



## Community Economic Diversification Strategy in Fish Processing in Bintan Regency

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### Article Info

#### Article history:

Received 11 February 2025

Received in revised form 5

May 2025

Accepted 25 May 2025

#### Keywords:

Cracker House Center

Bintan Regency

UMKM

### Abstract

*This study aims to explore economic diversification strategies that can be applied by local communities in fish processing, with a focus on developing value-added processed products. The methods used in this study include field surveys, interviews with business actors, and secondary data analysis. The results of the study indicate that product diversification, such as fish crackers, smoked fish, and other processed products, can increase community income and create job opportunities. In addition, skills training and increasing access to modern technology are important factors in improving product quality and competitiveness in the market. This study aims to analyze the potential and challenges faced by cracker houses in Bintan Regency. Crackers are one of the processed food products that have high demand in the local and national markets. The methods used in this study are qualitative and quantitative approaches, with data collection through interviews, observations, and document analysis. The results of the study indicate that cracker houses in Bintan Regency have strengths in terms of product quality and entrepreneur experience, but also face weaknesses such as limited capital and ineffective marketing. Opportunities for business development are enormous, especially with government support and increasing market demand. However, threats from tight competition and fluctuations in raw material prices need to be watched out for. Recommendations from this study include the need for collaboration between the government, non-governmental organizations, and business actors to provide training, access to capital, and better marketing.*

## Introduction

Indonesia is one of the largest maritime countries and fish producers. Indonesia has a vast sea area, which is around 5.8 million square kilometers or around 70% of Indonesia's territory. Indonesia's sea area stretches from Sabang to Merauke, and from Weh Island to Rote Island. Indonesia's vast sea area holds enormous fisheries potential. According to data from the Food and Agriculture Organization (FAO), in 2020, Indonesia's fisheries production reached 6.43 million tons (Mochtar et al., 2020; Prodhan et al., 2022; Bhuyan et al., 2022; Maycock et al., 2023). With this amount, Indonesia is the second largest fish producing country in the world after China.

Indonesia's fish production consists of two types, namely capture fisheries and aquaculture. Capture fisheries are fishing activities at sea, while aquaculture is fish farming activities in ponds, pools, or cages (Mustika et al., 2021; Rizal et al., 2022; Budiyanto et al., 2023; Nurlaili & Hikmah, 2022). Bintan Regency is one of the largest fish producing areas in Indonesia. This is because Bintan Regency has a vast water area and is rich in fish resources. The waters of Bintan Regency are included in the deep sea waters of the South China Sea, in the Indonesian Exclusive Economic Zone, the potential for fish resources in the waters and the South China Sea reaches 378.2 tons, with the amount of catch allowed is 302.5 thousand tons.

Based on data from the Bintan Regency Marine and Fisheries Service, Bintan Regency's capture fisheries production in 2021 reached 56,688 tons. The large potential of fish resources and high fisheries production make Bintan Regency one of the largest fish producing areas in Indonesia. This is also a potential for Bintan Regency to develop the fisheries industry, both capture fisheries and aquaculture.

The Bintan Regency Government continues to strive to increase fisheries production in its region. One of the efforts made is by providing assistance with modern fishing gear to fishermen. In addition, the government also provides guidance and counseling to fishermen so that they can apply sustainable fishing techniques (Parrondo et al., 2021; Hutchings, 2022; Cooke et al., 2023; Honarmand Ebrahimi et al., 2021; Hirokawa & Thompson, 2023). Increasing fisheries production in Bintan Regency is expected to improve the welfare of fishing communities and also the economy of Bintan Regency in general. Bintan Regency has 10 sub-districts, 15 urban villages and 36 villages (out of a total of 70 sub-districts, 141 urban villages and 275 villages throughout the Riau Islands). In 2017, the population was 148,658 people with an area of 1,318.21 km<sup>2</sup> and a population density of 113 people/km<sup>2</sup>.

Cracker Village, Bintan Regency is a cracker industry center located in Sei Lekop Village, Bintan Pesisir District, Bintan Regency, Riau Islands. This Cracker Village has become one of the popular culinary tourism destinations in Bintan. This Cracker Village has been established for decades. Initially, the cracker industry in this village was only carried out traditionally by the local community. However, along with the development of the times, the cracker industry in this village began to develop and become more modern. Currently, there are around 50 MSMEs engaged in the cracker industry in the Cracker Village. These MSMEs produce various types of crackers, such as fish crackers, shrimp crackers, onion crackers, butter crackers, and other crackers. The crackers produced by UMKM in Kampung Kerupuk have a distinctive and quality taste. This is because these crackers are made from fresh and high-quality raw materials. In addition, the cracker production process in this village is also carried out hygienically and in accordance with food safety standards.

This Cracker Village has become one of the tourism icons of Bintan Regency. Every day, this Cracker Village is visited by local and foreign tourists. Tourists who visit this Cracker Village can see the cracker production process directly, and buy crackers at affordable prices. Here are some things you can do when visiting Kampung Kerupuk, Bintan Regency: 1) See firsthand the cracker production process. Visitors can see firsthand how crackers are produced, starting from the selection of raw materials, the grinding process, the printing process, the frying process, to the packaging process; 2) Trying various types of crackers. Visitors can try various types of crackers produced in Kampung Kerupuk, such as fish crackers, shrimp crackers, onion crackers, butter crackers, and other crackers; 3) Buy crackers as souvenirs. The crackers produced by UMKM in Kampung Kerupuk have a distinctive taste and quality. Visitors can buy these crackers as souvenirs for family and friends. Kampung Kerupuk Bintan Regency is a culinary tourism destination that you must visit when on holiday in Bintan.

There are several problems faced by Kampung Kerupuk, Bintan Regency, including: 1) Infrastructure issues. The infrastructure in Kampung Kerupuk is still inadequate. Many of the roads in this village are still damaged, making it difficult for tourists and local people to access. In addition, tourism supporting facilities and infrastructure, such as parking lots, toilets, and trash bins are also still inadequate; 2) Marketing problems. MSMEs in Kampung Kerupuk still have difficulty marketing their products. This is because these MSMEs still do not have a wide marketing network. In addition, these MSMEs also still do not have the ability to compete with cracker products from outside the region.

## Methods

A mix of approaches was used in this study to study the economic diversification approaches in the fish processing sector, with a particular focus on the cracker house centers in Bintan Regency. Since both the cultural background and budget performance of the cracker industry are important, the researchers chose to use two different methodologies. The research tried to provide a complete view of the state of the sector by combining information gathered qualitatively with numerical data.

The purpose of the qualitative component of the study was to closely examine how the people involved perceive and wish to see cracker house operations. During the study, data was collected using interviews, joining in on activities and focus group discussions (FGDs). The interviews included important informants which included cracker business owners, employees and local customers, so we could collect information directly. The interviews offered great understanding of the industry's social and financial background.

Participatory observation was undertaken to let the researchers interact with the manufacturing process. It helped me see up close how things were done, what hygiene measures were used and how the work was handled. Scientists involved numerous cracker businesspeople in group discussions to find out what their major challenges were and look for ways to deal with them together. By talking with others, we were able to better confirm and support what we had observed and heard in the interviews, making the results more dependable.

The data used for qualitative analysis were grouped into themes by thematic analysis. It allowed us to understand the qualitative data in a logical way which helped uncover the key socio-economic forces operating in the cracker industry in Bintan Regency.

To add to the qualitative findings, the study also used numbers to assess important key factors in production, sales and profit. Data collection was completed with a set of questionnaires that owners of cracker houses were asked to complete. We asked about kilograms of output, financial performance, the cost of materials and other major business performance factors.

Data related to cracker production was studied numerically to give an overview of the current process. In addition, regression analysis was applied to highlight significant factors affecting a business's income, including raw material prices, different marketing methods and amount of labor being used. Because of this analysis, the company was able to see clearly how different factors inside and outside the company influenced the cracker businesses' finances.

An advanced theoretical structure that blends economic, social, cultural and environmental theories supported the study. From an economic perspective, market activities and inventions were explained with the Supply and Demand Theory and Value-Added Theory, respectively. These two theories suggest that MSMEs are best supported when communities work together and have strong, informal networks. Thanks to Cultural Identity Theory and Cultural Innovation Theory, it was clear that remembering local traditions and tastes greatly influences how products are produced. The last theories, Sustainability and Ecosystem, highlight the environmental results of fish processing and the important relationship between economic activities and the environment.

## Results and Discussion

### Cracker Production in Bintan Regency

The cracker industry in Bintan Regency is a small, local business that fits within the region's social, cultural and environmental system. Almost all such units are in coastal regions, small-scale and look after by women and older men and women in the family. Most of the production

is still traditional, with only little technology used and workers relying on older traditions. The method of production used on Bintan is common among several small-scale food businesses in Indonesia (Monatasya Sirait et al., 2023). The persistence of artisanal crafts highlights two needs: holding to cultural identity and finding ways to work around capital and infrastructural problems (Safas et al., 2024).

It appears from field research that production usually involves working in simple household areas or small sheds near the house. Research on rural MSMEs agrees that setting up businesses in open spaces is both a way to save on expenses and a way around a lack of formal industrial zones (Tariq, 2025). Challenges in electricity, sanitation and cold storage hold back the quality and their expansion opportunities (Russo et al., 2024). Because of their distance from the mainland, the logistical expenses on islands such as Bintan are typically much higher than they are elsewhere

Still, cracker factories work well as small-scale businesses established by families and aided by the cooperation of local people. In coastal economies, it is usual for family-based operations to be used, as family members help out rather than sign formal contracts for labor. In Bintan, local people normally do not get paid for their work which is similar to the study findings in Indonesia's rural creative areas (2017). Even though this structure holds up well, it also points to challenges, mainly in regard to worker rights, productivity and how lasting it can be.

In different areas, families produce between 10 and 15 kilograms of crackers daily, depending on whether it's hot or cold, if fish are abundant and how humid the air is. Unlike fully automated industries, the process of cracker drying on Bintan depends almost entirely on sunlight and open spaces. This shows that the industry responds to climate vagaries, much like other similar industries in Southeast Asia (Brown et al., 2012). Although they decrease energy use and cut carbon emissions, they can create uneven moisture levels that complicate quality and the product's shelf-life.

Fish and sago are mostly harvested locally, so interconnections among local economies are made stronger (Trisia et al., 2025). Yet, weak supply chains are visible during or after the fishing season and when fuel prices rise, affecting fish delivery. Evidence from Bintan reveals a kind of "localized dependency", meaning that cracker makers are closely linked to their environment and the small amount of produce they source from farmers.

The main point is that processor operators in Bintan are running their businesses without holding required safety certifications. Because of this, they have a harder time joining formal financing schemes and trading through organized markets, points made earlier in research on Indonesia informal MSME sector (Saifurrahman & Kassim, 2024). Until they obtain either a PIRT or halal certificate, people can only buy their products within the local area. Besides, a lack of agreed branding and packaging rules makes it harder for products to compete in areas like Bintan that depend on tourism.

Still, the cracker industry demonstrates that there is space for adaptive entrepreneurs. When people reflect on a sushi item, producers may modify their original recipe to suit what those customers are looking for, a process Scott (2009) refers to as "vernacular innovation." These changes are instituted without organized research, thanks to efforts in experimentation and collective recollection which are shared among family members. These forms of innovation are important and useful but are generally not used enough in informing development activities.

Given the prevailing forms in the industry—including traditional ways, disorganized spatial planning, limited return of capital and dominant family input from laborers—the definition of productivity and efficiency needs to be reconsidered for rural MSMEs. Instead of seeing these as weaknesses, development models should work with what is already strong—community life,

group identity and harmonious land use (Silberstein & Maser, 2013). Treating the cracker industry as a cultural and social system, rather than only an economic one, results in better and more inclusive policies.

### **The Value of Societies and Reflections of Traditions**

In Bintan Regency, cracker production does more than provide food; it is also essential to the income of coastal households, mainly women-led families and those who do not have formal work choices. Many coastal communities depend on crackers to get by during seasons with little or no work for fishermen. This idea is similar to Ruel et al. (2010) idea that rural families deal with crises and sustain their expenses by being involved in several economic activities. Instead of simply adjusting to problems, this form of diversification in Bintan is carefully planned, helping households continue earning in their area.

From our study, we found that many people in the field earn 40–70% of their monthly pay by making crackers. Few mothers in Indonesia receive much from mobile entertainment, but this additional income helps them meet the basic expenses of their families. Cracker production is a good example of how labor divisions in rural MSMEs allow women both freedom and influence over their work (Setyonaluri et al., 2021). In addition, women's work is often blended with caring for children and participating in community ceremonies which generally means combining joblike work and caregiving work.

The industry adds to job opportunities by linking upstream and downstream sectors. Demand for fish caught by artisanal fishers, who use un-refrigerated boats, is supported by upstream activities. It supports the local area by ensuring that trading and processing stay within the village, not with urban partners (as explained by Aulia et al., 2024). Crackers are then sold from mobile trucks and stalls in local neighborhoods, encouraging microbusinesses where many older residents or part-timers participate. Kabeer & Mahmud (2004) point out that having economic roles that fit the community helps to support rural life even if the roles themselves don't follow traditional work or business guidelines.

Cracker companies are sustained in large part by the unique aspects of their culture. Often, the recipes and the processes of cooking are passed down only in the female line. A small change in these recipes usually points to distinct clan, area or ethnic groups. This food culture helps produce goods and forms a key part of cultural knowledge (Fonte, 2008). Many producers celebrate the genuine side of crackers by stressing the genuine tasting nature and origins from family recipes. So, crackers become a form of cultural expression and a place where memories are kept, especially in the Malay village of Bintan.

Because of this cultural connection, the product can be different from others, even without formal branding or special packaging. For some items, buyers select specific producers thanks to their reputation which develops through years of promoting their brand in village markets. This idea also agrees with the concept proposed by Granovetter (1985) that trust, mutual support and networks play a larger role in economic exchanges than do detached market rules. At local celebrations, Bintan residents help market each other's products and turn the events into little marketplaces.

Nevertheless, this close link with traditional practices can hinder efforts to extend production or connect with a wider market. Often, these producers don't have the language, self-assurance or expertise in official rules to complete tasks such as licenses or registering on e-commerce websites (Andani et al., 2023). As a consequence, many are still working in the informal economy, even though their products are supported by the community. It fits with evidence from experts that while cultural roots help some families, they can actually restrict growth chances if they do not try to expand their abilities.

Cracker manufacturers help the economy stay stable when times are tough. Cracker production gives fishermen a backup way to earn money during times of temporary fishing bans or lack of fuel, as well as in case of emergencies in a family. According to Otokiti et al. (2022), the economy of poor houses responds to urgent needs by adjusting which is their main strategy for survival. Unlike a typical job where you must stick to certain times and outsiders check what you do, making crackers allows families to manage their own schedule.

It's remarkable that the embedded way production happens has encouraged people to learn and invent on the job. A number of companies tried making mixtures with fish, using plant-based colors or experimenting with drying to help their goods endure and be appealing to customers. Young farmers use adaptation strategies that essentially contain untold experience, always being improved with every attempt and error. The cracker industry, then, displays a form of innovation system that is not only inexpensive, based on practical experience and spread among the community, but diffuse as well.

Even so, we must handle monetizing culture and keeping things informal with caution. Anyone who makes a product but lacks protection from market changes, price control and imitation is placed at high risk. Some persons stated they did not want others to take their recipes or undercut remaining traders when selling at other markets. Because artists do not have reliable legal or market protections, they face many risks—a matter also raised in the study of informal creative industries.

### **Problems Related to Production, Marketing and Helping from Institutions**

Although Bintan Regency's cracker production is built on resilience and community involvement, it still encounters problems that hinder growth, competitiveness and sustaining its business over the long term. They appear in several areas such as quality, new technology, market entry and institutional help, all of which are linked and increase local producers' problems.

The inadequacy of current technology is a major problem for production tasks. In the region, most cracker companies depend on human hands, drying by the sun and ordinary knives to make their products. While these techniques help keep traditions and lower operating costs, they lower the amount and uniformity of what is made. It has been found that failing to use machines in micro-enterprises results in time wastage, changes in products and greater risk to the environment. Here in Bintan, drying is still a major issue because producers must rely on extended sunshine to dry their crops, making their farming very vulnerable to changes in the weather. Because of this, food manufacturing becomes less efficient and meets fewer health and safety standards, so less consumers are interested and the company cannot grow in regulated areas.

It is not enough to make goods; access to money and suitable technical tools is still a major problem. In this study, most cracker producers were found to have a limited knowledge of credit options provided through official banks or wider government credit schemes such as KUR. This lines up with national research that shows that very few MSMEs in remote or island areas can benefit from microfinance or important assistance (according to Bank Indonesia in 2022 and Tambunan's report in 2019). People may still waste credit opportunities if they have low financial knowledge, lack property to use as collateral or fear that they might not be able to pay off their debt. These results match earlier studies showing that not having access to financial services helps maintain informal systems and limits income improvement (Kamran & Uusitalo, 2024).

Marketing continues to be one of the least addressed areas in this sector. Most crackers are sold to customers by producers either in small tables or through people who hawk door to door.

Many small, independent sales are possible, but the sector struggles to grow, set higher prices or attract attention due to this system. With no packaging standards, labeling or certifications (including halal, PIRT or BPOM), Indonesian producers find it hard to join organized markets, including those aimed at tourism, supermarkets and online sellers.

In addition, weak coordination between producers adds to these marketing challenges. Although they depend on the same types of resources and address the same customers, joint efforts are quite low. No producer cooperatives or marketing boards have yet been formed that allow farmers to buy in large groups, use a single brand or work together in launching a product. These issues also show up in larger problems with forming trusting groups in informal economies. Making cooperatives work in the community has proved challenging because of poor guidance, designs made by “sensorimotor manipulation,” and there is not enough ongoing help. Each business faces responsibilities and setbacks it cannot bear alone from innovation and meeting market standards, so it needs other parties to join them.

Efforts to support ecosystem growth by institutions generally come in short bursts and depend on discrete projects. Even though the Department of Industry, Trade and Cooperatives arrange some occasional workshops or give away equipment such support is usually brief and not linked to permanent improvements. Many farmers have complained about training that is either too broad and untargeted or very different from what they need. This includes learning unfamiliar accounting formats, unsuitable rules for the farm and marketing strategies not suitable for them. What Cornwall & Gaventa (2001) call "invited participation" happens when beneficiaries are included in interventions, but they don't have any real power over what happens.

A major problem for institutions often comes from the presence of tough regulations. It can be very difficult for informal producers without education to get business permits, halal certificates or food safety licenses. It is often very hard for businesses to meet the costs and paperwork needed for certification. According to Cunningham et al. (2017), the process of making food micro-enterprises formal in Indonesia is slowed by both regulations and the fact that important services are not always located close to these enterprises. A majority of producers in Bintan are not part of the official economy and do not enjoy incentives, subsidies or other forms of protection.

Gender plays a role in both how and who is affected by these difficulties. Even though women do much of the cracker production, they have fewer roles in business talks and government meetings. As a result, their concerns often go unrecognized in how resources are allocated or training happens. Many studies suggest that unless addressed, taking part in rural industries does not always lead to more power or influence for women. In Bintan, most of the work is done by women, but they seldom join in decisions about expanding, making changes or setting policies.

In addition, people are paying more attention to environmental safety. Cracker ingredients are mostly taken from waters close to shore, where overfishing and changes in the environment threaten the supply in the long run. Most people involved in farming are not knowledgeable about sustainability labels or practices that focus on the environment and both overseas and local government oversight is very light. Like other local food industries in Indonesian archipelagos, the similar problem in this region is that quick economic gains lead businesses to ignore caring for the environment.

### **How to Make Your Business More Diverse**

The fact that traditional microbusinesses in cracker-making thrive in Bintan Regency proves that local industries help diversify livelihoods, protect culture and strengthen the economy.

Even so, the previous sections explain that achieving what is possible here demands attention and methods beyond simple praise for informality—we must develop in a structured and active way. It is not enough for sustainable diversification to increase household incomes; it should also help preserve institutions, the environment and culture. This part provides useful ideas and practical steps for driving such a transformation.

Strengthening producer cooperatives or creating network clusters is the main way to expand production and find new markets. According to research on similar Indonesian MSME clusters, branding together improves negotiating power, helps clusters buy supplies at better prices and increases the possibility of government support. People in Bintan could organize their producer groups by location as well as by the thing they produce or the market they serve. As a result, businesses would benefit from collaborating to develop and improve hygiene, packaging and marketing practices. Still, for cooperatives to work well, they need to come about with trust, a common purpose and ongoing support.

Instead of replacing ways of doing things completely, technology upgrading works best when ideas are adapted to the local environment and culture, raising productivity without harming local traditions. In practice, integrating solar tunnel dryers or economical dehydrators into the process has enabled farmers to maintain their products' quality and minimize effects of weather variations. To ensure these technologies are used correctly, training and support after the introduction are needed to watch for underutilization, a challenge found in many rural technology transfers (Hall & Clark, 2010). If hygiene equipment that meets food standards is introduced, it will not change the cultural importance of the food production process.

Furthermore, making regulatory changes simpler and more local would help arrive at the budget goals as set by the Association. Micro-entrepreneurs often avoid PIRT, halal certification and BPOM because applying for licenses is too expensive, the process is clumsy and it usually takes a long time. Subdistricts can create a unit that provides support to informal vendors with activities such as licensing, labeling and business registration. Tiered certification also holds great promise for informal enterprises since, as proved in Central Java, it offers a way to be officially recognized while keeping government support. These programs would link the gap between formal and informal economic activities without losing the qualities of everyday entrepreneurship.

Increased digital participation can have a big impact on making new markets available. Still, according to empirical studies, digitalization is more than downloading apps—it also needs people, systems and resources. Programs need to cover more than basic ICT lessons and add storytelling methods for branding, marketing through social media and responding to customers using WhatsApp or Tokopedia. Any “digital leap” needs to grow organically and work with how local people live. Numerous initiatives in other regions with low technology access have proven that with instructions and support, traditional community members may sell online while still showing their unique traits.

Cultural sustainability should always be a major priority when diversifying. Many people already know that the cracker industry helps transmit important knowledge from older to younger generations and supports a sense of community. Respecting and using cultural capital is necessary in policies and programs, not simply trying to turn all MSMEs into the same type of business. Government projects could feature the country's food traditions by hosting festivals, telling online stories or creating museum displays. Such projects play a role in protecting culture, encourage people to visit and lead to the development of new economic opportunities for residents.

Sustainability also expects people to focus on environmental aspects. Crackers should be made with fish that have been caught properly, especially if fishing from decreasing fish populations. Cooperatives and NGOs might participate in developing fishery sustainability charters that include traditional fishing practices and the essential principles of conservation science. It's also important for cracker producers to consider zero-waste by feeding fish offcuts to animals, recycling them as compost and finding biodegradable packaging.

Involving women meaningfully in all policy processes, management and innovations is important for achieving equal growth. Since women are most involved in cracker production, their views need to be included in the planning and evaluation, too. Through special training, safe public environments and including care work in economic plans, development programs should increase the leadership of women. As a result, this would strengthen the structures that support both hard work and a thriving community.

## Conclusion

Based on the results of research and discussion that have been conducted on the cracker house center in Bintan Regency, it can be concluded that this sector has significant potential to develop and contribute to the local economy. Although the quality of cracker products is generally good and meets food safety standards, the main obstacles lie in limited capital, ineffective marketing strategies, and disparities in skills among business actors. The high market demand for cracker products, both in the local market and the wider market potential, shows great opportunities for growth if these obstacles can be overcome. The success of developing the cracker house center in Bintan Regency depends on the synergy between improving product quality, comprehensive marketing strategies, accessibility of capital, increasing human resource capacity, and utilizing existing market opportunities.

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