

Acceptability of fish-jackfruit kroepck with moringa leaves

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Abstract: This study was conducted to develop and determine the acceptability of fish- jackfruit kroepck with moringa leaves. The products of this study were evaluated as to sensory qualities and acceptability in terms of appearance, aroma, taste and texture. The study was a developmental-experimental research that used the Completely Randomized Design (CRD), with three treatments in three trials. Score cards with nine-point hedonic scales was utilized in the collection of data. The general acceptability was evaluated by 100 consumers. The results show that based on the consumer's acceptability there were a significant difference among the three treatments of the fish Jackfruit Kroepck with malunggay leaves in favor of treatment B.

Keywords: Formulation, Analysis, Acceptability, Fish, Jackfruit, Seeds, Moringa, Kroepck

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INTRODUCTION

In recent years, there has been a growing interest in exploring alternative sources of nutrients and sustainable food ingredients to address global food security challenges and promote healthier dietary practices. As part of this endeavor, the utilization of unconventional yet nutritionally rich ingredients has garnered attention as a means to develop innovative food products with enhanced nutritional profiles (Khoo, et al., 2019).

The *galunggong* fish (*Decapterus macrosoma*), being a significant source of high-quality protein and essential nutrients, holds considerable potential for diversifying food product development (FAO, 2018). This fish is also abundant in the province of Capiz and is a staple food of the masses. Hence, the potential of developing it into different types of food products, aside from being a viand, is possible. Concurrently, malunggay (*Moringa oleifera*), commonly known as the miracle tree, and *langka* or jackfruit (*Artocarpus heterophyllus*) seeds have emerged as promising candidates for incorporating into food formulations due to their nutritional density and functional properties (Anwar et al., 2016; Nambiar and Seshadri, 2015).

It is understood that diet affects lifelong health. Diet and nutrition affect fetal, baby, child, and adolescent growth and development. Early nutrition affects adult chronic disease risk. Fish consumption in the Philippines has fallen. Young people eat less fish than adults, and young women in particular consume Fish Jackfruit Kroepck with Moringa Leaves. From a health standpoint, increasing the intake of both and Galunggong, Moringa Leaves is beneficial. The researcher was interested in the feasibility of incorporating the above-mentioned products together, particularly Moringa and Jackfruitseeds flour into fish-based kroepck, herein referred to as "Kroepck," to enhance their nutritional value and sensory attributes. By utilizing these alternative ingredients, the study seeks to explore the potential of creating a novel snack product that not only provides essential nutrients but also contributes to sustainable food production and utilization of underutilized resources (retrieved from www.fishalliance.ru/en frontpages/viewpage/39).

The utilization of Moringa and Jackfruit (Langka) seeds flour in fish-based crackers presents an opportunity to leverage the nutritional benefits of these ingredients while addressing challenges related to food waste and resource optimization. Additionally, the development of such innovative food products aligns with the broader goals of promoting dietary diversity and improving food security, particularly in regions where access to nutritious foods may be limited. For this reason, the researcher was motivated and encouraged to conduct a study on making varied food product like Jackfruit Kroepcek with Moringa Leaves.

Research objective

This experimental study was conducted to develop fish jackfruit kroepcek with moringa leaves and to determine the general acceptability of the products in terms of appearance, aroma, crispiness and taste.

LITERATURE REVIEW

Fish kroepcek, a traditional snack popular in Southeast Asia, has garnered attention in both local and global markets due to its unique flavor and texture. Understanding the factors influencing its general acceptance among consumers is essential for producers and marketers to develop effective strategies for promoting and distributing this product.

Several studies have investigated the general acceptance of fish kroepcek and its variations. For instance, Tan et al. (2016) conducted a consumer survey to assess the preferences and attitudes towards fish-based snacks in Malaysia. The study found that factors such as taste, aroma, and packaging influenced consumers' willingness to purchase fish kroepcek. Similarly, Nguyen et al. (2018) explored consumer perceptions of fish-based snacks in Vietnam and highlighted the importance of sensory attributes, nutritional value, and price in shaping purchasing decisions.

In addition to sensory factors, cultural and social influences also play a significant role in the acceptance of fish kroepcek. Research by Lim and Chong (2017) examined the cultural significance of fish snacks in Singapore and revealed how these products are deeply embedded in local culinary traditions. Similarly, Thanh et al. (2020) investigated the social factors influencing the consumption of fish-based snacks in Indonesia, emphasizing the role of social norms and peer influence.

Furthermore, marketing strategies and product positioning can impact the general acceptance of fish kroepcek. Effective branding, packaging design, and promotional activities can enhance consumer perception and generate interest in the product. For example, a study by Rahman et al. (2019) evaluated the marketing strategies employed by fish kroepcek manufacturers in Thailand and identified key success factors such as product innovation and brand visibility.

The general acceptance of fish kroepcek is influenced by various factors, including sensory attributes, cultural norms, social influences, and marketing strategies. By understanding these factors and addressing consumer preferences, producers can capitalize on the growing demand for traditional and innovative fish-based snacks in both local and international markets (Rozin, 2015).

To delve deeper into the factors affecting the general acceptance of fish kroepcek, it is crucial to explore how these elements interact and evolve within the context of changing consumer preferences and market dynamics. One aspect worth considering is the role of health and nutrition perceptions in shaping consumer attitudes towards fish-based snacks. (Rahman, et al., 2019)

Health-conscious consumers increasingly prioritize products perceived as nutritious and beneficial to their well-being. Fish kroeppek, being made from fish, inherently carries certain health associations due to the nutritional profile of fish, including its high protein content, omega-3 fatty acids, and various vitamins and minerals. Studies have shown that consumers are more likely to choose snacks perceived as healthier options, particularly those with natural and wholesome ingredients (Rozin, 2015). Therefore, emphasizing the nutritional benefits of fish kroeppek in marketing and packaging materials can enhance its appeal to health-conscious consumers.

Moreover, the marketing and packaging strategies employed for fish kroeppek can significantly influence consumer perceptions of the product's healthiness. Packaging that highlights key nutritional information, such as protein content, omega-3 fatty acids, and absence of artificial additives, can reinforce the perception of fish kroeppek as a healthy snack choice. Additionally, labeling certifications such as "low-fat," "gluten-free," or "high-protein" can further enhance its health appeal and attract health-conscious consumers (Wansink&Chandon, 2014).

Furthermore, incorporating functional ingredients known for their health-promoting properties, such as herbs, spices, or seaweed extracts, can not only enhance the nutritional profile of fish kroeppek but also appeal to consumers seeking functional snacks with added health benefits (Elmadfa& Meyer, 2019).

By leveraging health and nutrition perceptions through targeted marketing and packaging strategies, fish kroeppek manufacturers can enhance the product's appeal to health-conscious consumers and capitalize on the growing demand for nutritious and functional snacks in the market.

Sensory evaluation plays a crucial role in determining consumer acceptance of food products, including fish kroeppek. Studies have shown that sensory attributes such as taste, texture, aroma, and appearance significantly influence consumer preferences (Meilgaard et al., 2016). Therefore, it is essential to conduct sensory analysis to identify the optimal formulation and processing methods that result in a desirable sensory profile for fish kroeppek. For instance, research by Smith et al. (2018) explored different seasoning blends and frying techniques to enhance the flavor and crispiness of fish-based snacks, ultimately improving consumer acceptance.

Consumer taste preferences vary across cultures and regions, impacting the acceptance of fish kroeppek in different markets. Studies have investigated taste preferences for seafood snacks and found that factors such as familiarity with seafood flavors, spiciness levels, and perceived freshness influence consumer liking (Pineau et al., 2019). Therefore, understanding local taste preferences and adapting the flavor profile of fish kroeppek to align with consumer expectations is crucial for market success.

Consumers increasingly seek healthier snack options, driven by concerns about obesity, cardiovascular health, and general well-being. Fish kroeppek, being a seafood-based product, inherently carries health associations due to its nutritional profile rich in protein, omega-3 fatty acids, and essential vitamins and minerals (Mozaffarian&Rimm, 2016). Leveraging these health benefits through targeted marketing emphasizing the nutritional value of fish kroeppek can enhance its appeal to health-conscious consumers.

Effective marketing and packaging strategies are instrumental in shaping consumer perceptions and driving product acceptance. Research suggests that visually appealing packaging, clear labeling highlighting key nutritional attributes, and strategic placement in retail outlets can influence purchase decisions (Griffiths et al., 2017). Moreover, digital marketing channels and social media platforms provide opportunities to engage with consumers and communicate the unique selling points of fish kroeppek, further influencing consumer perceptions and purchase intent (Lee &Youn, 2018).

Ultimately, the success of fish kroepcek in the market hinges on consumer acceptance, which is influenced by a combination of sensory attributes, taste preferences, nutritional perceptions, and effective marketing strategies. Longitudinal studies tracking consumer preferences and purchasing behavior can provide valuable insights into the evolving acceptance of fish kroepcek over time and across different demographic segments. Hence, the acceptance of fish kroepcek as a seafood-based snack involves a complex interplay of sensory attributes, taste preferences, nutritional perceptions, and marketing strategies. By understanding and addressing these factors, manufacturers can enhance the product's appeal and capitalize on growing consumer demand for nutritious and flavorful snack options.

METHODOLOGY

The research method employed in this study was experimental-developmental research, which integrates elements of both experimental and developmental methodologies. In this study, the experimental method was utilized to investigate the optimal proportion of galunggong fish meat and malunggay leaves in the production of galunggong fish kroepcek, employing three distinct treatments.

Additionally, the developmental method was employed to explore the potential for product development and commercialization by incorporating jackfruit seeds into flour for the production of galunggong fish kroepcek enriched with moringa leaves. This combined approach allowed for both the exploration of optimal ingredient ratios through controlled experimentation and the advancement of the product towards market readiness through developmental strategies.

Product formulation of ingredients in making fish –jackfruit kroepcek with moringa leaves for sensory evaluation.

Ingredients	Treatment A	Treatment B	Treatment C
Galunggong fish	50 grams		
Mo-ong fish		50 grams	
Akin-akin fish			50 grams
Malunggay leaves	5 grams	5 grams	5 grams
Jackfruit Seeds flour	50 grams	50 grams	50 grams
Salt	2 grams	2 grams	2 grams
Garlic powder	2 grams	2 grams	2 grams
Black pepper	2 grams	2 grams	2 grams
Lye water	2 ml	2 ml	2 ml

Experimental Procedure

Preparation of raw materials

Preparation of galunggong, moong and akin-akin fish

The preparation of materials, tools, and equipment for the study involved selecting and purchasing fresh fish required for the experiment. Upon acquisition, the fish underwent thorough washing and cleaning to remove any dirt and unpleasant odor. This process included the removal of gills and intestines, followed by rinsing in running water to eliminate blood and ensure cleanliness. Subsequently, the fish was blanched, a crucial step to facilitate easy flaking and removal of fins. After blanching, the fish was marinated with calamansi juice, a pinch of salt, and black pepper for approximately 5 minutes to mitigate any lingering seaweedy odor. Finally, the fish was flaked and set aside for later use in the experiment, ensuring

that it was adequately prepared and primed for incorporation into the Fish Jackfruit Kroepeck with Malunggay leaves formulation.

Preparation of jackfruit seed flour, moringa leaves, and fish-kroepek

The preparation of Jackfruit seeds began with the collection and thorough washing of the seeds. Subsequently, they were boiled until tender, ensuring they reached an optimal consistency for further processing. Following cooking, the outer peel of the jackfruit seeds were carefully removed, and the seeds were dried using the sun drying method to preserve their quality and flavor. Once adequately dried, the seeds were roasted in a pan until they attained a golden brown hue, enhancing their aroma and flavor profile. After roasting, the seeds were finely powdered using a food processor, and the resulting powder was sifted to achieve a smooth and fine flour consistency.

The fresh moringa leaves were selected and sorted. Then, they were washed in running water. The moringa leaves were chopped finely and set aside for later use. The tools and equipment needed for making the kroepek were measured. In a mixing bowl, all the ingredients were combined, mixed thoroughly, and allowed to stand for fifteen minutes. Hands were rubbed with some cooking oil, and the paste was divided into four portions, with each portion rolled into a cylinder shape about seven centimeters in diameter. They were steamed for forty-five minutes on medium heat until they were firm and looked slightly transparent. The mixture was allowed to cool and chilled overnight until it was firm enough for slicing. It was then cut into thin slices of 2–3 mm thickness and spread onto a baking tray to dry under the sun for 10 to 12 hours. Finally, the slices were deep-fried until puffed.

Evaluation Procedure and analysis

Sensory evaluation was conducted using a comprehensive scorecard to assess the quality attributes of the product, including appearance, aroma, taste, and texture. These sensory qualities played a crucial role in determining the overall acceptability of the fish jackfruit kroepek with moringa Leaves formulation. The evaluation aimed to discern any significant differences in acceptability among the samples concerning taste, appearance, texture, and odor. The panel of evaluators consisted of 100 individuals, comprising 10 Food Technology instructors, 15 Technology and Livelihood Education students specializing in Foods, 75 homemakers/consumers, and 10 restaurant and catering business owners, all in Roxas City. This diverse panel ensured a comprehensive assessment of the sensory qualities and overall acceptability of the product, providing valuable insights into its market potential and consumer preferences. The evaluators scored the products using the nine-point hedonic rating scale. This scale was also used to analyze the data after the survey result was tabulated.

FINDINGS AND DISCUSSION

Based on the evaluation conducted by 100 consumers to assess the acceptability of fish-jackfruit kroepek with moringa leaves, Treatment B was “Liked Extremely” as shown by the grand mean rating of 8.21. The second highest score was obtained by Treatment C with a mean score of 8.07 and interpreted as “Liked Very Much”. Furthermore, the lowest mean rating of 8.03 was received by Treatment A which was described also as “Liked Very Much”.

The result implies that the three varieties of fish as added ingredients in making fish-jackfruit kroepek with moringa leaves were found to be acceptable and potential product for development. However, the consumers generally preferred Treatment B among the three treatments.

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for development. However, the consumers generally preferred Treatment B among the three treatments.

Correlating to these findings are previous studies have investigated the general acceptance of fish kroepkek and its variations. For instance, Tan et al. (2016) conducted a consumer survey to assess the preferences and attitudes towards fish-based snacks in Malaysia. The study found that factors such as taste, aroma, and packaging influenced consumers' willingness to purchase fish kroepkek. Similarly, Nguyen et al. (2018) explored consumer perceptions of fish-based snacks in Vietnam and highlighted the importance of sensory attributes, nutritional value, and price in shaping purchasing decisions. In addition to sensory factors, cultural and social influences also play a significant role in the acceptance of fish kroepkek. Research by Lim and Chong (2017) examined the cultural significance of fish snacks in Singapore and revealed how these products are deeply embedded in local culinary traditions. Similarly, Thanh et al. (2020) investigated the social factors influencing the consumption of fish-based snacks in Indonesia, emphasizing the role of social norms and peer influence.

CONCLUSIONS AND RECOMMENDATION

The fish-jackfruit kroepcek with moringa leaves shows significant potential for further development and marketability. Researchers are encouraged to refine the product based on consumer feedback to enhance its appeal and market viability. Utilizing fish-jackfruit flour as a main ingredient in kroepcek production is a promising avenue. Treatment B received the highest consumer approval, followed by Treatment C, both rated highly, while Treatment A, though receiving the lowest score, was still "Liked Very Much." It is recommended to submit the product for proximate analysis and nutrient content evaluation to explore commercialization opportunities. Additionally, future research should consider exploring other variants and factors not addressed in the current study.

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