



Regular article

## Product Development and Innovation at Catfish Nugget (Study on Gumuk Bago Hill, Nogosari Rambipuji Village

### *Pengembangan dan Inovasi Produk pada Nugget Lele (Studi di Dusun Gumuk Bago Desa Nogosari Rambipuji*

Fany Dwi Maulidiyah<sup>a,\*</sup>, Deltaningtyas Tri Cahyaningrum<sup>b</sup>

<sup>a</sup> Department of Agroindustrial Management Politeknik Negeri Jember, Indonesia

<sup>b</sup> Department of Agroindustrial Management Politeknik Negeri Jember, Indonesia

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#### ABSTRACT

Gumuk Bago Hamlet in Nogosari Village, Rambipuji District, Jember Regency, has natural potential that has not been utilized optimally, such as empty land and river flows only used for irrigation. Researchers introduced the Smart Aquaponic system, integrating the cultivation of catfish and kale plants with IoT technology. Apart from training residents in managing aquaponic products, innovations are being made by processing catfish into nuggets rich in nutrients, which have great potential on the market. This research analyzes the development and innovation strategy for catfish nugget products. Data was collected through interviews, observation, and documentation. The research results show that marketing strategies include improving quality, expanding distribution, and promotions with more attractive packaging designs. The manufacturing process is carried out traditionally without preservatives, however, innovation continues to be developed in the form of flavors and product variants to attract new consumers and maintain market share. In conclusion, the product innovation and marketing strategy succeeded in increasing product adoption and keeping sales growth of catfish nuggets in the local market.

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\* Corresponding author.

Email address: [maulidiyahfany1@gmail.com](mailto:maulidiyahfany1@gmail.com) (Fany Dwi Maulidiyah)

## Introduction

Gumuk Bago Hamlet is located in Nogosari Village, Rambipuji District, Jember Regency. Which has an area of 1,97 km<sup>2</sup> with a population of 2600 people (BPS Jember Regency, 2021). This area has natural potential that has not been utilized properly by the residents of the village. The natural potential is empty land owned by residents and also river water which is only used for irrigation. Based on this natural potential, and having also held joint discussions with the head of Gumuk Bago hamlet, researchers introduced the Smart Aquaponic system, which integrates the cultivation of catfish and water spinach with IoT technology.

Aquaponics is the process of growing aquatic organisms and plants symbiotically, where aquaculture waste undergoes microbial transformation to be used as a source of nutrients for plant growth, while the absorption of nutrients from plants remediates water for aquaculture. Some systematically define aquaponics as a production system for aquatic organisms and plants in which the majority (>50%) of the nutrients that support optimal plant growth come from waste originating from the food of aquatic organisms (Lennard, 2015).

Smart Aquaponic is the application of an aquaponic system in the form of catfish and kale combined with an IoT system, making it easier to use for users. The IoT system used in Smart Aquaponics is the Bardi Smart Plug, this tool is used to control the on and off of the water pump used in aquaponics so that it saves more electrical energy. The use of Smart Aquaponics is quite complex, so researchers not only provide training on smart aquaponics but also teach the residents of Gumuk Bago Hamlet, how to process the results of aquaponics. One of the processed products from smart aquaponics is catfish nuggets. Not only consumed personally, but residents of Gumuk Bago hamlet are also developing and innovating the catfish nugget product.

Catfish is a food source that has high nutritional content. The nutritional content of catfish includes protein, omega 3, amino acids, vitamin A, vitamin C, iron, and so on (Damayanti, et al., 2023). Therefore, nugget products made from catfish are highly nutritious food products (Musyaddad, et al., 2019). The aim of processing catfish into nuggets is to add value to the product and increase the income of the residents of Gumuk Bago hamlet. The method and process for processing catfish nuggets is almost the same as the process for processing nuggets in general, the only difference being the raw materials.

The promising market potential for catfish nuggets, especially among children and teenagers, is encouraging increasingly tight business competition. To win the competition, manufacturers need to focus on improving product quality, developing strong brands, and continuous

innovation. In this way, catfish nugget products can continue to meet the growing needs of consumers and become market leaders.

Competition in the catfish nugget market is getting tighter with the emergence of various new brands. During this competition, most catfish nugget producers still maintain traditional production processes. However, some manufacturers are starting to use modern technology to improve production efficiency and product quality. This shows that there is an effort to balance maintaining traditional tastes with meeting the demands of an increasingly modern market. Shows that there is an effort to balance maintaining traditional tastes with meeting the demands of an increasingly modern market.

Thus, the development and innovation of catfish nugget products have the potential to be carried out because of the natural potential possessed by Gumuk Bago Hamlet. The catfish nuggets produced by The Gumuk Bago community still use traditional methods. Food using the traditional method itself has the advantage that in its processing it does not contain additional ingredients (food additives) and preservatives. Our ancestors also created food that was categorized as "functional food" (Muhilal, 1995). So, the development of catfish nugget products must be integrated with smart aquaponic technology

Based on the background description above, the researcher formulated the research objective to analyze the development and innovation strategy for catfish nugget products.

## Literature Review

### *Product Development*

Product Development is everything that is offered on the market to attract attention, be sold, used, or consumed, and can fulfill desires and needs following current developments (Abdullah & Tantri, 2017). Product development is a process carried out to anticipate changes, to improve products to provide greater benefits and satisfaction, considering that production is a fundamental aspect of life (Moh Idril Gufon, 2015). Product development can be carried out by company staff by implementing a new product development system that follows the models desired by the market. Several ways that companies can use in developing a product, that is: (Alma, 2007)

1. Idea generation: New product development begins with a systematic idea search process to produce a new product idea. Entrepreneurs often have new ideas to find the best among them. The purpose of this idea-collection is to generate lots of ideas. The new idea will be evaluated to determine whether it is suitable and worthy of processing. If the idea is feasible, it will be continued, if not it will be discontinued.

2. Idea filtering: Idea screening aims to filter existing ideas and find the best ideas. This stage aims to reduce the number of ideas generated, so that only quality ideas remain, while less good ideas are eliminated. Here, producers must be able to produce ideas that suit consumer needs.
3. Concept development and testing: After ideas have been filtered, the next step is to introduce the new product model to consumers and conduct a survey to get consumer responses to the product.
4. Marketing strategy development: In this context, the company designs a marketing strategy plan for new products by utilizing the selected market segmentation, as well as available information sources.
5. Business Analysis: Business analysis is carried out using the method of improving the number of sales compared to purchases of raw materials, production costs, and profit estimates.
6. Product development: In the product development process, ideas that are still in the design stage are sent to production to be produced, branded, and packaged attractively. The essence of a successful brand is a superior product or service, supported by consistent planning, long-term commitment, and creative and well-planned marketing. A strong brand will create loyal customers.
7. Market testing The next step is to market the new product in the planned segment so that information will be obtained about the condition of the goods, agents, potential demand, and others.
8. Commercialization: Once the planning is complete, implemented, and tested, large-scale production requires a significant capital investment. Starting to launch a new product on the market, which will go through the process as a new product, until it reaches the adoption stage by consumers, and can provide satisfaction for customers and profits for the company.

Product development is a cross-disciplinary activity that requires contributions from almost all functions within the company, with a product development project (Cross, 1994) is:

1. Marketing: The marketing function acts as a liaison between the company and customers. Other duties include identifying product opportunities, conducting market segment research, and understanding customer needs. Apart from that, the marketing department must also be able to design communication between the company and customers, set target prices, and plan product launches and promotions.
2. Design: The design function has an important role in explaining the physical form of a product so that it can meet customer needs. In this case, the tasks of the design section include engineering design (mechanical, electronic, software, etc.) as well as industrial design

(aesthetics, ergonomics, and user interface).

3. Manufacturing: The manufacturing function is responsible for designing and managing product systems in the production process. This function includes purchasing, installation, and distribution.

The product development process has six phases (Ulrich & Eppinger, 2001), that is, Phase 0: Product Planning and planning activities are often referred to as the “zero phase” because at this stage they wait for project approval and the actual product development launch process. Phase 1: Concept Development, in the concept development phase, targeted market needs are identified, alternative product concepts are generated and evaluated, and one or more selected concepts will be further developed and tested. Phase 2: System Level Design, the system level design phase involves understanding the product architecture and breaking down the product into subitems and smaller components. Phase 3: Planning, details the design phase involves preparing complete specifications regarding the shape, material, and combination of all unique components contained in the product, as well as identifying all standard components that will be purchased from suppliers. Phase 4: Testing and Repair, the test and refinement phase involves the construction and evaluation of various production versions of the production line from an early stage. Phase 5: Production, in the initial production phase, products are made using actual production systems. This stage aims to train the workforce in overcoming problems that arise in the real production process. The transition from initial production to full production is usually done gradually. At some point during this transition, the product will launch and become available for distribution.

#### *Product Innovation*

Innovation is defined as a creative idea regarding a business development strategy, which can be found in various parts of the company. The process begins by identifying new ideas that are easy to implement, before on to larger initiatives. Then, one of the various visions of the future is selected, which includes developing a good representation of the company’s possible future, as well as generating assumptions about the forces that can influence the market and various existing uncertainties (Kotler & Koller, 2009).

Product innovation is a way for companies to adapt to an ever-changing environment. Therefore, companies are required to continue to create new ideas and offer innovative products, as well as improve services that are considered to satisfy customers (Utaminingsih, 2016).

Product innovation is a series of processes starting from new ideas and discoveries to the development of new markets that interact with each other. The introduction of new methods through innovation can have a significant change impact, especially in assessing the benefits of a product produced by a company compared to the price set by the producer (Kotler, 2016).

*Types of Product Innovation*

1. New Product Innovation is a product and service that has never existed before.
2. Product Development Innovation refers to the development of existing products and services.

*Factors that Influence Product Innovation*

1. Quite a request
2. Products comply with the applicable marketing structure
3. New products offer more benefits
4. Sufficient funds
5. Doesn't break the law
6. Have sufficient management skills to manage

*How to Make Innovation Products Have Distinctive Characteristics*

1. Increase the value of product benefits
2. Finding new users for the product
3. Dare to enter new markets
4. Changing brand positioning
5. Increase product usability
6. Expanding products with the same brand to other products

*Product Innovation Type*

1. New from the company's perspective. A product can be considered new if the product produced is truly innovative and different from products that have been launched previously.
2. New from a consumer perspective. A product is considered new by consumers if it has different benefits and prices from existing products. It is important for companies to always pay attention to the consumer's perspective because this can influence the number of purchases of the product.

**Research Method**

The research applies research methods with a descriptive qualitative approach. The purpose of choosing this method is so that researchers can describe situations that truly correspond to reality, and explore and analyze more deeply the development and innovation strategies for catfish nugget products produced by residents of Gumuk Bago hamlet. Interviews, observations, and documentation are qualitative approaches obtained by researchers. The focus of the research is on the development and innovation strategy for catfish nugget products in Gumuk Bago Hamlet, Nogosari Rambipuji Village.

Data collection techniques used by researchers in conducting research are observation, interviews, and documentation. Research instruments for the development and innovation of catfish nugget

products in Gumuk Bago Hamlet, Nogosari Rambipuji Village, namely using a recorder, field notes, interview guides, and the researcher himself are the instruments used by the researcher as a tool for collecting data. To carry out data analysis in the Journal of Development and Innovation of catfish nugget products in Gumuk Bago Hamlet, Nogosari Rambipuji Village, researchers used a model, namely the interactive Miles, and Huberman. Data collection, data reduction, data display, and verifying are the stages of data analysis used by researchers. The validity of the data here is that the researcher uses source triangulation techniques. Source triangulation is used to test the credibility of data by verifying information obtained from several sources (Sugiyono, 2010).

**Result and Discussion***Product Development Strategy*

## 1. Marketing

The processed catfish nugget product from the residents of Gumuk Bago hamlet itself is now a favorite in various areas in the Rambipuji sub-district. With a unique taste that comes from processed catfish which is turned into nuggets, this product often competes closely with other processed frozen food products. To pamper loyal customers, especially residents, we continue to innovate so that the catfish nuggets processed by Gumuk Bago Hamlet residents provide a more delicious and nutritious taste.

Several ways can be done to modify the market, namely: increasing sales, by attracting the interest of non-consumers through promotions, looking for and entering new market segments where previously these segments did not know about processed catfish nugget products from the residents of Gumuk Bago Hamlet, improving product quality through high-quality raw materials, hygienic production processes, and flavor innovations that consumers like, expanding distribution channels, by placing catfish nugget products in school canteens, food stalls, and also opening e-commerce to reach wider consumers.

In conducting a marketing analysis that adheres to the marketing mix theory, the following were found: the catfish nugget product experienced defeat in design and packaging, but consumers in the target market recognized its nutritional superiority and were willing to buy it again even though the packaging was less attractive. Catfish nuggets are known as a product that has a high protein and omega-3 fatty acid content, making it a healthy food choice that is still in demand. Catfish nuggets have a higher price compared to nuggets in general. This is caused by several factors, including the quality of the raw materials and the nutritional value offered. Catfish nuggets contain higher-quality protein and higher levels of omega-3 fatty acids compared to chicken or beef-based nuggets. Apart from that, the catfish nugget production process requires special attention to maintain the quality and freshness

of the catfish.

This premium price reflects the added health benefits and better-quality ingredients, although it may make catfish nuggets a more expensive option on the market. Consumers who are aware of the importance of health are often willing to pay more to get products with higher nutritional content at the point of sale. Catfish nuggets are sold at the house of the Gumuk Bago hamlet head. This location is strategic because it makes access easier for residents and makes the product more easily known in the community. Sales at this place also create direct relationships with consumers, increasing trust and loyalty to the product. Promotion of catfish nuggets is carried out without audio-visual advertising, relying only on the word-of-mouth (WOM) method. This approach leverages word-of-mouth recommendations, which are effective in building trust and loyalty in local communities. The WOM method also allows for more personal and direct promotion from consumers who are satisfied with the product.

## 2. Desain

Catfish nugget products are packaged in mica packages weighing 250 grams. Each packaging is equipped with a product label sticker to ensure quality and authenticity. Creating a more attractive packaging design must of course be based on a good marketing concept, including: To attract customers, it is important to have a strong and attractive brand or logo. This can be achieved by offering products that are unique compared to competitors and meeting customer needs with added value. Attractive packaging design is the key to creating product uniqueness. Having a strong brand is not enough if the packaging design does not attract customer attention. A unique and attractive packaging design will make the product stand out and encourage customers to consider it.

Apart from considering customer needs and desires, product packaging design is also an important aspect of marketing. Therefore, manufacturers need to create good, attractive, and unique packaging. Start designing product packaging when the product development process begins. Make several sketches of ideas to get a visual representation of the final product, so you can imagine what it will look like when finished. The motto "Keep It Simple" is always emphasized by designers. By keeping the product packaging design simple, profits will be gained in the future. It is important to ensure the packaging design presents relevant information about the product and required warnings, as well as helping to reduce production costs. Market positioning and branding are crucial aspects of product packaging design. Knowing the target market and customer expectations will increase marketing effectiveness. Apart from that, studying competitors is also important, because understanding competitors can strengthen the product's position in the market.

## 3. Manufacturing

The catfish nugget manufacturing process includes procuring raw materials (fresh catfish obtained from aquaponics owned by residents of Gumuk Bago hamlet and additional materials: including flour, herbs, spices, and binders such as eggs). Next is the cleaning and preparation, the catfish is cleaned to remove dirt and slime, the catfish is been cleaned, then steamed briefly with the addition of bay leaves to remove the fishy smell, the catfish is steamed next, only the catfish meat is taken, grinding the meat: Fish meat The catfish is ground to get a smooth texture and is easy to shape, mixing the ingredients: The catfish meat that has been ground is mixed with additional ingredients such as flour, seasonings, and spices according to the recipe, the mixture is stirred evenly so that all the ingredients are mixed well. Either, the mixture of fish meat is formed into nuggets using a machine or manually.

Next is pressing: The nuggets are pressed to ensure uniform density and shape, and the nuggets are dipped in a coating mixture, such as an egg or flour mixture. Then coated with breadcrumbs to give a crunchy texture after frying. Frying: The nuggets are fried in hot oil until cooked and golden. Fried nuggets are cooled at room temperature or using a cooling machine to prevent condensation and maintain texture. Packaging: Nuggets are packaged in designed packaging. Packaging is carried out using automatic machines or manually according to needs. Labeling: Packages are labeled with product information such as name, ingredients, expiration date, and nutritional information. The final step is Storage and Distribution, Storage: The finished product is stored in a freezer or cold temperature to maintain freshness. Distribution: Catfish nuggets are distributed to markets, shops, or retailers according to demand.

### *Product Strategy and Innovation*

Innovation refers to goods, services, or ideas that consumers consider new, even though the ideas may have been around for a long time. A relevant example is the catfish nugget product which is currently being developed. Innovation products usually require quite a long time to spread widely to all market segments and social systems. This process is known as diffusion. Diffusion is the spread of new ideas from the idea creator to the consumer. This is different from the adoption process, which refers more to the mental process in which a consumer hears about the innovation and then decides to regularly consume the product being offered. These three processes, innovation, diffusion, and adoption, appear to be running smoothly in catfish nugget products so that in a short time, catfish nuggets can be developed and accepted by consumers. In the adoption process, the catfish nugget product can be described through the following stages:

#### 1. Introduction (Awareness) of catfish nugget products

In the introduction phase, consumers began to realize and know

about the catfish nugget innovation, even though they still lacked information about the product. At this stage, producers introduce catfish nuggets to the market.

## 2. Interest in catfish nugget products

In this phase, consumers begin to be interested in seeking information about product innovation. Therefore, companies must immediately provide information about this innovation. Producers disseminate information by providing direct explanations to consumers.

## 3. Evaluation of catfish nugget products

In this phase, consumers begin to consider whether they want to try the product that has been innovated.

## 4. Try it out (Trial) on catfish nugget products

In this phase, consumers try the product that has been innovated to compare their expectations and the real value of the product.

## 5. Acceptance (Adoption) of catfish nuggets

If product innovation exceeds consumer expectations, they will choose to use and consume it continuously. This happens to catfish nugget products which offer new and different flavors to nuggets in general.

Consumers will accept and buy innovative products if there is a significant difference between the total value received by consumers and the total costs incurred (Kotler, 2009). In other words, there is a positive value from the overall value of the product received by consumers. To attract new consumers, Gumuk Bago Hamlet residents can promote catfish nuggets by highlighting their benefits, such as their ability to support heart health and help reduce the risk of heart disease as part of a balanced diet. Initially, consumers received the product well, as evidenced by the continued increase in sales. However, it seems that old consumers are starting to feel bored because the catfish nugget variant has not been developed further. The feeling of boredom among existing consumers is still balanced by potential demand from customers who do not often consume catfish nuggets due to limited supply. This consumer group helps keep sales of processed catfish nuggets from the residents of Gumuk Bago Hamlet stable.

## Conclusion

The catfish nugget product from the residents of Gumuk Bago Hamlet has succeeded in attracting the market's attention with its unique taste and competes with other frozen food products. Effective product development strategies include increasing sales through promotions, entering new market segments, improving product quality, and expanding distribution channels. Although current product packaging is less attractive, nutritional advantages such as high protein content and

omega-3 fatty acids are the main attraction. Premium prices reflect the quality of raw materials and health benefits, although they can be a limiting factor for some consumers. Local sales are carried out using the word-of-mouth (WOM) method as the main promotional strategy, but it is necessary to consider the use of additional promotional channels. Packaging design needs to be improved with a focus on strong branding, attractive packaging, and clear delivery of product information to increase attractiveness in the market. The catfish nugget manufacturing process involves several stages from raw material procurement to distribution, where it is important to maintain the quality at each stage so that the product meets standards. Product innovation and adoption showed good acceptance by new consumers, while existing consumers experienced boredom due to the lack of new variants, although sales remained stable thanks to demand from customers who did not frequently consume this product.

## Recommendations

To develop catfish nuggets from Gumuk Bago Hamlet, several strategic steps need to be taken. First, developing new variants to reduce the saturation of old consumers and attract new consumers. Promotions should be extended through digital advertising and e-commerce platforms. A more attractive and informative packaging design will support branding. Apart from maintaining the quality of raw materials, flexible prices such as special offers or bundling packages can attract more segments. The distribution must be expanded to school canteens, food stalls, and online. Education about the health benefits of catfish nuggets is also important to attract health-conscious consumers. These steps are expected to increase product competitiveness.

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