

DIVERSIFICATION STRATEGIES OF INDONESIAN SEAWEED COMMODITIES TO STRENGTHEN MARKETS, COMPETITIVENESS, AND ECONOMIC RESILIENCE OF COASTAL COMMUNITIES

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ABSTRACT

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Background: This paper aims to study the potential, opportunities, problems, and strategies for diversifying seaweed commodities to strengthen markets, competitiveness, and economic resilience of coastal communities. Seaweed is an aquaculture product that can improve the people's economic welfare, employ many laborers, and even increase the country's foreign exchange.

Aim: The potential for seaweed distribution in Indonesia is wide open for those naturally grown and cultivated in the sea.

Method: There are good opportunities for the seaweed industry related to the potential for cultivation land, availability of raw materials, and demands for processed products. However, there are problems and challenges to the nation's ability to export and compete for world market share to meet the world's seaweed needs.

Findings: They include low quality and continuity of raw materials, provided capital, weak human and institutional resources, and seaweed products marketing strategies. There must be appropriate strategies for the diversification of Indonesian seaweed commodities for market strengthening, competitiveness, and economic resilience of coastal communities

KEYWORDS

Seaweed, diversification, economic resilience, coastal communities

INTRODUCTION

Seaweed is a commodity for Indonesian economic growth. Its use has a long history, as does the cultivation of certain groups of species, and is relatively small (Buschmann, et al., 2017). It is an autotrophic organism that can produce many advantageous compounds demanded a long time ago. It has also become a source of nutrition in many countries in Asia, Europe, America, and Australia (Garcia-Poza, et al., 2020). Seaweed cultivation in Indonesia is carried out in most parts of the archipelago by small farmers (Rimmer, et al., 2021). This is because the seaweed commodity has a high economic value. It is one of the non-oil and gas export commodities, a source of income for most coastal communities, and land for employment in cultivation and industrial sectors. Commercial seaweed cultivation has undergone drastic changes to keep up with the increasing demands in quantity and quality (Sugumaran, et al., 2022). More than one million people living in coastal regions in Indonesia strongly rely on seaweed cultivation that contributes to the rapid growth of the seaweed industry. Indonesian seaweed has always been a mainstay for non-oil and gas export activities and contributes to Indonesian export values. In 2020, seaweed contributed USD 279 million or equivalent to Rp. 4 trillion. The figures released by the Ministry of Maritime Affairs and Fisheries (KKP) confirm the position of seaweed in the ranks of the national leading export

commodities. As a result, seaweed has been a source of livelihood for coastal communities throughout the islands in Indonesia.

However, the price of this seaweed is very volatile. It makes it difficult for small farmers to obtain sustainable income. Their income distribution can cause massive transformations in the human resources structure and impact economic outputs (Bilan, Mishchuk, Samoliuk, & Yurchyk, 2020). This unsustainable income may reduce the production process and affect the government's plan to increase the production rate five times higher. Until now, seaweed products still experience up and down in the production process. Many farmers have suffered significant losses due to attacks of pests and diseases which still cannot be handled properly. The harming pests include copepods, amphipods, and certain fish (Ward, et al., 2019). There is no growth in the processing industry, especially on the downstream side. Most of the business units in Indonesia only process *Eucheuma cottonii* into semi-refined carrageenan, and only a few turn it into carrageenan.

There have been 23 Indonesian companies engaged in the *Eucheuma cottonii* seaweed processing (ATC, SRC, and RC) until 2017. The seaweed is a promising protein source for the future if its protein content is optimized through the cultivation process within high nutrient concentrations (Stedt, et al., 2022). Seaweed cultivation has become an alternative or complementary to terrestrial biomass production (Hasselstrom, Visch, Grondahl, Nylund, & Pavia, 2018). World seaweed production mainly occurs in Asian countries (around 23.3 million tonnes) in 2018. Meanwhile, 5300 tonnes of seaweed are cultivated in Europe in 2018. This represents less than 0.02% of the total volume produced globally, valued at US\$ 9.6 million (Stevant & Rebours, 2021). This means that ocean aquaculture is needed to meet the demands for food, materials, and energy for a growing global population (Solvang, Bale, Broch, Handa, & Alver, 2021). Likewise, the Indonesian seaweed industry has spread across 17 regencies/cities in 10 provinces, namely Bangka Belitung, Banten, West Java, Central Java, East Java, NTB, NTT, South Sulawesi, Gorontalo, and North Maluku, with a total of installed capacity of 25,992 tons with annual raw material needs of 102,835 tons. For the seaweed industry, *Gracilaria* sp (agar) is processed by 14 companies spread over eight districts/cities in 4 provinces, namely North Sumatra, Banten, West Java, and East Java, with an installed capacity of 7,658 tons and annual raw material needs of 66,911 tons. The total production of seaweed in Indonesia has reached 11.3 million tons, or 38% of the world production of 29.4 million tons (Busthanul, et al., 2020).

There must be brand new strategies in developing Indonesian seaweed products to be more competitive. The harvested seaweed can decompose quickly, so it must be processed as fast as possible (Emblemsvag, et al., 2020). All of the factors mentioned above should be implemented concerning a holistic work plan through the development of seaweed commodities by strengthening product diversification. Using a proper diversification strategy, there will be more added values, business sustainability, and market strengthening for improving the economic life of coastal communities. Therefore, this paper aims to examine the potential, opportunities, problems, and strategies for diversifying Indonesian seaweed products for market strengthening, competitiveness, and economic resilience of coastal communities.

METHOD

This research uses a desk study approach and is conducted in 2022. The desk method is an effort to study relevant information, data, and reports to the research objectives. This method aims to collect and review data or initial and further information related to the research topics. It also aims to get clarity to develop a theoretical basis for enriching the conceptual framework and methodological design as well as references during the preparation of the final study report.

The data analysis method is descriptive qualitative, and quantitative methods. Descriptive studies function to ascertain and describe the characteristics of the variables of a situation. The purpose of descriptive research is to describe relevant aspects of the phenomena of an individual or organization (Sekaran, 2000). Hasan (2002) explained that to use descriptive methods appropriately, researcher must have a repressive nature, always seek instead of test, and have an integrative power towards various kinds of information he receives into a unified interpretation.

RESULTS AND DISCUSSION

Potential and Opportunities for Seaweed Industrial Development

Talking about opportunities for the seaweed trade market, Indonesia has a great power in supplying seaweed raw material needs for the world. Seaweed can have more economic value after receiving further treatments. In general, post-harvest handling of seaweed by small farmers only comes to the drying stage. Dried seaweed can produce gelatin, carrageenan, or algin, depending on the seaweed's contents. The factories mostly carry out these processes. Meanwhile, product diversification aims to increase added value for the economic strengthening of coastal communities as seaweed cultivators. Therefore, seaweed processing should also be in farming communities and women (Anggadireja, 2007).

Seaweed is a potential commodity and a mainstay for empowering women in business development as an alternative livelihood to increase family income. This happens because seaweed has become a popular food for humans, either through simple processing (directly consumed in raw condition) or through more complex steps to become semi-finished goods and further processed by downstream industries into finished goods such as pharmaceutical, cosmetics, food, and others (Suhendar, 2006).

Seaweed from red algae is more popular among farmers than those from green and brown algae. The new brown algae (*Sargassum*) have attracted more attention from research subjects. Meanwhile, the cultivation business has not yet been developed. Brown algae produce alginate. Meanwhile, red seaweed, especially the *Eucheuma* type, produces polysaccharides like Agar and Carrageenan. These two polysaccharides are common materials in many industrial fields. That is why they have a high economic value. The world market demand for these two polysaccharides has increased every year. In general, the three secondary metabolites of the three types of seaweed above have the same functions in the industrial world. They work as thickeners, suspenders, stabilizers, and emulsifiers. In this regard, the product diversification actors must deploy their maximum efforts so that seaweed gets added value as a processing result. The complex empowerment system is closely related to the success of processing seaweed into semi-finished or finished goods. To better utilize and develop the Indonesian seaweed industry to be an integrated and reliable business from upstream to downstream, all elements related to the Indonesian seaweed sectors (government and private sectors as well as cultivators) must cooperate and integrate through the implementation of the seaweed cluster strategy. There must be good collaborations with the same understanding of development, including with the regional stakeholders. Other related agencies should provide optimal facilities to develop seaweed as a superior product in each region. The seaweed cluster means synergizing several supporting components of the seaweed processing industry. The success rate depends on some key factors, such as the creation of partnerships, research innovation, human resources, and cluster locations.

Problems and Challenges of Indonesian Seaweed Product Diversification

Currently, the seeds used and developed by the local communities are still obtained directly from vegetative development. They usually set aside the thallus from their cultivation. They have low skills for selecting good thallus for seedlings. Most of them also

still have limited knowledge, so the yields are often not optimal. The limited number of nursery centers to support seaweed cultivation development areas also makes it difficult for cultivators to obtain quality seeds.

The low mastery of technology related to seeding, cultivation, harvesting, and drying of seaweed is also a crucial problem in increasing seaweed productivity. The existing human resources still have a relatively low level of education, knowledge, and skills related to the development of aquaculture technology. This is due to the low acceptance of access to capital, information, technology, and marketing of fishery products. These issues greatly influence the low scale of business development which in turn results in low job opportunities.

Post-harvest handling plays a very important role in the seaweed industry. This stage determines the quality of the seaweed as raw material for processing. This activity must be carried out carefully, starting from the way of harvesting, washing, drying, packaging, and storage. Harvested seaweed must be 45 days old. The washing stage must produce a specific level of cleanliness that meets the requirements such as salt and dirt levels below 5%. The drying process must achieve a low enough moisture content so that the seaweed is suitable for sale to manufacturers or exporters. Dried seaweed sold by cultivators has a maximum water content of 35% for *Euchema* (Director General of Aquaculture, 2009) and is under Indonesian National Standard 01-2690-1992 (Ministry of Agriculture, 2013).

However, the problem is that many of them are found in Parigi Moutong Regency. The harvest age is too young and the post-harvest management is not very well. The farmers often take the seaweed less than the recommended harvest time of 45 days. This causes the carrageenan content to be low. They also do not dry the seaweed in a good drying area. There are still many seaweed farmers who dry their seaweed on the sand using only nets/tarpaulins without parachutes. This causes a lot of dirt to get stuck in the seaweed. They also do not apply seaweed drying to the specified water content. Often the water content of seaweed purchased directly from the farmers can reach above 40% so the salt content can be more than 5%. This condition will damage the seaweed during the storage and distribution process. To improve the quality, exporters or manufacturers often have to re-dry and clean the rest of the salt. This of course requires additional costs and results in heavy shrinkage due to re-drying and re-cleaning steps.

Indonesian Seaweed Commodity Diversification Strategy for Market Strengthening, Competitiveness, and Economic Resilience of Coastal Communities. The sustainability of the seaweed industry is influenced by quality assurance and production continuity (production system), market (network), business capital, and guarantee for doing business (regulation) (Anggadiredja, 2007). Meanwhile, the development strategies, according to Keppel (2008), can be pursued through mapping and structuring cultivation areas, developing business systems within the area, strengthening institutions, and empowering cultivators. Pandelaki (2012) explained that the development of the seaweed cultivation industry must also be followed by the development of the processing industry because it is where the added value of seaweed lies mostly.

1. Increasing Productivity and Quality of Seaweed

There are some activities to increase the productivity and quality of seaweed. They include providing more accessible and resistant seaweed seeds to disease through the provision of seed gardens in production centers. It is also important to provide an understanding to the local farmers regarding the quality of seaweed produced from pre-production to post-harvest stages, such as planting age, spacing, RL water content, and planting calendar, through advocacy and intensive supervision. Meanwhile, there must

also be the provision of seaweed storage warehouses for individuals/ groups or cultivators and the establishment of seaweed logistics institutions.

Subsidies for production inputs such as drying racks are also important things to do to increase the productivity and quality of seaweed. Moreover, the government must optimize its role in advocating partnerships between cultivators and traders. The strategic roles of local governments in formulating strategic regulations are the preparation of a master plan and regional spatial planning such as RT and RW supported by the carrying capacity of the environment. Also, to increase seaweed productivity and quality, there must be an optimization of the local governments in determining seaweed cultivation zoning according to the ecosystem and cultivation methods. The next important thing is to facilitate investment for external investors.

2. Development of The Semi-Finished Seaweed Processing Industry (ATC, SRC, And RC) in Stages In Seaweed Production Centers

The government strengthens partnerships between the processing industry and cultivators in production centers to ensure the continuity of raw materials and improve production efficiency. On the other hand, the government is gradually limiting the export quota of raw/dried seaweed (raw material) by shifting part of the export market share to domestic (ATC, SRC, and RC processing industries). It is optimizing the assistance of seaweed processing plants from the Ministry of Industry and developing new seaweed processing industries in industrialized locations through a synergy program between the Ministry of Industry and the Ministry of Ocean and Fisheries.

The government is also collaborating with foreign investors to transfer technology for the seaweed processing industry through the Training of Trainers (TOT) to realize an industry with international standards. Meanwhile, there are simpler regulations and easier licensing facilities to encourage the growth of the seaweed processing industry in production centers. Thus, the government encourages the private sector to invest by opening ATC, SRC, and RC seaweed processing units in seaweed production centers through promotion and consolidation between the government, investors, and other key players. Besides, the government facilitates a marketing network between the processing and manufacturing industries (pharmaceutical, cosmetic, food grade, etc.).

3. Development of a business scale for processing seaweed ready for consumption from micro to an industrial scale

To develop a business scale for processing seaweed ready for consumption from micro to an industrial scale, there must be strengthening capital through a credit guarantee scheme in collaboration with the banking sector and the Ministry of Cooperatives and SMEs. They should also facilitate the processing of business actors in business financial management through financial management training. On the other hand, it is also important to assist processing business actors in making attractive product packaging and branding to improve knowledge and competitiveness. Meanwhile, there should also be regular socialization and assistance in the context of making P-IRT, halal certification, and HACCP in the seaweed processing business. It is also important to support business actors in marketing processed seaweed products through exhibition events, business and partner meetings, as well as promotion of processed seaweed products, and the establishment of marketing networks.

CONCLUSION

Indonesia has a very big opportunity to diversify seaweed commodities to strengthen markets, competitiveness, and economic resilience of coastal communities for the development of the seaweed industry. It can be seen from the potential for land area, production and productivity of seaweed, and the potential for increasingly positive demand. The support of Indonesia's potential can make it a major producer of seaweed in the world. Appropriate programs can also make seaweed a source of foreign exchange. On the other hand, there are still various problems and challenges faced by the seaweed industry, especially related to the quality and continuity of raw materials in the upstream and downstream sectors. Indonesian farmers still have relatively low ability to export and compete in the struggle for world market share to meet the world's seaweed needs. There is also low added value in the form of processed products ready for consumption. Meanwhile, the development of the seaweed cultivation industry must also be followed by the development of the processing industry, because it is where the added value of seaweed is mostly located. There are some strategies for the development of the seaweed processing industry, such as; 1) increasing productivity and quality of seaweed, 2) developing of semi-finished seaweed processing industry (ATC, SRC, and RC) gradually in seaweed production centers, and 3) development of ready-to-eat seaweed processing business from micro to an industrial scale.

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