RETURN
Study Of Management,
Economic and Business

Analysis Of Potential Development of Fishery By-Product Processing Industry in Lingga Regency, Riau Islands Province

Wisman Indra Angkasa[1*], Ida Royanti[2], Renny Primasari Gustia Putri[3], Citra Kusumaning Dyah[4], Dewi Nandyawati[5]
National Research and Innovation Agency, Jl. MH. Thamrin 8 Jakarta[1,2,3,4,5]
Wism001@brin.go.id[1]

PAPER INFO	ABSTRACT
	Background: Lingga Regency has a great potential for marine fishery products that about 96 % of its area is marine waters. However, it has not provided too much income for the region since this great potential has not been fully exploited. At least 1,728 tons of export quality of live and dead fish are sent to Singapore in a year. Unfortunately, the revenue of overall exported fish is received by Batam and Tanjung Pinang city, because it becomes the export access of Lingga fish products. One of the programs is the development of the Fishery Processing Industry to increase the added value of marine by-products by involving community participation **Aim:** The purpose of the study was to determine the potential for the development of a fishery by-product processing industry **Method:** Data collection techniques were observation, in-depth interviews and document review. The data analysis consists of the type and capacity of the industry, production time assumptions and utility. **Findings:** The results showed that Lingga Regency has the potential to develop a fishery by-product industry, especially a fish flour industry with a capacity of 1 ton per day, with a production time of 5.6 days in a week and 51 weeks in a year. The raw materials used for the industry was a waste from fish fillet and minced fish processing industry with both of yield were 35 %. The initial production capacity of this industry was set at 66% and will increase annually with a maximum used capacity of 89%.
KEYWORDS	

INTRODUCTION

The Lingga Regency area is known for its marine fishery potential. It can be seen that the marine fisheries sector is the mainstay sector in Lingga Regency. The cause of this condition is that the area of Lingga Regency is a sea with an area of 96 percent of the total area. In addition, the fisheries sector, indeed even globally is a sector that makes an important contribution to food security (Warren and Steenbergen 2021) as an example in China (Li and Liu 2022). It's just that the weakness of Lingga Regency is that there are no maximum results so that it can help support regional income. Moreover, this potential has not been maximally utilized even since its establishment in Lingga Regency in the Riau Islands Province. However, the volume of marine fisheries production in the last five years has increased. This is because in a year at least 1,728 tons of fish with export quality can be sent to Singapore. Meanwhile, exports are undeniably important for economic growth (Fujii-Gambero and García-Ramos 2015).

Overall, the world market is targeting various types of reef fish, shrimp and crabs. With this, the volume of production and also the value of fishery production in Lingga Regency is from 2010 to 2018. With the increase in fishery production in Lingga Regency, it cannot be separated from the business of the local government of Lingga Regency. Especially, in an effort to improve the facilities and infrastructure of the fisheries sector. Fishery production is actually an economical and innovative strategy to promote food security and diversity of foods

(Shava and Gunhidzirai 2017) which are the most traded and globally important for human nutrition (Gephart et al. 2017) . However, for Lingga Regency, it turns out that the result of the entire export of fish is only income from Batam City. This is because Batam City is the exit gate for export of fish products from Lingga Regency. Meanwhile, Lingga Regency itself does not get any results from the export activities of the fishery sector.

In addition to this export problem, there are several other things that are a problem in the marine fisheries sector in Lingga Regency such as the not yet optimal production of marine aquaculture, low fish processing results, low capacity of fishermen groups, majority of fishermen still live below the poverty line. , and management of low marine resource potential. Moreover, globally, fish conservation is indeed difficult due to the lack of adequate conservation systems as well as climatic and environmental conditions that can support rapid degradation (Adjou et al. 2017). One of the things being done to overcome this problem is to develop a sustainable marine fishery product processing industry to increase added value and also the competitiveness of marine fishery products which can have an impact on increasing the income and welfare of fishing communities in the Lingga Regency area (Amanah and Farmayanti 2014).

The existence and also the development of a fishery product processing industry which has a positive impact on the surrounding area because it opens up job opportunities and increases people's income. Thus, the existence of fish processing business of frozen fish, fish fillets, mashed meat, fish meal can greatly encourage economic development in Lingga Regency. On the other hand, another impact of the existence of a fish processing business is the guarantee of price stability and market access so as to provide income certainty for fishermen. Therefore, this research discusses the by-products that can be produced from the development of the fishing industry in Lingga District.

METHOD

The method used in this research is descriptive qualitative. Data was collected from a literature review that came from scientific journals, articles and previous books related to the potential for fisheries development in Lingga District, especially those related to fishmeal. Then these data are described to describe the findings or results in the discussion.

RESULTS AND DISCUSSION
A. Regional Conditions of Lingga Regency

Lingga Regency was known several centuries ago as the Lingga Malay Kingdom and also earned the nickname as the mother country of the Malay land (Subanu 2021). Meanwhile, from 1722 to 1911, there were two Malay kingdoms that were in power and also fully sovereign, namely the Riau Lingga Kingdom which became the center of the kingdom and the Riau Malay Kingdom on Bintan Island. Before the Treaty of London was signed, these two Malay kingdoms were merged into one so that this kingdom was considered to be getting stronger. Meanwhile, his territory is not only limited to the Riau Archipelago, but also covers the Johor and Malacca areas or Malaysia, Singapore, and a small part of the area in Indragiri Hilir.

The center of the kingdom is located on Penyengat Island and is known throughout the archipelago and also the Malacca Peninsula region. After the Sultan of Riau died in 1911, the Dutch East Indies government then placed its emirs as Districh Thoarden for large areas and Onder Districh Thoarden for slightly smaller areas. Meanwhile, the Dutch East Indies government finally united the Riau Lingga and Indragiri regions to serve as a residency, namely Afdelling Tanjungpinang which included the Riau-Lingga, Indragiri Hilir, and Kateman Islands whose positions were in the Tanjungpinang region and appointed a Resident as ruler. Then, based on the Decree from the delegation of the

Republic of Indonesia, Central Sumatra Province on May 18, 1950 joined Indonesia and the Riau Archipelago which was given the status of a Level II Autonomous region headed by the Regent as the head of the region in charge of four kawedanan areas.

One of the aspects of regional conditions that is most clearly considered as a space and subject of development is geography and demography. This geographical aspect provides an overview of the characteristics of the location and region, as well as the potential for regional development (Reibel 2007). Meanwhile, for an overview of demographic conditions, including changes in population, composition, and also the population as a whole or in groups within a certain period of time. Meanwhile, the administrative boundaries to the north are Batam City and the South China Sea, the Bangka Sea and the Berhala Strait to the south, the Indragiri Hilir Sea to the west, and the South China Sea to the east. In the development potential of the Lingga district as stated in the Lingga Regency Spatial Pattern Plan, the spatial pattern plan in Lingga Regency consists of the western spatial pattern plan and the sea spatial pattern.

B. Potential Development of Fish Processing Industry

It is widely known that the development of the fish processing industry in Lingga Regency is one of the potential sectors of economic development (Widiyarini et al. 2022). In the beginning, the development of the fishery industry was started with a fishery industry based on sea fish and it is very possible that it is also followed by the development of a fishery industry based on cultivated fish. Thus, it is very possible to develop a fish processing business in Lingga Regency which is carried out in stages on an industrial scale. Meanwhile, the fishing industry was developed in Lingga Regency using the concept of a growing industry.

Based on supply chain analysis of available raw materials and business feasibility, the types of industries built are cold storage and frozen fish or frozen food industries with a total capacity of around 30 tons per day. In addition, there is also a fish fillet processing industry where the capacity is 1 ton per day. On the other hand, there is also an industry for processing minced meat or minced fish with a capacity of 1 ton per day and an industry for processing fish meal or fish meal with a production capacity of 1 ton per day. Meanwhile, the pattern of business that is developing for the fishing industry in Lingga is an independent business pattern and a partner business pattern.

There needs to be a development priority in one of the industrial areas. This is done by looking at the feasibility of the location and environmental carrying capacity of the planned industrial areas. The areas selected for the fishing industry in Lingga Regency are Tanjung Sebayur, Marok Tua, West Singkep District. Meanwhile, sources of raw materials used for the fish processing industry come from capture or marine fisheries originating from various areas in Lingga such as Panuba Village, Senayang Village, Batu Belobang, and Tanjung Baik Village. There are 52 types of fish that can be caught in the records. Meanwhile, there are 116 catch fish containers in Lingga Regency, with the largest number being 8 in Mamut Village.

Fish meal is included in the results of fish processing. It is a source of defatted protein (Huber and Slade 1967). This is because the sale of marine fishery product processing industry products in the form of frozen fish and processed fish can be done alone or by intermediaries, both to local and export markets. Sales at the local market scale are carried out through intermediaries to fish processing units that already have export licenses. Before this export is carried out, all fish enter the quarantine process for the sorting process. Meanwhile, the development of the fishing industry in Lingga District requires large investment costs and also capital costs at the beginning of the year which are not small. On the other hand, risks that may occur in the fishery industry business that will be developed

in Lingga Regency are identified in several aspects, namely operational aspects that help reduce the risk of production volume and processed fish quality. Coupled with the risk of inefficient fish processing technology, the risk of limited number and reach of the fleet or means to distribute processed fish products, as well as the risk of failure in the development or diversification of processed fish products and new market shares.

With regard to facilities, seen from a marketing aspect such as for example the risk of changes or price competition for processed fish products, the risk of changes in consumer preferences, the risk of decreasing service quality, the risk of ineffective marketing, decreasing market share, dependence on certain consumers or traditional markets, and risks market allocation error. Meanwhile, from the aspect of human resources, such as the risk of incompetence and inproductivity, the risk of inability to build a solid fishing industry team and inconsistent work. Coupled with other risks that have not been identified. Meanwhile, to support the fishery product industry in Lingga Regency, it is necessary to build utilities or facilities and infrastructure that can support the fish processing industry. For example, the ice-making industry, fish meal processing, and so on. Thus, it can be seen that the acceleration in the construction of fish landings can assist in developing fish farming as an alternative raw material.

Including fish meal, the fishery processing industry is growing quite rapidly. It is undeniable that this growth was driven by increasing demand for processed fish products. In addition, along with the increase in population from year to year, the demand for processed fish products is increasing which is also triggered by the strengthening of public awareness for a healthier lifestyle. In this way, it can be seen that people are increasingly aware that fish is a food that contains many nutrients, one of which is omega-3 which can lower cholesterol. In addition, the factor driving the increasing demand for processed fish products is because the price of fish is relatively cheap when compared to the price of beef, chicken and mutton. Also by starting to shift consumer tastes from red meat or red meat to white meat or white meat (fish).

C. Fisheries Processing: Production of Fish Meal

Fish meal is one of the by-products which can actually be part of the handling of solid fish waste from its body parts which contain protein. This is an effort so that the waste resulting from fishery processing does not cause pollution, such as a strong odor. This fish meal can be used later for fish cracker ingredients and also animal feed. This is because the main source of fish feed protein in general still relies on the use of fish meal (Setyono et al. 2020). Meanwhile, the facilities needed are such as machines such as fish grinding or crushing machines to grind wet fish and dried fish pulp, fish cutting or chopping machines used to chop bones and tails as well as large body parts of fish, and fish mixer machines. wet fish which is used to grind wet fish from fish that are still good to be used as high quality flour (Khotimah and Haryanto 2017). Then, the results of this mill will be steamed and dried in the sun to be ground using a flour milling machine which can later be used as an ingredient for making fish crackers.

The result of grinding fish meal depends on the raw material for the fish to be ground. If the fish used is of good quality, the fish will be nice and white, while if the material is fish waste, the result will be brown. The properties of good fish meal are that the grains are uniform, free of bone residue, fish eyes and foreign matter, a clean smooth color, and a fishy fish odor. High quality fishmeal contains 6-10% water, 5-12% fat, 60-75% protein and 10-20% ash. Meanwhile, those with low quality will be brown in color and there will be lots of bones so they will end up being used as animal feed and plant fertilizer.

For Lingga District itself, there is the ability to produce fishmeal with a capacity of 1 ton per day, with a production time of 5-6 days a week and also 51 weeks a year. This production capacity can be defined as the volume or number of products that can be produced by production facilities or companies in a certain period using available resources (Bachtiar 2018). How to calculate it according to Subchan (Subchan 2014) is by:

Meanwhile, the raw materials used for this industry are waste from fish fillets and the ground fish processing industry with a yield of 35% each. The industry's initial production capacity is set at 66% and will increase every year with a maximum used capacity of 89%.

CONCLUSION

Based on the description of the research above, it can be concluded that Lingga Regency has great potential in processing marine fishery products. It can even produce by-products. One of them is fish meal, which can be made from good fish and fish waste. This fish meal itself can later be used as fish crackers and animal feed. Meanwhile, the production of this fish can reach a capacity of 1 ton per day with a production time of approximately 5 to 6 days with raw materials which can be fish fillet waste and ground fish processing industries with a yield of 35% each where the initial production determination is 66 % which will be increased annually with a maximum capacity of up to 89%.

REFERENCES

Adjou, Euloge S., René G. Dègnon, Edwige Dahouenon-Ahoussi, Mohamed M. Soumanou, and Dominique C. K. Sohounhloue. 2017. "Improvement of Fermented Fish Flour Quality Using Essential Oil Extracted from Fresh Leaves of Pimenta Racemosa (Mill.) JW Moore." *Natural Products and Bioprospecting* 7(4):299–305.Google Scholar

Amanah, Siti, and Narni Farmayanti. 2014. *Pemberdayaan Sosial Petani-Nelayan, Keunikan Agroekosistem, Dan Daya Saing*. Yayasan Pustaka Obor Indonesia. Google Scholar

Bachtiar, Afifi. 2018. "Perencanaan Kapasitas Produksi Dengan Pendekatan Biaya Marjinal Pada Pabrik Tahu Â€ ŒSBRâ€ Bengkulu." *Creative Research Management Journal* 1(1):21–32. Google Scholar

Fujii-Gambero, Gerardo, and Manuel García-Ramos. 2015. "Revisiting the Quality of Exports." *Journal of Economic Structures* 4(1):1–17. Google Scholar

Gephart, Jessica A., Lisa Deutsch, Michael L. Pace, Max Troell, and David A. Seekell. 2017. "Shocks to Fish Production: Identification, Trends, and Consequences." *Global Environmental Change* 42:24–32. Google Scholar

Huber, J. T., and L. M. Slade. 1967. "Fish Flour as a Protein Source in Calf Milk Replacers." *Journal of Dairy Science* 50(8):1296–1300. Google Scholar

Khotimah, Bain Khusnul, and Bangun Sentosa Dwi Haryanto. 2017. "Pemberdayaan Masyarakat Melalui Pembuatan Tepung Ikan Dari Limbah Ikan Di Kepulauan Talango Sumenep Madura." *Jurnal Ilmiah Pangabdhi* 3(1):20–29. Google Scholar

Li, Bo, and Zun Liu. 2022. "Measurement and Evolution of High-Quality Development Level of Marine Fishery in China." *Chinese Geographical Science* 32(2):251–67. Google Scholar

Reibel, Michael. 2007. "Geographic Information Systems and Spatial Data Processing in Demography: A Review." *Population Research and Policy Review* 26(5):601–18. Google Scholar

Setyono, Bagus Dwi Hari, Andre Rachmat Scabra, Muhammad Marzuki, and Sudirman Sudirman. 2020. "Efektifitas Tepung Ikan Lokal Dalam Penyusunan Ransum Pakan Ikan Nila Oreochromis Niloticus." *Jurnal Perikanan Unram* 10(2):183–94. Google Scholar

Shava, Elvin, and Constance Gunhidzirai. 2017. "Fish Farming as an Innovative Strategy for Promoting Food Security in Drought Risk Regions of Zimbabwe." *Jàmbá: Journal of*

Disaster Risk Studies 9(1):1–10. Google Scholar

Subanu, Romy. 2021. "Formulasi Kebijakan Pemindahan Lokasi Dinas Kelautan Dan Perikanan Kabupaten Lingga Ke Kecamatan Senayang." Google Scholar

Subchan, Muchammad. 2014. "Analisis Kapasitas Produksi Dalam Mengantisipasi Kenaikan Jumlah Permintaan Pembuatan Kerangka Baja Di Pt. Ometraco Arya Samanta Dengan Metode Rought Cut Capacity Planning (RCCP)." *Jurnal Teknik Mesin* 3(02). Google Scholar

Warren, Carol, and Dirk J. Steenbergen. 2021. "Fisheries Decline, Local Livelihoods and Conflicted Governance: An Indonesian Case." *Ocean & Coastal Management* 202:105498. Google Scholar

Widiyarini, Widiyarini, Achmad Rodoni, Darwati Susilastuti, and Dona Fitria. 2022. "Determinants of Fishery Sub Sectors Performance in Riau Island Province." in *Proceedings of the First Multidiscipline International Conference, MIC 2021, October 30 2021, Jakarta, Indonesia*. Google Scholar