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## **BUILDING VILLAGES WITH PROCESSED STINGRAY SKIN CHIPS (A Case Study of Keraton Village)**

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## Abstract

**Background.** While Stingrays have been the subject of numerous studies, none have systematically investigated the processing of stingray skin into crackers to improve the economy of villagers.

**Aims.** The processing of stingrays based on this research, which is framed within the concept of Micro, Small, and Medium Enterprises as a way of utilizing natural resources, proposes a case study design to improve the economy of local villagers.

**Methods.** The investigative approach used in this research is descriptive qualitative. Data sources come from observations of MSMEs and interviews with MSME business owners of Pari Fish Chips as respondents. The community service program was carried out on March 19, 2025, at one of the UMKM places in Keraton Village, Suranenggala District, Cirebon City, West Java Province.

**Result.** This training process introduces stingray skin raw materials, how to process them, packaging, and sales, which are conducted both online and offline.

**Conclusion.** This service program was enthusiastically welcomed by residents, who provided suggestions for further service activities using different raw materials but still utilizing the same natural resources.

Implementation. Building a village can by processing stingray chips.

**Keywords:** Village Building, Stingray Skin Waste, Income, Village, MSME.

## INTRODUCTION

Indonesia, as an archipelagic country, has a territorial waters area of 6.4 million km<sup>2</sup> with potential fishery resources estimated at 12.5 million tons per year. One fishery commodity that is abundant but has not been optimally utilized is stingray. Data from the Ministry of Marine Affairs and Fisheries (KKP) shows that stingray production in Indonesia reaches around 50,000 tons per year, but its utilization is still limited to its meat. Stingray skin, which accounts for 10-15% of the total weight of the fish, is often discarded or only utilized traditionally. In fact, stingray skin contains high collagen and has a unique texture, so it has the potential to be processed into economically valuable products such as chips.

Keraton Village, Suranenggala Sub-district, Cirebon Regency, is one of the villages that have great economic development potential based on local natural resources. However, the village still faces challenges in improving the welfare of its community, especially in terms of sustainable economic empowerment. Along with the times, this village seeks to transform into a village that excels in the fields of economy and development, which is expected to become a model village for other villages in the vicinity. One way to achieve this goal is by utilizing the potential of natural resources owned by the region, one of which is stingray, which has not been optimally used to this extent.

Stingray skin chips are one of the innovative processed products that can be a solution to reduce fisheries industry waste. Based on data from the Central Statistics Agency (BPS),

fisheries waste in Indonesia reaches 1.2 million tons per year, and most of it has not been optimally utilized. Processing stingray skin into crackers not only decreases waste but also creates new products that have added value. In addition, stingray skin crackers contain protein and collagen that are beneficial for health, so they can be an alternative healthy snack that is in demand by the public.

**Table 1** Nutrient content of several types of fish in Keraton village

<b>Kind of fish / Shells</b>	<b>Energy (kcal)</b>	<b>Protein (g)</b>	<b>Lipids (g)</b>	<b>Carbohydrates (g)</b>	<b>Calcium (mg)</b>	<b>Iron Substance (mg)</b>
Stingray Fish	120	20	4	0	30	1.2
Spiny Fish	110	22	3	0	25	1.0
Anchovies	250	30	10	0	50	2.5
Mackerel	140	18	5	0	35	1.5
Shells Ijoan	80	15	2	0	20	1.0

(Sources: Perum Perindo, 2023)

Based on the nutrient content table above, the consumption of fish and Shellfish can support the nutritional needs of the community in the Suranenggala area, especially in increasing the intake of protein, calcium, and zinc. The market potential for stingray skin chips is quite large, considering that crackers are one of the most popular snacks in Indonesia. Data from the Indonesian Fish Processing Industry Association (AIPII) shows that chip consumption in Indonesia reaches 2.5 kg per capita per year. With a population of more than 270 million, the market for chips in Indonesia has great potential. With their unique raw materials, Stingray skin chips can attract consumers who are increasingly concerned with natural and nutritious products. In addition, this product also has the potential to become a regional souvenir due to its unique ingredients and flavor.

From an economic perspective, the development of micro, small, and medium enterprises of stingray skin chips can positively impact coastal communities. Fishermen and small entrepreneurs can earn additional income from the utilization of stingray skins that previously lacked value. Data from KKP shows that around 60% of coastal communities are still classified in the middle to lower economic category. By developing a stingray skin chips business, it is hoped that new jobs can be created, from collecting raw materials and

production to marketing. This will encourage local economic growth and improve the welfare of coastal communities.

Community empowerment through local product-based Micro, Small, and Medium Enterprises (MSMEs) such as stingray skin chips can have a significant economic impact. In addition to creating jobs, this business also has the potential to improve family welfare because the products produced can be sold at affordable prices both offline and online. The market potential for stingray skin crackers is quite large, considering the high consumption of chips in Indonesia and consumer interest in products made from natural ingredients that are beneficial for health.

The community service program carried out in March 2025 in Keraton Village aims to introduce the community to the process of processing stingray skin into crackers and providing training related to product packaging and marketing. With this training, it is hoped that the community can optimize the potential in their village and improve the local economy so that Keraton Village can become a more advanced and independent village.

Through an approach based on the utilization of local natural resources, processing stingray skin into chips focuses not only on economic aspects but also on sustainability. Stingray skin processing provides multiple benefits, namely reducing waste and improving the community's quality of life by creating new business opportunities. In addition, stingray skin chips, which are rich in collagen, have the potential to become a more nutritious food product, contributing to the improvement of public health.

The program also provides training on package products to last longer and attract consumers professionally. In addition, digital product marketing is also an important aspect that is introduced to the community. Given the rapid development of technology and the internet, online product marketing will open up more significant opportunities for stingray skin chip products to be more widely known. Therefore, training in digital marketing techniques is also needed to support the success of this product in the broader market.

By optimizing the existing potential, it is hoped that the stingray skin cracker product can become a flagship product of Keraton Village, which provides economic benefits to the local community and contributes to the village's overall economic development. It is hoped that this village can become a successful example of sustainable utilization of natural resources to support economic growth and the welfare of its people.

## **METHODS**

In this service, the training participants were RW. 03 housewife in Keraton Village, Suranenggala District, on March 19, 2025, at one of the UMKM places in Keraton Village, Suranenggala District, Cirebon City, West Java Province. The stages carried out in this service process begin with providing knowledge education about stingrays, training, processing practices, product packaging so that it is durable, and how to sell it both offline and online.

The data analysis process of this research uses thematic data analysis, namely analysis based on the theme of service, starting with finding the definition of the theme of service, asking for information from residents who take part in training and practice of processing stingray crackers to find out the production process of making products and providing suggestions for product innovation processing by utilizing other types of natural resources in the Suranenggala area.

## **DISCUSSION**

Stingrays are a group of cartilaginous fish with flattened bodies and pectoral fins extending like wings. They belong to the class Chondrichthyes, which also includes sharks. Stingrays are commonly found in tropical and subtropical waters, both in marine and brackish waters. Suranenggala is a region known as a coastal area with fisheries and agricultural activities as the main livelihood of its residents, so stingrays are often found in this area.

### **Processing of Stingray Skin into Chips**

In the training phase conducted in Keraton Village, Suranenggala Subdistrict, participants, who were primarily housewives, were given an understanding of the processing of stingray skin into chips. The processing begins with selecting fresh stingray skin, which is then washed thoroughly to remove dirt. Next, the stingray skin is boiled to reduce fat content and facilitate cutting. After that, the fish skin is cut into small pieces according to the desired size and seasoned with traditional spices.



**Picture 1.** Stingray drying process

*(Source: personal documentation, 2025)*



**Picture 2.** Stingray drying process

*(Source: personal documentation, 2025)*



**Picture 3.** Packaging of Stingray Skin Chips

(Sources : personal documentation, 2025)

The frying process is carried out at the right temperature to produce crisp and not too oily crackers, and the fish's content does not disappear. The frying results are then packed in vacuum plastic to make the product more durable. In this training, participants were able to practice each stage of processing and received guidance on good packaging techniques to maintain product quality.

### **Community Acceptance of Stingray Skin Crackers Products**

The local community enthusiastically welcomed the training conducted in Keraton Village. Most participants showed high interest in learning how to process stingray skin into saleable products. The community sees great potential in utilizing this fisheries waste as a business opportunity, which not only increases family income but also reduces fish waste that is often discarded without being utilized.

Respondents involved in the training revealed they felt more skilled and confident in producing stingray skin crackers. Some participants even started planning to make these crackers independently and market their products to local markets, both offline and online. This shows that the training has positively impacted the economic empowerment of village communities through improved skills and knowledge of product processing.

## **Economic Impact of Stingray Skin Processing**

Based on observations made during the training, most of the participants have a background as housewives who were not previously involved in food processing businesses. After attending the training, they now have new skills that can help increase their family income. With a relatively affordable selling price, stingray skin crackers can be sold in large quantities, both in local markets and through digital platforms such as social media or marketplaces. Coastal communities, which generally depend on the fisheries sector, can utilize stingray skin as a raw material previously considered waste. In addition, the income earned from selling the crackers can be a significant addition, especially for families with a lower-middle economy. This is in line with previous research, which states that developing MSMEs in coastal areas can improve the local economy (Taufik and Rahmat, 2018).

Stingray skin processing impacts the welfare of the individuals involved in the business and the economy of the community as a whole. With more people involved in this business, there is an increase in economic activity in coastal areas. The turnover of money from selling processed products based on stingray skin can have a domino effect on other sectors, such as raw material distribution, packaging, and marketing. Small businesses that act as raw material suppliers also benefit because stingray skin, which was previously considered waste, now has economic value.

In addition, with the increasing demand for processed products based on stingray skin, many parties are interested in investing in this business. For example, several cooperatives or joint business groups can be formed to improve production efficiency and expand marketing networks. Local governments and related institutions can also provide support through training, access to capital, and marketing facilitation to strengthen this industry. With support from various parties, stingray skin processing-based businesses have the potential to grow more rapidly and have a broader economic impact.

Business sustainability can also be supported by innovation in the production and marketing processes. Businesses can develop various variants of stingray skin-based products, such as healthy snacks, crackers with multiple flavors, or other processed products with added value. Innovations in packaging can also increase product appeal and expand market reach, including to exported markets. In addition, digital marketing is essential in introducing these products to a broader range of consumers. By utilizing social media, e-commerce, and other digital marketing strategies, businesses can increase their competitiveness and reach a broader market.

Not only does stingray skin processing have an economic impact, but it also adds value to the environment. This business contributes to reducing environmental pollution by utilizing previously unused fishery waste. Fishery waste that is not managed properly can cause environmental problems, such as unpleasant odors and water pollution. Therefore, processing stingray skins into economically valuable products aligns with the circular economy principle, where waste is transformed into a helpful resource.

From a social perspective, this business also has a positive impact on women's empowerment in coastal areas. Many housewives who previously had no steady income can now participate in economic activities through the production and marketing of stingray skin crackers. This increases their economic independence and strengthens their position in the family and community. With increased household income, family welfare can also improve, including in terms of children's education and access to better health services.

In conclusion, stingray skin processing has a significant economic impact on coastal communities. Not only does it provide new business opportunities for housewives and other community groups, but it also contributes to increased income and overall community welfare. With innovations in production and marketing, as well as support from various parties, this industry has the potential to continue to grow. Furthermore, its positive impacts are not only limited to economic aspects, but also include social and environmental aspects, making it one of the sustainable solutions for the economic development of coastal areas.

#### 4. Potential for Online and Offline Product Marketing

One of the aspects discussed in the training was product marketing strategies. With the development of technology and wider internet access, marketing of stingray skin crackers is not only limited to the local market but can also be expanded online. Based on discussions with the coaching participants, most of them showed interest in marketing their products digitally, either through social media platforms or marketplaces.

Online product marketing provides an opportunities for rural people to reach a wider range of consumers, both within and outside the region. Research by Wijaya (2022) states that the use of e-commerce platforms by MSMEs can increase market access and allow local products to compete with large products. Therefore, training on how to market products online is essential to be introduced to village communities so that their products are more easily found by potential consumers.

In addition to online marketing, offline marketing strategies remain relevant and have an important role in introducing products to local consumers. Offline marketing can be done

through participation in culinary exhibitions, MSME bazaars, and cooperation with local shops and supermarkets. According to research from Santoso and Lestari (2021), marketing through direct interaction with consumers can increase customer loyalty and build trust in the product. Therefore, the combination of online and offline marketing is an effective strategy to develop the market for stingray skin crackers.

The advantage of online marketing is its ability to reach a wider market without having to have a physical store. Platforms such as Instagram, Facebook, and marketplaces like Shopee and Tokopedia allow businesses to promote their products at a relatively low cost. With the right digital marketing strategy, such as the use of attractive product photos, informative descriptions, and the utilization of paid advertisements, products can be more easily found by potential buyers. A study by Prasetyo (2023) shows that MSMEs that utilize digital marketing experience an increase in sales of up to 40% compared to those that only rely on traditional marketing.

However, online marketing poses several challenges that need to be considered, such as high competition and the need for a better understanding of technology. Therefore, training on digital marketing should not only cover how to create an account on an e-commerce platform, but also sales optimization strategies such as copywriting techniques, the use of SEO (Search Engine Optimization), and customer management. With comprehensive training, businesses can be better prepared to face competition in the digital world.

On the other hand, offline marketing remains a good option, especially for consumers who are more comfortable shopping in person. Some offline marketing strategies that can be implemented include creating attractive packaging to make it more recognizable in stores, collaborating with local restaurants or food stalls to provide products as additional snacks, and using promotional strategies such as discounts and free samples to attract new customers.

With a combination of online and offline marketing, stingray skin cracker products have a greater chance of being widely recognized and increasing their competitiveness in the market. Support from the government and the MSME community is also an essential factor in the development of this business. According to a report by the Ministry of Cooperatives and SMEs (2022), synergies between business actors, the government, and digital platforms can drive local economic growth and improve the welfare of coastal communities that depend on the fisheries sector.

In conclusion, the marketing strategy for Stingray Skin Crackers should combine online and offline approaches to reach more consumers and increase sales. By leveraging

digital technology and remaining active in conventional promotions, this business has great potential to grow and provide significant economic impact for coastal communities.

### **Challenges in the Development of Stingray Skin Chips Business**

While the potential market for stingray skin chips is quite large, there are several challenges faced in developing this business. One of the main challenges is the limited procurement of raw materials for fresh stingray skin, especially outside the stingray fishing season. In addition, stingray skin processing requires specialized skills in the cutting and frying process, which requires more time and attention to ensure product quality is maintained.

Another challenge is product packaging and distribution. Although packaging in vacuum plastic can extend the product's shelf life, small businesses may encounter obstacles in procuring adequate packaging equipment. Therefore, further assistance is needed to increase production and packaging capacity, so stingray skin cracker products can be more competitive.

### **Suggestions and Recommendations for Further Development**

Based on the discussion and feedback from the training participants, some suggestions for further development of the stingray skin chips business include:

**Improved Processing and Marketing Skills:** Improve training in product processing, especially more effective and efficient frying and packaging techniques. In addition, businesses need to be equipped with digital marketing skills to compete in the digital era. Training on branding, product photography, and business financial management can also be provided so businesses are better prepared to face market competition.

**Product Innovation Development:** Creating new flavors or shapes of stingray skin crackers to make the product more attractive to consumers can be done. Derivative product development, such as shredded stingray skin or other healthy snacks, can also be considered. In addition, exploring the use of natural ingredients to enhance the flavor and attractiveness of the product can be an added value. Innovations in packaging, such as eco-friendly packaging or premium packaging for specific market segments, can also be attractive. Halal certification and distribution permits can also increase consumer confidence.

- **Broader Marketing:** Encourage training on digital marketing to help communities utilize e-commerce platforms and social media to introduce their products to a wider

market. Strategies such as endorsements by local influencers or collaborations with culinary communities can increase the product's appeal to consumers. Product exhibitions and culinary festivals can also be venues to introduce these products to a wider audience.

- Government and Related Institutions Support: Local governments and related institutions can assist in the form of production equipment, business capital, and ongoing training for MSME players. In addition, regulations on product quality and safety standards should be introduced to make these products more competitive. The government can also facilitate market access by introducing these products into national culinary programs or exports abroad.
- Networking and Partnership Enhancement: Establish partnerships with restaurants, eateries, or hotels that could use stingray skin crackers as part of their menu. This can increase the number of repeat customers and expand the product's marketing reach. In addition, establishing partnerships with fisheries cooperatives can help in maintaining the availability of raw materials. Collaboration with academics and research institutions can also help develop more innovative and value-added products.
- Strengthening the Business Community: Build a community for Stingray Skin Cracker entrepreneurs to share experiences, market information, and build a stronger business network. The government or related institutions can facilitate this community in the form of cooperatives or MSME forums. This community can also serve as a platform to share strategies to overcome challenges the business faces.
- Diversify sources of income: Instead of relying solely on selling crackers, businesses can also explore other opportunities, such as training other communities to make chips or selling raw materials of stingray skin to other food industries.
- By applying the right strategies to facing challenges, the stingray skin chips business has a great opportunity to grow and provide wider economic benefits to coastal communities. Support from various parties and continuous innovation will be the key to improving its competitiveness and sustainability.

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form of cooperatives or MSME forums. This community can also serve as a platform to share strategies to overcome business challenges.

- Diversify sources of income: Instead of relying solely on the sale of chips, businesses can explore other opportunities, such as training other communities in making products or selling processed stingray skin raw materials to other food industries.
- The stingray skin chips business has a great opportunity to grow and provide wider economic benefits to coastal communities by deploying the right strategies when facing challenges. Support from various parties and continuous innovation will be the key to improving its competitiveness and sustainability.

## CONCLUSIONS

The market potential for stingray skin chips is promising locally and online. The uniqueness of the product, which is naturally based and highly nutritious (due to collagen content), makes it attractive to consumers who care about health. In addition, community empowerment through Micro, Small, and Medium Enterprises (MSMEs) based on local natural resources can help create new jobs, improve the village economy, and introduce regional specialty products to a broader market.

For further community service activities, it is recommended that other products be innovated, such as producing chips or other preparations from stingray skin or creating other products from different types of fish, following the wishes of the community and in accordance with the wealth of natural resources in each region.

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