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Analysis of Processed Fishery Product Development in the Jambal Roti Industry in Pangandaran: A Case Study of the Jambal Roti Bahari Store, Jambal Roti Tatang Yus Store, and Jambal Roti Abah Emen Store

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ABSTRACT

Jambal roti is a leading processed fishery product in Pangandaran Regency with potential to increase the added value of fishermen's catches. This study analyzes product development in the jambal roti industry through in-depth interviews with three businesses: Jambal Roti Tatang Yus Store, Jambal Roti Asli Bahari Store, and Jambal Roti Abah Emen Store. Findings reveal four aspects of product development: raw materials, product variation, packaging, and marketing. Raw material availability depends on seasons and catches, while product variation involves different fish species, sizes, textures, and complementary products. Packaging strategies range from adjusting sizes to retaining existing formats. Marketing is gradually shifting toward social media and e-commerce, although limited human resources remain a challenge. Continuous assistance is needed to support more equitable and sustainable product innovation

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INTRODUCTION

Pangandaran Regency is one of the regencies in West Java with substantial capture fisheries production and fishery catch output (Apriliani et al., 2020). One way to utilize catches and turn them into higher-value products is through product development technology. Product development technology involves applying scientific knowledge and technological innovation to the design, improvement, and creation of new products to enhance quality, efficiency, and market competitiveness (Li et al., 2023). One widely used product-development approach for fishery products is processing marine fish into salted fish (Fitriyanti Linda, 2021). Salting, fermentation, and drying are important processes for extending shelf life, maintaining quality, and increasing economic value (Gumilar et al., 2026). Salted fish is a processed marine food product made by preserving fish meat with a substantial amount of salt (Desse et al., 2025). Pangandaran has many salted-fish products, and one of its best-known products is jambal roti. Jambal roti is a salt-fermented product generally made from sea catfish (*Arius thalassinus rupell*). The term jambal roti refers to its distinctive flesh texture, which crumbles easily after frying, resembling toasted bread, and to its characteristic aroma. This aroma is associated with the degradation of proteins and fats, which produces compounds such as methyl ketones, butyraldehyde, amino acids, and other substances (Mutaqin and Natari, 2021).

Product development is one way for business operators to sustain their businesses while adapting products to consumer needs. This does not always mean creating entirely new products; it can also involve adjusting raw materials, adding product variations, changing packaging sizes and designs, and developing marketing methods. Marlena and Sholekhuddin (2018) explain that product innovation contributes to marketing performance among MSMEs processing milkfish. This is consistent with Junianto et al. (2024), who found that jambal roti product development in Pangandaran involved storage technology, packaging innovation, and online marketing development. These findings indicate that fishery-processing businesses need to pay attention to product development to ensure that their offerings continue to meet market needs. In addition to product innovation, marketing strategy is also important for business sustainability. The ability of business operators to develop marketing strategies is linked to efforts to reach consumers and maintain business activities (Setiyorini et al., 2018).

Product development in Pangandaran Regency's jambal roti industry is worth examining because each business operator has a distinct approach to managing raw materials, providing product variations, selecting packaging, and marketing products. Krismahyanti et al. (2025), in their study of consumer behavior when purchasing jambal roti salted fish in Pangandaran Village, highlighted the relevance of consumer considerations to the development of this regional specialty. Accordingly, this study was conducted at Jambal Roti Tatang Yus Store, Jambal Roti Asli Bahari Store, and Jambal Roti Abah Emen Store. These businesses were selected because their characteristics are relevant to describing the development of the jambal roti industry in Pangandaran. The selection also considered businesses that have operated for a relatively long time and therefore

have experience in developing and maintaining their products. In addition, one business has a strong social media presence, a relatively large number of followers, and a broader marketing reach, offering insight into the use of digital media for marketing development. The three businesses also exhibit different development characteristics, allowing this study to provide a more varied picture of product-development strategies in the jambal roti industry. This study therefore aims to identify the forms of product development adopted by each business. The findings are expected to describe product development in Pangandaran Regency's jambal roti industry and provide a basis for business operators to consider development measures suited to their respective conditions and capabilities.

LITERATURE REVIEW

Product Development in Fishery Processing

Product development is an effort to improve product quality and competitiveness through innovation and the refinement of existing products. In the fishery processing industry, product development can be implemented through raw material management, product diversification, packaging improvements, and marketing strategy development. Nurmalasari et al. (2024) reported that jambal roti product development in Pangandaran involved the use of storage technology, vacuum packaging, packaging innovation, and online marketing.

Aspects of Product Development

Product development in fishery processing can be examined through several aspects, namely raw materials, product variety, packaging, and marketing. Raw material management is related to the availability and quality of fish used in the production process. Product diversification provides consumers with alternative product choices, while packaging development aims to protect the product and enhance its appeal. Natari and Mutaqin (2024) discussed the importance of packaging design and brand identity in the development of jambal roti businesses. Furthermore, Junianto et al. (2025) examined the marketing characteristics of jambal roti, including direct sales and personal promotion to consumers.

Previous Studies and Conceptual Framework

Nurmalasari et al. (2024) examined jambal roti product development at a single business in Pangandaran, whereas Natari and Mutaqin (2024) focused on packaging development and brand identity. Meanwhile, Junianto et al. (2025) investigated the added value and marketing characteristics of jambal roti salted fish. Building on these different research focuses, the present study aims to compare product development practices among three jambal roti businesses in Pangandaran based on four aspects: raw materials, product variety, packaging, and marketing techniques. The findings are expected to provide an overview of the similarities, differences, and challenges associated with product development in each business.

METHODOLOGY

This study used a qualitative descriptive method to describe product development among jambal roti businesses in Pangandaran Regency. A qualitative descriptive approach is appropriate when research aims to provide a direct and detailed account of a phenomenon based on information obtained from participants, without interpreting the findings beyond what the data support (Doyle et al., 2020). The study involved three businesses: Jambal Roti Tatang Yus Store, Jambal Roti Asli Bahari Store, and Jambal Roti Abah Emen Store.

Data were collected through semi-structured interviews with business owners or managers directly involved in product processing and marketing. Semi-structured interviews use a prepared set of questions while allowing researchers to develop follow-up questions based on information that emerges during the interview (Busetto et al., 2020). The interviews covered topics aligned with the research objectives, including raw material development, product variation, packaging, and marketing techniques. The interviews provided information about the product-development efforts implemented by each business.

The interview data were then analyzed descriptively by grouping information according to the product-development aspects under study. Qualitative data can be analyzed by identifying and grouping information according to patterns or themes emerging from the data, thereby providing a systematic description of the phenomenon (Doyle et al., 2020). Information from the three businesses was compared to identify similarities and differences in raw material management, product variation, packaging selection, and marketing techniques. The comparison is presented to describe product-development practices among jambal roti businesses in Pangandaran Regency. The analysis also considers each business's conditions, including raw material availability, product adjustments to consumer needs, and the use of conventional and digital marketing to support business activities.

RESEARCH RESULT

Business Profiles

Jambal Roti Tatang Yus Store sells a range of processed fishery products, particularly salted fish. Its products include jambal roti, salted petek fish, and various types of small salted fish. Complementary products such as chili sauce, shrimp paste, and crackers are also available as souvenirs. This product diversity indicates that the business does not rely solely on jambal roti sales but offers several processed commodities to meet consumer needs. The seasonal changes in the types of salted fish available also show that the business remains closely linked to fluctuations in fishermen's catches.

Jambal Roti Asli Bahari Store was established in 2006, following the tsunami in Pangandaran. Its activities initially involved sourcing and selling caught fish, then expanded to include fish processing before sale. Jambal roti production began to develop around 2010, while shrimp paste and other salted-fish products had been marketed earlier. This development reflects a diversification process from selling raw materials to processing fishery products to create added value.

Jambal Roti Abah Emen Store has been operating since 2010. It was previously part of a fisheries business group before developing into an independently run business. Its main products are salted fish; the raw materials are purchased and processed in-house. In addition to salted fish, the store also resells shrimp paste obtained from other suppliers. This approach combines production and trading activities in business management. The three stores are shown in Figure 1.

(1) (2) (3)

Figure 1. Documentation of the MSME stores: (1) Jambal Roti Tatang Yus Store; (2) Jambal Roti Asli Bahari Store; (3) Jambal Roti Abah Emen Store

Raw Material Development

Raw materials are a key component of the jambal roti industry because their quality and availability are directly related to production continuity and product added value (Gumilar et al., 2026). In the businesses observed, raw material development involves not only the fish species used but also fish availability, seasonal influences, sources of raw materials, and the selection of suitable materials for processing. Dependence on catches means that raw material availability can fluctuate over time, requiring business operators to adjust product types to supply conditions.

At Jambal Roti Tatang Yus Store, raw material availability is strongly influenced by seasonality. The types of salted fish available may change with the fishing season. When a particular fish species is caught in large quantities, the availability of raw materials and products tends to increase. Conversely, when catches decline, raw materials become more limited. This indicates that salted-fish processing businesses depend on fluctuations in capture fisheries production. In Pangandaran, this is important because processing catches is one way to increase the economic value of fishery commodities (Gumilar et al., 2026).

The diversity of raw material species is also part of the product-development strategy. Jambal roti sold by the store may be made from several fish species, including manyung, jahan, kadukang, and others. Different fish species produce different product characteristics, particularly in texture. Products marketed as original jambal roti have a softer texture, while products made from certain raw materials may be firmer. Using several fish species shows that raw material diversification can help maintain product availability when the supply of one species changes.

At Jambal Roti Asli Bahari Store, raw materials also come from several fish species, namely kadukang, manyung, and jahan. Using multiple species makes use of fish-resource diversity as a source of raw materials for processed products. Raw material procurement combines materials processed in-house with smaller

fish products obtained from external sources. This approach can help the business adjust production volume to raw material availability.

At Jambal Roti Abah Emen Store, fish raw materials are purchased and then processed in-house. The materials are selected before processing and obtained from local fishers operating in the surrounding area. This procurement pattern indicates a direct relationship between the processing business and local raw material suppliers. Sourcing materials locally may also support the sustainability of the local supply chain.

Product Variety Development

Product variety is one form of innovation observed in all three businesses. Variations involve the fish species used, product size, thickness, texture, and the addition of products other than jambal roti. Innovation among fish-processing MSMEs does not have to involve creating entirely new products; it can also be achieved by modifying product characteristics and diversifying complementary products (Marlena and Sholekhuddin, 2018).

At Jambal Roti Tatang Yus Store, product variety is reflected in the range of products offered. In addition to jambal roti, the store sells petek fish, small fish, various salted-fish products, chili sauce, and shrimp paste. This diversity can reduce dependence on a single product while giving consumers more choices. However, the availability of some salted-fish species remains seasonal, so product variety may change at certain times. The product range at Jambal Roti Tatang Yus Store is shown in Figure 2.

Figure 2. Product Variety at Jambal Roti Tatang Yus Store

At Jambal Roti Asli Bahari Store, jambal roti variety is primarily reflected in the fish species used and the characteristics of the processed product. Jambal roti is made from kadukang, manyung, and jahan, with variations in product thickness. Differences in thickness relate to the physical characteristics of the product and consumer preferences. These adjustments show that product variation can accommodate consumer needs without changing the product's core concept.

Product development at Jambal Roti Asli Bahari Store is also reflected in variations in processing level and texture. Products categorized as "super" are softer, while other products are relatively firmer or drier. Some types of dried products are also available at certain times, although their availability is not consistent. These texture variations broaden consumer choice and show that physical characteristics can differentiate processed fish products.

Product variety development also includes complementary products. Jambal Roti Asli Bahari Store is developing chili sauce as part of its business

diversification. This type of diversification can broaden consumer choice and create sales opportunities by combining the main product with complementary products. Thus, product development involves not only changes to jambal roti itself but also adding products related to the business's core offering. The products from Jambal Roti Asli Bahari Store are shown in Figure 3.

Figure 3. Product Variety at Jambal Roti Asli Bahari Store

At Jambal Roti Abah Emen Store, product variety is relatively limited. Products sold since the business began have not changed substantially, but several fish species are used as raw materials, allowing products to be differentiated by fish type. This shows that innovation is not always marked by the addition of new menu items. Using different raw materials can also constitute product variation when it results in different characteristics for consumers. The products from Jambal Roti Abah Emen Store are shown in Figure 4.

Figure 4. Product Variety at Jambal Roti Abah Emen Store

Across the three businesses, product variety development can be grouped into two patterns. First, product diversification through the addition of complementary products such as chili sauce, shrimp paste, and other salted-fish types. Second, modification of the main product through differences in fish species, size, thickness, and jambal roti texture. This is consistent with the concept of product innovation among MSMEs, which can involve developing product characteristics or adding varieties to better meet market needs (Marlena and Sholekhuddin, 2018).

Product Packaging Development

Packaging is an important part of product development because it protects the product while supporting its identity, appeal, and marketing. For processed fish products, packaging improvements can help increase competitiveness by protecting product quality and differentiating products in the market (Fahimah et al., 2023). Observations showed that packaging development differed among

the three businesses, ranging from adjusting package sizes to retaining previously used packaging formats.

At Jambal Roti Tatang Yus Store, packaging is adjusted to product size and consumer needs. Small and large packages are available at different prices. Small packages may be used for limited purchases or sharing, while larger packages are intended for purchases in greater quantities. Packaging is also adjusted based on sales performance. This indicates that packaging is not merely a wrapper but also part of a strategy to adapt products to consumer segments and purchasing behavior.

Packaging development at Jambal Roti Tatang Yus Store can be viewed as an adaptation to market responses. Adjusting package size and form provides flexibility in setting prices and the quantity purchased. This strategy is important for small businesses because packaging decisions can be tailored to product characteristics and consumers' purchasing power.

At Jambal Roti Asli Bahari Store, packaging is also intended to maintain product quality during distribution. Certain materials inside the packaging help reduce fish odors when the product is carried, especially during vehicle travel. Products are also available in several size and quality categories. This indicates that packaging decisions consider not only product appearance but also functionality during storage and distribution.

Jambal Roti Abah Emen Store follows a different pattern because its packaging has changed relatively little over time. After processing, products are packed in small or large sizes. This suggests that packaging development has not been a primary focus of innovation at this business. Nevertheless, the availability of different sizes still gives consumers options regarding purchase quantity.

Overall, packaging development in the jambal roti industry at the study sites has not been uniform. Tatang Yus is more adaptive in adjusting package sizes to consumer needs and sales levels; Bahari places greater emphasis on packaging functionality during distribution; and Abah Emen tends to retain its existing packaging format. These differences indicate that packaging strategies are influenced by market needs, product characteristics, and each business's capacity. Packaging innovation therefore remains an area that could be strengthened among small businesses (Fahimah et al., 2023). Images of the packaging used by the three businesses are presented in Figure 5.

Figure 5. Product Packaging Development at the Three Jambal Roti MSMEs

Product Marketing Technique Development

Advances in information technology have changed how MSMEs introduce and sell products, including processed fishery products. Digital marketing can expand market reach and is associated with increased sales for fish-processing

MSMEs (Nugraha, 2025). Social media can also serve as an effective promotional tool for MSMEs selling processed fish products, helping them introduce products and reach consumers (Abdullah et al., 2022). The three businesses observed still use conventional marketing but have begun supplementing it with social media and online sales to varying degrees.

At Jambal Roti Tatang Yus Store, marketing still relies on customers who already know the store and on direct purchases. Social media has not been used intensively, although TikTok has begun to serve as a promotional channel. Promotional activities are not conducted regularly because content creation depends on store conditions and staff availability. This shows that digital marketing adoption by small businesses depends not only on platform availability but also on the human resources available to manage it.

Jambal Roti Tatang Yus Store also accepts online orders and ships products outside the region, including to Jakarta and Bandung. This indicates an expansion from customers who visit the store in person to customers outside Pangandaran. Conventional marketing remains important because existing customers continue to contribute substantially to sales. Combining these channels provides flexibility in reaching consumers with different characteristics. The marketing channels used by Jambal Roti Tatang Yus Store are shown in Figure 6.

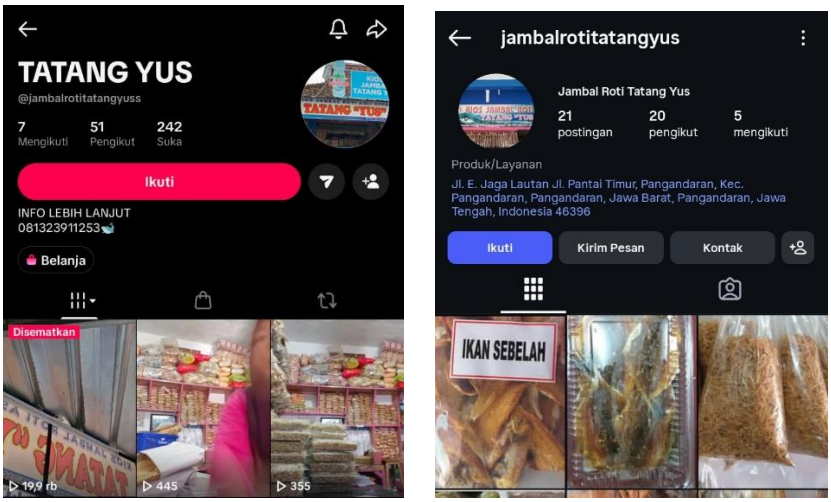

Figure 6. Product Marketing Techniques at Jambal Roti Tatang Yus Store

At Jambal Roti Asli Bahari Store, social media use is more prominent through TikTok and Instagram, alongside sales through Tokopedia and Shopee. Social media orders have reached customers outside the region, including Bali, and the business has also experienced shipping products overseas. The use of several digital channels shows that social media is used not only for promotion but is also connected to sales activities.

TikTok use at Jambal Roti Asli Bahari Store began around late 2023 and subsequently became one of the channels for introducing products to a wider audience. Using several platforms simultaneously indicates a shift from marketing focused on local consumers toward marketing with a broader

geographic reach. The marketing channels used by Jambal Roti Asli Bahari Store are shown in Figure 7.

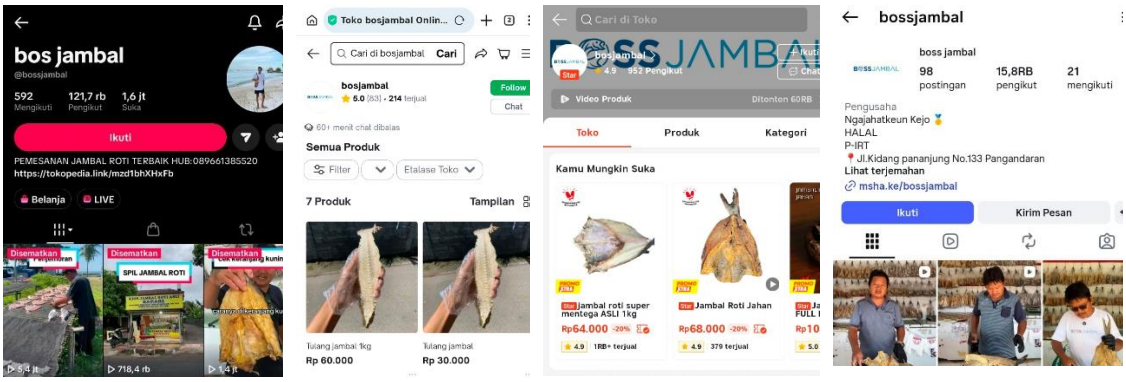

Figure 7. Product Marketing Techniques at Jambal Roti Asli Bahari Store

At Jambal Roti Abah Emen Store, marketing still relies heavily on customer relationships and recommendations from previous customers. Customers who have purchased products may introduce them to others, including people in Bandung. In addition to customer referrals, the business accepts online orders and ships products outside the region. This shows that word-of-mouth marketing can coexist with digital marketing.

Social media at Jambal Roti Abah Emen Store was previously managed with help from family members. This activity later became less intensive because the family members involved had other jobs. This indicates that limited human resources can affect the continuity of digital marketing in small businesses. Therefore, the use of digital media needs to be supported by a clear division of tasks and adequate content-management skills.

Compared with one another, the three businesses demonstrate different marketing patterns. Tatang Yus combines direct marketing with limited use of social media and online sales; Bahari is more active on social media and e-commerce platforms; and Abah Emen combines customer referrals with online sales. These differences show that marketing digitalization occurs gradually and is influenced by human-resource capacity, established marketing habits, and each business's capabilities. This finding is consistent with the importance of marketing strategies suited to the circumstances of fish-processing MSMEs (Setiyorini et al., 2018; Nugraha, 2025).

CONCLUSIONS AND RECOMMENDATIONS

Based on the results and discussion, product development in Pangandaran's jambal roti industry occurs gradually and differs from one business to another. Raw material development in all three businesses remains strongly influenced by fishing seasons and fish availability, causing the types and volumes of products to fluctuate. Product innovation does not always involve creating new products; it is more commonly achieved by diversifying complementary products such as chili sauce and shrimp paste, and modifying jambal roti characteristics in terms of fish species, size, thickness, and texture. Packaging strategies also differ: Tatang Yus adjusts package sizes in response to

market demand, Bahari focuses on maintaining product quality during distribution, and Abah Emen retains its existing packaging format. All three businesses have begun adopting digital marketing to varying degrees. Bahari makes the most active use of social media and e-commerce platforms, while Tatang Yus and Abah Emen continue to combine conventional marketing with limited digital activities due to human-resource constraints. Overall, the findings indicate that each business's adaptive capacity and strategy are key factors in successful product development among small businesses. Technical assistance, digital-marketing education, and better access to packaging innovation are therefore needed to support more equitable and sustainable development of jambal roti products in Pangandaran.

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