liked Very Much
T_3- 500 g Taro Flour + 500 g Rice Flour	8.09	8.12	7.91	24.12	8.04	Liked Very Much
T_4- 750 g Taro Flour +250 g Rice Flour	8.03	8.18	7.88	24.09	8.03	Liked Very Much
T_5- 1000 g Taro Flour	7.74	8.44	8.28	24.46	8.15	Liked Extremely
Grand Total/Mean				**120.75**	**8.05**	**Liked Very Much**

Taste helps identify, accept, and appreciate the food product (Sharif et al., 2017). The result indicates that the consumer panelists preferred the 1000 g taro-flour-made kropek among the other treatments due to its excellent taste. However, a study by Himeda et al. (2022) investigated the chemical, functional, and sensory characteristics of biscuits made with wheat–taro composite flours, which varied with the proportion of taro flour. Based on the study's results, at lower ratios, products with taro flour were rated as comparable to, or even preferred to, 100% wheat biscuits, indicating that taro can be incorporated without reducing consumer acceptance. In contrast, higher ratios introduced a stronger taro flavor, leading to slightly lower preference among some panelists. Moreover, the data imply that the four remaining treatments, with varying levels of taro flour, for developing kropek show no drastic decline in consumer acceptance when taro flour is incorporated.

The results of the analysis of variance (ANOVA) are presented in Table 8. The treatment effect had a computed F-value of 0.21, which is much lower than the tabular values at both the 5% (3.48) and 1% (5.99) levels of significance. This indicates that the differences among the treatments were not statistically significant. This implies that varying the proportion of taro flour and rice flour in the formulation did not produce significant differences in the taste of kropek.

3.5 Texture of Taro Kropek

Table 5 shows the texture of taro kropek. The statistical analysis showed a significant result at the 1% level. 1000 g taro flour (T_5) got the highest mean of 8.19 and is comparable with 1000 g rice flour (T_1) and 250 g taro flour + 750 g rice flour (T_2) with means of 8.15 and 8.12, which were interpreted as "liked extremely,". This was followed by 500 g taro flour + 500 g rice flour (T_3), with a mean of 8.01, and is comparable to 750 g taro flour + 250 g rice flour (T4), with a mean of 7.94, interpreted as "liked very much."

Table 5. *Sensory Evaluation of the Texture of Taro Kropek*

	Replication					
Treatments	**I**	**II**	**III**	**Total**	**Mean**	**Interpretation**
T_1- 1000 g Rice Flour (Control)	8.24	8.06	8.16	24.46	8.15[a]	Liked Extremely
T_2- 250 g Taro Flour + 750 g Rice Flour	8.12	8.12	8.13	24.37	8.12[a]	Liked Extremely
T_3- 500 g Taro Flour + 500 g Rice Flour	8.03	8.09	7.91	24.03	8.01[b]	Liked Very Much
T_4- 750 g Taro Flour +250 g Rice Flour	7.91	7.94	7.91	23.82	7.94[b]	Liked Very Much
T_5- 1000 g Taro Flour	8.09	8.26	8.23	24.58	8.19[a]	Liked Very Much
Grand Total/Mean				**121.26**	**8.08**	**Liked Very Much**

The results imply that T5 and T2 at 1000 g and 250 g levels of taro flour were most preferred by the consumer panelists due to their crunchy texture. Furthermore, Pereira et al. (2021) stated that an important factor in food acceptability, aside from visual appearance and taste, is food texture. Hendek Ertop et al. (2019) evaluated taro flour as a substitute for rice flour and corn starch in milk pudding formulations. The study revealed that taro flour significantly enhanced thickness and viscosity. However, sensory evaluation indicated that higher levels of taro flour incorporation adversely affected textural attributes, particularly smoothness, as products became grittier. These findings suggest that while taro flour can contribute positively to product consistency, its use should be optimized at lower ratios to maintain consumer acceptability.

The Analysis of Variance (ANOVA) in Table 8 below revealed a highly significant difference ($p < 0.01$) among treatments in terms of texture. The computed F-value of 6.50 exceeded both the 5% (3.48) and 1% (5.99) tabular F-values. Results revealed that the proportion of taro and rice flour incorporated in the kropek significantly influenced the panelists' evaluations.

3.6 Overall Acceptability of Taro Kropek

Table 6 displays the overall acceptability of taro kropek. The statistical analysis revealed a significant difference at the 1% level. The acceptability results demonstrated that all Kropek formulations, whether made with rice flour alone or with varying proportions of taro flour, were generally well accepted by the panelists. Among the treatments, 1000 g rice flour (T_1) obtained the highest mean score of 8.17, interpreted as "liked extremely." This treatment was followed by 1000 g of taro flour (T5), with a mean of 7.91, which was comparable to 250 g of taro flour + 750 g of rice flour (T2), with a mean of 7.82. It was followed by 500 g taro flour + 500 g rice flour (T_3) with 7.77, and comparable with 750 g taro flour + 250 g rice flour (T_4) with 7.77. All of these treatments were interpreted as "liked very much."

Table 6. *Sensory Evaluation of the Overall Acceptability of Taro Kropek*

	Replication					
Treatments	**I**	**II**	**III**	**Total**	**Mean**	**Interpretation**
T_1- 1000 g Rice Flour (Control)	8.18	8.24	8.09	24.51	8.17[a]	Liked Extremely
T_2- 250 g Taro Flour + 750 g Rice Flour	7.97	7.91	7.84	23.72	7.91[bc]	Liked Very Much
T_3- 500 g Taro Flour + 500 g Rice Flour	7.85	7.88	7.72	23.45	7.82[cd]	Liked Very Much
T_4- 750 g Taro Flour +250 g Rice Flour	7.79	7.79	7.72	23.30	7.77[d]	Liked Very Much
T_5- 1000 g Taro Flour	7.92	8.03	8.00	23.95	7.98[b]	Liked Very Much
Grand Total/Mean				**118.93**	**7.93**	**Liked Very Much**

Figure 1. *Kropek Samples Made with Taro Flour are Arranged from Treatment 1 to 5, Left to Right*

Based on the data, the four remaining treatments, with varying levels of taro flour, appear to yield results comparable to those with rice flour. Overall, the results show that rice flour remains the superior base in terms of overall acceptability, but taro flour alone is also a promising alternative. The analysis of variance (ANOVA) revealed, in Table 8, highly significant differences ($p < 0.01$) among the different treatments of kropek formulations. The computed F-value (Fc = 17.11) was much higher than both the tabular values at the 5% level (3.48) and the 1% level (5.99), indicating that the differences in the mean scores among treatments were influenced by the type of flour used in the formulation.

3.7 Cost and Profitability Analysis of Formulated Taro Kropek

Table 7 shows the financial analysis of the formulated taro kropek. The study found that the highest return on investment (ROI) was in 1000 g of rice flour (T1) at 82.95%. It was followed by 250 g taro flour + 750 g rice flour (T_2) with 71.20%, 500 g taro flour + 500 g rice flour (T_3) with 60.88% and 750 g taro flour + 250 g rice flour (T_4) with 51.72%. The 1000 g taro flour (T_5) had the lowest ROI among treatments at 43.55%. As the level of taro flour increased, the return on investment decreased due to the costs of manually processing the flour from raw materials. It implied that for every peso invested in developed pure taro kropek, there is a 0.44 centavo return on investment.

Table 7. *Cost and Profitability Analysis of Formulated Taro Kropek*

Treatments	Taro Kropek Produced (pc/100g)	Price/pc (Php)	Sales (Php)	Total Expenses (Php)	Net Income (Php)	ROI (%)	Break-Even Sales (Php)	Break-Even Output (pcs)
T_1- 1000 g Rice Flour (Control)	20	25	500	273.30	226.70	82.95	273.30	11
T_2- 250 g Taro Flour + 750 g Rice Flour	20	25	500	292.05	207.95	71.20	292.05	12
T_3- 500 g Taro Flour + 500 g Rice Flour	20	25	500	310.80	189.20	60.88	310.80	13
T_4- 750 g Taro Flour +250 g Rice Flour	20	25	500	329.55	170.45	51.72	329.55	14
T_5- 1000 g Taro Flour	20	25	500	151.70	151.70	43.55	348.30	14

Moreover, the break-even analysis revealed that as taro substitution increased, both the break-even sales and break-even output also increased. Overall, while taro-based kropek is financially viable, formulations with a moderate taro ratio (250-500 g) balance cost and profitability more effectively than higher ratio levels.

3.8 Summary of ANOVA Results for Sensory Evaluation of Taro Kropek

The sensory attributes of taro kropek were subjected to Analysis of Variance (ANOVA) to determine significant differences among treatments. The parameters evaluated included appearance, aroma, color, taste, texture, and overall acceptability. A summary of the ANOVA results is presented in Table 8.

Based on the study's findings, the formulation of taro kropek significantly influenced its appearance, color, texture, and overall acceptability, indicating that variations in flour composition play an important role in the product's visual and sensory appeal. On the other hand, attributes such as aroma and taste were not significantly affected, remaining relatively stable across treatments regardless of the ratio of taro to rice flour used.

Table 8. *Summary of ANOVA Results for Sensory Evaluation of Taro Kropek*

Parameter	F-value	CV (%)	Significance
Appearance	13.33**	2.11	Significant @ 1%
Aroma	2.90ns	2.14	Not Significant
Color	70.07**	1.12	Significant @ 1%
Taste	0.21ns	2.82	Not Significant
Texture (Crunchiness)	6.50**	0.89	Significant @ 1%
Overall Acceptability	17.11**	0.84	Significant @ 1%

4.0 Conclusion

The study revealed that taro flour can be incorporated into kropek formulations, producing snacks that are both acceptable to consumers and commercially viable. Sensory evaluation revealed that formulations with higher taro content enhanced taste and texture, while appearance and color were most preferred in rice flour-based products. Overall acceptability remained favorable across all treatments, indicating that taro is a promising alternative to rice flour. Financial analysis showed that moderate taro substitution (250–500 g) offered an optimal balance between production costs and profitability, whereas 1000 g taro flour reduced return on investment due to higher processing expenses. These findings suggest that taro kropek can contribute to food innovation, diversify snack options, and utilize underused tubers like taro. Future research is recommended to optimize taro substitution ratios, enhance aroma and flavor, investigate shelf-life and storage stability, assess nutritional benefits, and explore market potential for large-scale commercialization.

5.0 Contributions of Authors

Author 1: Conceptualization, data gathering, data analysis, and manuscript writing as part of academic requirements.
Author 2: Paper refinement, submission, and revision for publication.

6.0 Funding

No external funding was received for this study. It was self-supported by the researchers at the Sultan Kudarat State University-Bagumbayan Campus.

7.0 Conflict of Interests

The authors declare that there are no conflicts of interest associated with this research, authorship, or publication of the paper.

8.0 Acknowledgment

The researchers extend their gratitude to the Sultan Kudarat State University-Bagumbayan Campus for their support and approval of this study. Sincere thanks are given to the panel of evaluators for their valuable insights and to the 100 consumer panelists for their active participation in the sensory evaluation.

9.0 References

Dolorico, R. C. (2025). Formulation, analysis, and acceptability of root crops (kropek). Pantao International Journal of the Humanities and Social Sciences, 4(2), 106. https://doi.org/10.69651/PIJHSS0402106

Espejo-Hermes, J. (1998). Fish processing technology in the tropics. Tawid Publications.

Estrella, S. (2022, September 1). Kropek: The history of our favorite prawn cracker. Pepper.ph. https://pepper.ph/blog/kropek-history

Ferdaus, M. J., Chukwu-Munsen, E., Foguel, A., & da Silva, R. C. (2023). Taro roots: An underexploited root crop. Nutrients, 15(15), 3337. https://doi.org/10.3390/nu15153337

Floros, J. D., Newsome, R., Fisher, W., Barbosa-Cánovas, G. V., Chen, H., Dunne, C. P., & Ziegler, G. R. (2010). Feeding the world today and tomorrow: The importance of food science and technology: An IFT scientific review. Comprehensive Reviews in Food Science and Food Safety, 9(5), 572–599. https://doi.org/10.1111/j.1541-4337.2010.00127.x

Fufa, T., Oselebe, H., Nnamani, C. V., Afiukwa, C. A., & Uyoh, E. A. (2021). Systematic review on farmers' perceptions, preferences and utilization patterns of taro [Colocasia esculenta (L.) Scott] for food and nutrition security in Nigeria. Journal of Plant Sciences, 9(4), 224–233. https://doi.org/10.11648/j.jps.20210904.23

Hasmadi, M., Salit, M. R., & Jamaluddin, H. (2023). Color characteristics of cassava, maize, taro, and banana flours. Revista Bionatura, 8(3), 2375–2382.

Hendek Ertop, M., Atasoy, R., & Akın, Ş. S. (2019). Evaluation of taro (Colocasia esculenta) flour as a hydrocolloid on the physicochemical, rheological, and sensorial properties of milk pudding. International Journal of Food Science & Technology, 54(12), 3351–3359. https://doi.org/10.1111/ijfs.14212

Himeda, M., Njintang, N. Y., Fombang, E., Facho, B., Kitissou, P., Mbofung, C. M. F., & Scher, J. (2022). Chemical composition, functional and sensory characteristics of wheat–taro composite flours and biscuits. Journal of Food Science and Technology, 59(6), 2230–2240. https://doi.org/10.1007/s13197-021-05254-6

Hutchings, J. B. (1977). The importance of the visual appearance of food to the food processor and consumer. Journal of Food Quality, 1(3), 267–278. https://doi.org/10.1111/j.1745-4557.1977.tb00945.x

Johnson, M. (2021, February 2). The 9-point hedonic scale. Society of Sensory Professionals. https://tinyurl.com/2ff9n66z

Kaushal, P., Kumar, V., & Sharma, H. K. (2012). Comparative study of physicochemical, functional, antinutritional, and pasting properties of taro (Colocasia esculenta), rice (Oryza sativa) flour, pigeonpea (Cajanus cajan) flour, and their blends. LWT - Food Science and Technology, 48(1), 59–68. https://doi.org/10.1016/j.lwt.2012.02.028

Kaushal, P., Kumar, V., & Sharma, H. K. (2015). Utilization of taro (Colocasia esculenta): A review. Journal of Food Science and Technology, 52(1), 27–40. https://doi.org/10.1007/s13197-013-0933-y

Monteiro, C. A., Levy, R. B., Claro, R. M., Castro, I. R. R. de., & Cannon, G. (2010). A new classification of foods based on the extent and purpose of their processing. Cadernos de Saúde Pública, 26(11), 2039–2049. https://doi.org/10.1590/S0102-311X2010001100005

Nigussie, M. (2025). Nutritional and anti-nutritional quality of taro (Colocasia esculenta): A review. Innovation, 6(1), 8–14. https://doi.org/10.11648/j.innov.20250601.12

Nuñez, M. G., Olivar, G. M. C., Terana, C. C., & Mutya, R. C. (2023). Sensory attributes and acceptability of taro (Colocasia esculenta) root kropeck. Journal of Applied and Natural Science, 15(2), 450–458. https://doi.org/10.31018/jans.v15i2.4483

Pereira, T., Barroso, S., & Gil, M. M. (2021). Food texture design by 3D printing: A review. Foods, 10(2), 320. https://doi.org/10.3390/foods10020320

Sharif, M. K., Butt, M. S., Sharif, H. R., & Nasir, M. (2017). Sensory evaluation and consumer acceptability. In Handbook of Food Science and Technology (pp. 362–386). [ResearchGate]. https://tinyurl.com/npd7rtpa

Stich, E. (2016). Food color and coloring food. In Food Quality and Shelf Life (pp. 1–35). Academic Press. https://doi.org/10.1016/B978-0-08-100371-8.00001-4

Suriati, L., Mardewi, N. K., Sukmadewi, D. K. T., Datrini, L. K., Manik Cindrawati, A. A. S., Sulis Dewi, N. L. P., & Raditya Putra, P. A. (2023). Regional leading product development program of wanagiri taro processing group, Sukasada District, Buleleng Regency. AJARCDE (Asian Journal of Applied Research for Community Development and Empowerment), 7(2), 79-82. https://doi.org/10.29165/ajarcdev7i2.264ajarcde-safe-network.org

Suriati, L., Mardewi, N. K., Sukmadewi, D. K. T., Datrini, L. K., Raditya Putra, P. A., & Widiantara Putra, I. W. (2024). Development of packaging and product variations of taro chips at the wanagiri taro processing group. Asian Journal of Advances in Agricultural Research, 24(8), 10-16. https://doi.org/10.9734/ajaar/2024/v24i8532

Wang, S., Chen, H., & Sun, B. (2020). Recent progress in food flavor analysis using gas chromatography–ion mobility spectrometry (GC–IMS). Food Chemistry, 315, 126158. https://doi.org/10.1016/j.foodchem.2019.126158

Zelman, K. (2024, October 16). Health benefits of taro roots. Nourish by WebMD. https://tinyurl.com/26r5a73b