

Acceptability of Mantis Shrimp (Stomatopods) as Seasoning Cube

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ABSTRACT

This study developed mantis shrimp (Stomatopods) seasoning cubes and assessed their sensory acceptability, observational shelf-life characteristics, and preliminary economic potential. A descriptive-experimental and research-and-development approach was applied using a Stage-Gate product-development framework. Thirty purposively selected evaluators from Barangay Castillo, Cabusao, Camarines Sur participated: 10 teachers, 10 students, and 10 fisherfolk. Three formulations were produced by varying the quantity of mantis shrimp powder while keeping the complementary ingredients constant. A four-point sensory-evaluation scale was used to assess color, taste, aroma, texture, and appearance. Formulation 3, containing 3/4 cup of mantis shrimp powder, obtained the highest overall weighted mean ($M = 3.60$) and was interpreted as Very Highly Acceptable.

Formulation 2 obtained $M = 3.11$ and was Highly Acceptable, while Formulation 1 obtained $M = 2.46$ and was Moderately Acceptable. Visual shelf-life monitoring showed that all formulations retained acceptable physical quality from Days 1 to 59. On Day 60, Formulations 1 and 2 showed moisture-related deterioration, whereas Formulation 3 remained stable. A foul odor was detected in Formulation 3 on Day 61, indicating that its observational shelf life did not extend beyond 60 days under the storage conditions used. The source manuscript reported a positive gross-profit margin, suggesting preliminary livelihood potential. The findings support further development of mantis shrimp seasoning cubes, but laboratory nutrient analysis, microbiological testing, controlled packaging trials, and complete cost documentation are required before commercial food-safety, nutritional, or profitability claims are made.

Keywords: *food product development, mantis shrimp, seasoning cube, sensory acceptability, shelf-life observation, Stomatopods*

INTRODUCTION

Coastal communities can strengthen livelihood opportunities by transforming locally available fishery resources into value-added products. Mantis shrimp, locally known in some communities as kamuntaha or pitik, is an edible marine resource that may be underutilized despite its potential for food-product innovation. Published studies have reported useful nutritional characteristics in mantis shrimp and related species, including protein, minerals, fatty acids, and antioxidant components (Balzano et al., 2017; Chaijan & Panpipat, 2019; Lawal-Are et al., 2018).

Seasoning cubes are widely used because they provide convenient flavor enhancement. However, the development of locally sourced alternatives remains relevant for communities seeking to diversify food products and generate additional income. Mantis shrimp powder offers a potential base ingredient because its savory profile may contribute to taste and aroma while increasing the value of an available marine resource.

The development of a mantis shrimp seasoning cube also aligns conceptually with sustainable fishery-resource use. Republic Act No. 8550, as amended by Republic Act No. 10654, emphasizes responsible management and development of Philippine fishery resources. Transforming an underutilized catch into a value-added product may contribute to livelihood diversification, provided that sourcing remains ecologically responsible and food-safety requirements are met.

This study aimed to identify a replicable process for producing mantis shrimp seasoning cubes, determine the most acceptable formulation, assess sensory acceptability in terms of color, taste, aroma, texture, and appearance, describe the product's observational shelf-life characteristics, and assess its preliminary economic potential.

Literature Review

Mantis Shrimp as a Food Resource

Mantis shrimp has been examined as a food resource because of its chemical composition and potential for value-added processing. Lawal-Are et al. (2018) reported proximate composition and mineral-profile information for Guinean mantis shrimp. Chaijan and Panpipat (2019) characterized oil extracted from mantis shrimp and reported antioxidant-related properties. Balzano et al. (2017) also examined bioactive fatty acids in mantis shrimp and other crustaceans. These studies support the exploration of mantis shrimp in food-product development, although product-specific nutrient claims must be established through laboratory testing.

Value-Added Processing and Seasoning Development

Processing can increase the usability and storage potential of marine resources. Keshk and Emara (2018) examined the utilization of whole mantis shrimp as an edible powder for value-added products. Yang et al. (2022) studied compound flavor condiments using oyster and mantis shrimp. These studies indicate that mantis shrimp can be processed into a powder or flavoring component suitable for further product development.

Sensory Acceptability and Shelf-Life Assessment

Sensory evaluation is essential when developing food products because color, taste, aroma, texture, and appearance shape consumer acceptance. Maina (2018) emphasized the importance of sensory factors in food acceptability. Storage assessment is likewise necessary because moisture, packaging, processing conditions, and microbial activity affect product stability (Fellows, 2017). Visual observation can reveal obvious deterioration, but microbiological and physicochemical testing remain necessary for validated shelf-life claims.

Stage-Gate Product Development

The Stage-Gate approach provides a structured guide for new-product development. Cooper (1990, 2008) described a sequence of discovery, scoping, business-case development, testing, validation, and launch decisions. In this study, the framework guided the conversion of mantis shrimp meat into powder, the preparation of three formulations, sensory evaluation, shelf-life observation, and preliminary economic analysis.

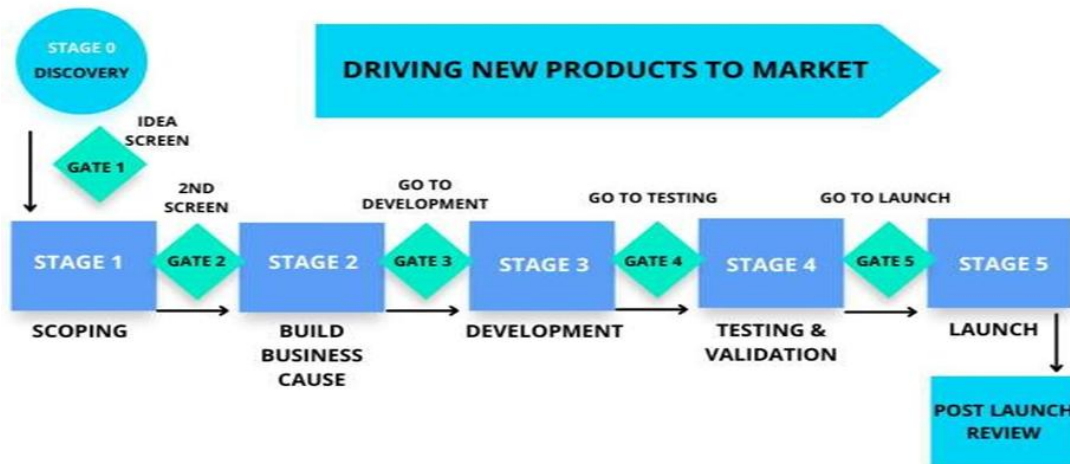


Figure 1. Stage-Gate Product Development Framework Used as a Guide for the Study

METHODS

Research Design

The study used descriptive-experimental and research-and-development methods. The experimental component involved three formulations with different quantities of mantis shrimp powder. The descriptive component summarized sensory ratings, shelf-life observations, and preliminary economic considerations. The Stage-Gate framework organized the development and evaluation process.

Research Locale and Evaluators

The study was conducted in Barangay Castillo, Cabusao, Camarines Sur. Thirty evaluators were selected purposively because they represented stakeholders who could provide feedback on food-product acceptability and local resource utilization.

Table 1. Distribution of Evaluators

Evaluator Group	Frequency	Percentage
Teachers	10	33.33%
Students	10	33.33%
Fisherfolk	10	33.33%
Total	30	100.00%

Research Instrument

An English-Bikol evaluation sheet was used to gather sensory ratings and feedback. The instrument assessed color, taste, aroma, texture, and appearance using a four-point scale: 3.26-4.00, Very Highly Acceptable; 2.51-3.25, Highly Acceptable; 1.76-2.50, Moderately Acceptable; and 1.00-1.75, Less Acceptable. The source manuscript describes validation procedures but does not report final reliability coefficients; therefore, no unsupported psychometric values are introduced.

Product Formulations

The three formulations differed only in the quantity of mantis shrimp powder. Salt, sugar, white pepper, garlic powder, ginger powder, shortening, and vegetable oil were kept constant.

Table 2. Formulations of Mantis Shrimp Seasoning Cubes

Ingredient	Formulation 1	Formulation 2	Formulation 3
Mantis shrimp powder	1/4 cup	1/2 cup	3/4 cup
Salt	1 tsp	1 tsp	1 tsp

Sugar	1 tsp	1 tsp	1 tsp
White pepper	2 tsp	2 tsp	2 tsp
Garlic powder	2 tsp	2 tsp	2 tsp
Ginger powder	2 tsp	2 tsp	2 tsp
Shortening	2 tbsps	2 tbsps	2 tbsps
Vegetable oil	2 tbsps	2 tbsps	2 tbsps

Product Development Procedure

Fresh mantis shrimp were cleaned and washed under running water. The shrimp were steamed and cooled, after which the shell covering and appendages were removed. The extracted meat was dehydrated in a food dryer for approximately five to eight hours, pulverized using a blender, and sieved to obtain a fine powder. The powder and dry ingredients were measured and mixed. Shortening and vegetable oil were incorporated, and the mixture was flattened and molded into uniform cubes using a weighing scale.

Data Gathering and Analysis

The three formulations were presented to the evaluators for sensory assessment. Weighted mean was used to summarize the ratings. The three formulations were also monitored visually during storage. The source manuscript recorded observations for Days 1-59, Day 60, and Day 61 onward. A preliminary economic assessment was discussed qualitatively based on the reported cost and revenue considerations.

Ethical Consideration

Participation in the sensory evaluation was voluntary. Informed consent was obtained, and responses were treated confidentially and reported in aggregate form. Local fisherfolk knowledge and terminology were respected during data gathering. Future consumer or commercialization studies should include formal food-safety review, allergen screening, and regulatory compliance procedures because the product contains shellfish.

RESULTS AND DISCUSSION

Process for Producing Mantis Shrimp Seasoning Cubes

The established process consisted of sourcing fresh mantis shrimp, washing, steaming, cooling, removing the shell, drying the meat, pulverizing, sieving, measuring ingredients, mixing, incorporating shortening and oil, flattening, molding, and packaging. The process is replicable at a small scale and demonstrates how an underutilized fishery resource can be transformed into a value-added condiment prototype.

Sensory Acceptability of the Three Formulations

Table 3. *Sensory Acceptability of Mantis Shrimp Seasoning Cube Formulations*

Sensory Attribute	F1 WM	Int.	F2 WM	Int.	F3 WM	Int.
Color	2.03	MA	3.50	VHA	3.53	VHA
Taste	2.50	MA	2.93	HA	3.60	VHA
Aroma	3.40	VHA	3.20	HA	3.03	HA
Texture	2.03	MA	2.97	HA	4.00	VHA
Appearance	2.33	MA	2.93	HA	3.60	VHA
Overall weighted mean	2.46	MA	3.11	HA	3.60	VHA
Overall rank	3		2		1	

Formulation 3 obtained the highest overall weighted mean ($M = 3.60$) and was interpreted as Very Highly Acceptable. It received strong ratings for color (3.53), taste (3.60), texture (4.00), and appearance (3.60). Aroma received a mean of 3.03 and remained within the Highly Acceptable range. Formulation 2 ranked second with an overall weighted mean of 3.11, while Formulation 1 ranked third with an overall weighted mean of 2.46. The results identify the 3/4-cup formulation as the preferred prototype under the study conditions.

The findings suggest that a higher inclusion level of mantis shrimp powder strengthened the sensory profile of the seasoning cube, especially its taste, texture, and appearance. However, the evaluation involved a small purposive panel from one locality. Broader consumer testing is necessary before generalizing the preference pattern to a larger market.

Observational Shelf-Life Characteristics

Table 4. *Visual Shelf-Life Observations of the Three Formulations*

Storage Period	Observed Condition	Interpretation
Days 1-59	All formulations remained physically stable, with no reported visible mold or unacceptable odor.	Acceptable physical quality under the study's storage conditions.
Day 60	Formulation 1 became moist and developed initial visible mold. Formulation 2 became slightly moist. Formulation 3 remained stable.	Formulation 3 retained the best physical quality.
Day 61 onward	Formulations 1 and 2 showed increased mold growth and foul odor. Formulation 3 retained its appearance but developed a foul odor.	None of the formulations remained acceptable for consumption beyond Day 60.



A. Initial product sample



B. Stored seasoning cube



C. Visible deterioration



D. Advanced deterioration

Figure 2. *Selected Product Photographs*

Visual monitoring indicated that Formulation 3 retained acceptable physical quality through Day 60 under the study's storage conditions. The foul odor detected on Day 61 marked the limit of its observational shelf life. The results should not be interpreted as a laboratory-validated expiration date because no microbiological analysis, moisture-content test, or controlled packaging trial was conducted.

Preliminary Economic Potential

The source manuscript reported a positive gross-profit margin and described the product as a potential livelihood opportunity for fisherfolk and processors. However, the submitted manuscript did not provide a complete itemized cost table or the exact gross-profit computation. The economic finding should therefore be treated as preliminary. A complete feasibility study should include raw-material costs, labor, utilities, equipment depreciation, food-grade packaging, regulatory compliance, storage losses, transport, marketing, and distribution expenses.

Proposed Enhancement Priorities

Table 5. *Recommended Product-Development Priorities*

Priority Area	Recommended Action	Expected Outcome
Laboratory safety analysis	Conduct microbiological, moisture-content, and physicochemical testing.	Validated safety and shelf-life evidence
Nutrient verification	Complete laboratory-based proximate and nutrient analyses.	Accurate product-composition claims
Packaging optimization	Test food-grade packaging, seal integrity, and controlled storage conditions.	Improved quality retention and validated storage guidance
Consumer testing	Expand sensory evaluation to larger and more diverse consumer panels.	Stronger market-acceptability evidence
Economic feasibility	Prepare a complete cost model including labor, utilities, compliance, and distribution.	More realistic profitability assessment
Sustainable sourcing	Coordinate with fisherfolk and local agencies on responsible harvesting.	Livelihood development with resource protection

CONCLUSION

Mantis shrimp meat was successfully processed into powder and incorporated into seasoning cubes through cleaning, steaming, shell removal, dehydration, pulverization, sieving, mixing, and molding. Among the three formulations, Formulation 3, containing 3/4 cup of mantis shrimp powder, obtained the highest overall sensory rating and was interpreted as Very Highly Acceptable. Visual monitoring showed that the formulation remained physically acceptable through Day 60 but developed a foul odor on Day 61. The study demonstrates the potential of mantis shrimp as a locally sourced ingredient for value-added condiment development and livelihood diversification. Nevertheless, laboratory nutrient analysis, microbiological testing, packaging validation, complete economic documentation, and sustainable-sourcing safeguards are necessary before commercial production or food-safety claims are pursued.

Recommendations

1. Food processors and community livelihood groups may use Formulation 3 as the starting prototype for further development because it obtained the highest sensory-acceptability score.
2. Laboratory microbiological, moisture-content, physicochemical, and nutrient analyses should be completed before establishing a commercial shelf life or making nutritional claims.
3. Packaging trials should be conducted using food-grade materials and controlled storage conditions to determine the effects of seal integrity, temperature, and moisture exposure.
4. A larger and more diverse consumer panel should assess acceptability, purchasing intent, preferred packaging, and price sensitivity.

5. A complete economic-feasibility study should include labor, equipment depreciation, utilities, regulatory compliance, quality control, transportation, marketing, and distribution costs.
6. Local government units, fisheries agencies, and fisherfolk organizations should develop sustainable-sourcing guidelines to prevent overharvesting and support responsible resource management.
7. Any future market testing should include clear allergen disclosure because the product contains shellfish.

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