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RESEARCH ARTICLE

OPPORTUNITIES OF SEAFOOD PROCESSING DEVELOPMENT IN SOUTHEAST MALUKU DISTRICT

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ABSTRACT

Seafood is an excellence of sea commodities, it content a great compound of protein, minerals and unsaturated fatty acids, that carachterize by the very high biological value so it is good for health. This excellence can be used to diversify the variety of processed products both for food and non-food products such as cosmetics and pharmaceuticals. Optimizing the marine products utilization as a raw material of various healthy products can impact on the increase of income and living standards of the fishermen and communities along the of sore. The aim of this study was to inventory the potency of marine products in Southeast Maluku district in order to know the opportunity of seafood processed development. Research method used in this research was descriptive or exploratory, by survey approaches, field observation and Focus Group Discussion (FGD). Southeast Maluku have an ecological dynamics, so it enabled to arise a wide variety of ecosystems with a distingtive diversity and character, however, there were no the balance of fishing, aquaculture production compared to processed product. It was not any attention of the government to the fishing and farmers communities in mentoring them on how to manufacture the processed product from the catches or aquaculture. While the potency of the seafood commodities in Southeast Maluku district is abundant both the types and the numbers (fish and non-fish including endemic species), in fact, the processing aspect of the product is still very low. The total of fiheries production in Southeast Maluku District recorded in 2011 were 82,233.00 tons consist of catch fisheries and aquaculture production 39,010.00 and 38,350.00 tons respectivelly. Meanwhile, the processed product were still very low at around 4,873.00 tons. Development opportunities of seafood processing is still promising, considering a plenty of raw materials available and the competition of processed product in the market is still low.

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INTRODUCTION

Geographically, the Southeast Maluku District is consisting of many small Islands, most of the region is coastal. This region have function as a buffer zone, the habitat for many types of biota, a spawning place, growth ground, feeding ground and shelter for many species of marine life and beaches. This is possible because in general, coastal areas have a high fertility rates and a source of organic matter as an important component in the cycle of the marine food chain. The excellence of seafood is lies on its protein, minerals and unsaturated fatty acids existences with a very high biological value so it is good for health. This exellencies can be used to diversify the variety of processed products both for food and non-food products such as cosmetics and pharmaceuticals. Optimizing the utilization of marine products as raw material of various healthy products resulted of income and living standards increased of fishermen and coastal communities.

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On the other hand, seafood commodities is categorize as perishable food so that it is necessary the proper postharvest in order to avoid the food and financial losses that ruin the fishing economies. Proper postharvest handling activities and the diversification of processed products based on marine products including endemic commodities was an effort to optimize its utilization in order to provide the value added of the family and society economics. Recent policies, the priority on fisheries exploitation in order to increase the Sustainable Maximum Yield (MSY) have not really been impacting the improving of the living standard of fishermen but instead reduced the productivity of marine products as a result of an imbalance of exploitation and sustainable. The recent phenomenon on weakness of fisherman and coastal society has taken the stakeholders to optimally utilize the abundant marine resources for the welfare of the society. At least, by optimizing the utilization of marine products, it stimulate the development of micro, small and medium enterprises (SMEs) and industries based seafood becomes the supporting pillars to break out of the poverty phenomenon which are hindering communities and coastal fishermen over the years. The purpose of this study was

to inventory the marine products potency in Southeast Maluku District in order to know the opportunities of processed products development.

MATERIALS AND METHODS

Research method was descriptive or exploratory, by survey approach, field observation and Focus Group Discussion (FGD). The research was focused on six sub districts in Southeast Maluku District, at each district chosen four potential villages, the number of respondents for each village were 12 respondents. The research was held on August until September 2012.

RESULT AND DISCUSSION

Seafood commodities

Southeast Maluku have an ecological dynamic, there are arise a wide variety of ecosystems. There is the upwelling occurrence that greatly affected the condition of the waters oceanographic. Based on the data obtained from the Department of Marine and Fisheries (2011), it is known that in Small Kei Islands are existed 103 species, 40 familia, and 2 classes of mollusks, gastropods and bivalves. Gastropod class consists of 80 species that representing 25 familias, while bivalves consisted of 23 species that representing 15 familias. And based on the information from the local society and the literature study, an amount of 72 of the 103 species of mollusks were obtained from Small Kei Islands, they had been potentially utilized them, while 31 other species had not been utilized yet. Most mollusks used as food (55 types). In addition, molluscs was found potentially using as a decorating, souvenirs, ornaments and clothing accessories (31 types), building (4 types), blades (*Cypraea spp*. and *Ovula ovum*), money (genus *Cypraea*), and *bioactive* (genus Conus) materials.

Moreover, some of them have become a major trading commodities of marine nonfish sector in the waters surrounding the islands of the Kei Kecil (7 types) (Rieuwpassa *et al*, 2012). There are found the small pelagics included anchovy (*Stolephorus spp*), trevally (*Selaroides spp*), 'layang' (*Decapterus spp*), mackerel (*Rastrelliger* spp), 'tembang' fish (*Sardinela* spp), flying fish (*Cypsilurus* spp) and others. The dominant species of large pelagic found in the Southeast Maluku District waters are yellowfin tuna (*Thunnus albacares*), skipjack (*Katsuwonus pelamis, Euthynus affinis, Auxis thazard*) and others. Whereas, the demersal resources that economically important include: 'baronang', 'sikuda', 'lencam', 'bambangan', grouper, red snapper, 'bubara', 'samandar' and others. There are found about 50 species of macro algae. From the number of species found, the green algae (*Chlorophyta*) (26 species) is the greatest species, followed by the red algae (*Rhodophyta*) (18 species) and the brown algae (*Phaeophyta*) (6 species). Macro algae is rarely found, nevertheles, there are several genus found like Caulerpa, Gracilaria and Hypnea that are economically very valuable. The most well cultivated macroalgae are Gracilaria and Eucheuma, however, the others have an opportunities to be cultivated like Gelidium and Hypnea. The valuable non-fish resources which can be developed by the marine culture activities were mollusks (gastropods and bivalves); echinoderms (scrub, pineapple, and milk sea cucumbers). There is a kind of small-sized shrimp commonly called 'rebon' and crabs (mud crab). This commodities can be found a year-round because they are naturally available in the field, however a good harvest season is on the east wind season from April to July.

There are found three types of turtle namely Hawksbill turtle (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*) and the leatherback turtle (*Dermochelys coriacea*). The presence of leatherback turtles in this coastal waters coincide with the blooming of jellyfish as its main feed source. Those three types of turtle are included in protected marine species reptiles, because their population in the wild has dropped dramatically due to human hunted to meet the various needs of life and traditional rituals. On the other hand, the frequency of the sea turtle presence in the coastal areas and small islands of this district has been reduced because of the quantity and quality declining of coral reefs and sea grass beds due to the environmental and utilization pressures. Therefore, it is needed an effort to conserve the sea turtle and its habitat. There are certain types of marine specific commodities (endemic commodities) abundantly available, they are: 'laor' (Wawo worms), 'lat' (sea wine), 'kian' (sea worms) and 'wor' (caviar) (Figure 1).

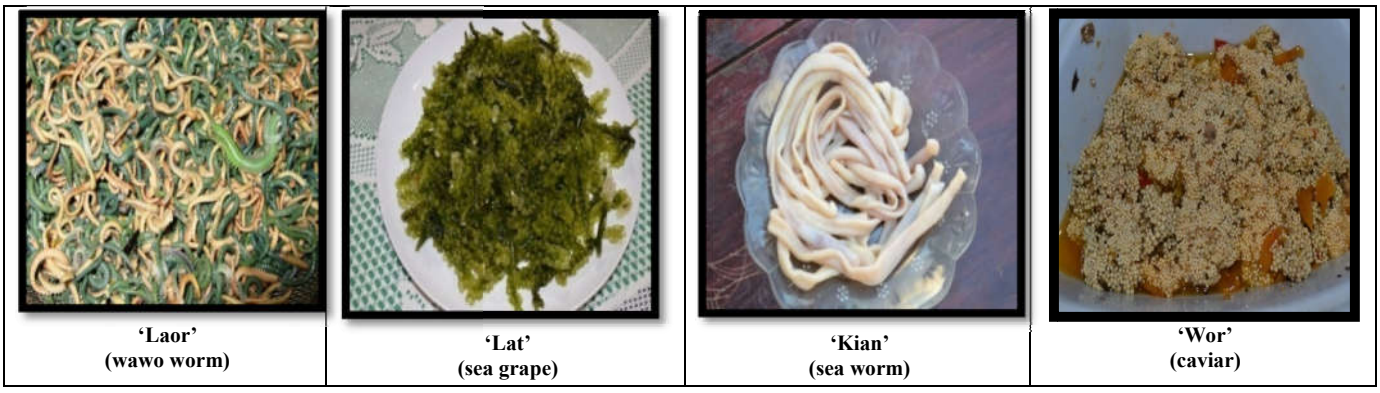

Fig.1. Endemic commodities in Southeast Maluku District

Laor' is local name for sea worm of Phylum Anelida found in coral waters. These worms appear on the surface of the sea at certain period once a year. They appear in a large quantity every April, during high tides (full moon), in that time the people droved to catch these worms by using small net. However, there is an exception in many villages like in Small Kei name Wearlilir, the 'laor' arise every month in the full moon eventhough the number is not as much as in April. 'Laor' contain high nutrients, especially protein and minerals so that they are very good food for people consumption (Latumahina *et al.,* 2007). Generally, people in this region consumed the processed 'laor', namely 'bekasang' (fermented 'laor') and 'lawar' (spicy 'laor'). Laor is also found around the Ambon and Lease Islands. The nutrient composition of 'laor' derived from Latuhalat waters (Ambon city) and Wearlilir (Southeast Maluku District) shown in Table 1.

Table 1. Nutrition composition of 'Laor'

Compostition (%)	Source of 'Laor'	
	Latuhalat	Wearlilir
Water	81.51	76.71
Protein	13.92	13.85
Fat	1.01	0.11
Ash	2.41	2.40

Source: Latumahina *et al*. (2007)

Lat' is local name for sea grapes the genus Caulerpa usually found in a great number in sandy coral substrate and its existence does not depend on the season. It is harvested by hand. The difference between 'Lat' and other seaweed is 'lat' can be consumed uncooked but not for others. Because of the abundant of 'lat' in this district, it can be developed into various processed products such as jelly candy, jam, 'dodol', meatballs, 'otak-otak', dragon foot, rollade and others (Tapotubun *et al*., 2013). Physical and chemical properties of fresh 'laor' shown in Table 2.

Table 2. The characteristics and physico-chemist profile of 'Lat'

Physic-chemist	Composition
Water (%)	94.84
Ash (%)	3.29
Protein (%)	1.29
Fat (%)	0.76
Iodin (g)	0.0047
Crude fiber (%)	0.002
Gel strength (g/cm^2)	8.00
Viscosity (Cps)	11.60

Source: Tapotubun *et al.* (2013)

'Kian' is local name for sea worm non segmented, the phylum Sipuncula, found on muddy sand substrate, or muddy coral. These animals appears at any time and when the low tide. Bamboo pointy stick is used to harvest 'Kian'. 'Kian' is consumed while the bad weather in the east wind season, in that time the fisherman activities are arrested by the bad weather. 'Kian' also can be used as fish bite. 'Wor' is the local name for caviar, the eggs of flying fish, found in the deep sea in the region of the Great Kei. 'Wor' is found in a great number of bundles during the east wind season when the wind is blowing hard and the waves carried the 'wor' from the open sea (Arafura Sea) toward the coast in the region of the Big Kei. This time the fishermen are compete to get the 'wor' float in the sea in the large quantities. People consumed fresh or processed 'wor'.

Potency of Marine culture

The calm condition of the most Southeast Maluku District waters, protectioned throughout the season (year), is very potential for marine culture or fishing grounds. The future of marine culture activities suggested are seaweed, fish, sea cucumbers and pearl cultivation. Recently, marine culture activities that spread almost in 40 % of the area is seaweed farming. The condition of the water and its quality are the main requirements for the seaweed farming activities in order to achieve the best production and business development.

The production of dried seaweed in Southeast Maluku District faced a significant increase in the recent five (5) years (Marine and Fisheries affair of Southeast Maluku District (2012). Production of dried seaweed in Southeast Maluku District shown in Table 3.

Table 3. Seaweeds Production in Southeast Maluku

Years	Production (Ton)
2007	44.10
2008	381.12
2009	3,285.00
2010	4,870.60
2011	7,944.00

Source : Marine and Fisheries affair of Southeast Maluku (2012)

Continuous improvement of the dried seaweed production indicated the great chance of marine culture in this region. Murdinah (2008), states that the region of both Large and Small Kei is the best region in Maluku for seaweed cultivation. Geographically, the position of the Kei Islands is the most profitable than other regions in the province of Maluku for seaweeds farming industrial. The high potency of seaweed can be developed for a variety of refined products. It is intended to increase the income of sea farming in Indonesian especially in Southeast Maluku District. Seaweed can be used as the raw material for many product like food, health, cosmetics and other product, also as a source of medicine and a powerful toxin (Angka and Suhartono, 2000). Anggadiredja (2010) stated, development strategy of seaweed in Indonesia is to overcome the technologies formulation in order to produce the ready use of processed products include food, beverage, pharmaceutical and so on.

Potency of Fisheries

In general, the fishermen of Southeast Maluku District carry out the fishing activities surrounding the waters of this territorial. The wide of Southeast Maluku waters are 432.30 km^2, but the fishermen also doing fisheries activities until the limit of 4-12 nautical mile territorial waters which mean that the fishing ground can be covered the waters area of 116.20 km^2. The types of fishing gear used by the fishermen are purse seine, lift net, drift gill nets, encircling gill net, angling gear and set net. Most of the people in Southeast Maluku have their own fishing gear. The number of respondents act as a

fishing gear owner were 182 people and only a few of them, about 10 people, are the freelance, while the remaining about 15 people are a permanent employees (Figure 2).

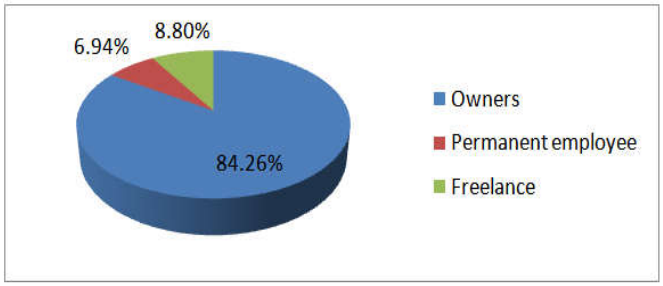

Fig.2. Ownership status of the fishing gear

The people have a great desire to pursue a job as fishermen and farmers, but they have the low ability to buy the fishing gear and marine culture aids. They only have a simple fishing gear with a small fishing capacity. All the respondent have a long line for seaweed culture, but its capacity varies depend on their buying power.

The opportunities of Processed Product Development

The abundant of marine product commodities in Southeast Maluku District are potencial to be developed into a variety of valuable refined products, although in fact the fish processing is still low (Marine and Fisheries affair Southeast Maluku District 2012). Table 4 shows the fish production in Southeast Maluku District.

Table 4. Fish Production of Southeast Maluku District 2011

Fish Sources	Total (Ton)
Fishing	39,010.00
Aquaculture	38,350.00
Processing	4,873.00
Total	82,233.00

Source: Marine and Fisheries affair Southeast Maluku District (2012)

Processed fish is the smallest portion of the fisheries products. On the other hand, the number of wasted fish is reaching more than 4 tons on a fishing season and is more ironic that the fish is damaging before landing. This is indicating the worse of post-harvest activities. The post-harvest handling practiced limited to chill using ice buying from local ice producer in the small shop around the village. There is only one cold storage so it is not enough to accommodate the fish production. Postharvest applied to the seaweed only by using the dryer rack or by spreading them on the net on the ground. Seaweeds are marketed when it has been dried and contained in the sack with a capacity of 50 kg per sack. The seaweed is bought by the traders who come directly to the village. The seaweeds marketing channel involves four institutions namely producers, traders, wholesalers and customers (exporters and mills).

At the moment, it is doing the seaweed processing plant situated in the Letvuan Village, it will process seaweed into ATC (alkali treated cottonii). By the seaweeds processing plant building, the people expected to sell their dry seaweed easier, to create the new job, and to increase the revenue. Nothing seafood processed products sold in traditional markets and supermarkets in the district of Southeast Maluku, because most fishery activities in the village are fishing and marine culture. Fish processing, generally, is only practiced for daily consumption not for sale. Selayar village is an exception, in this village it is practiced in a big scale; the mean product is dry anchovy which is processed traditionally. This condition is an opportunity that should be exploited as good as possible, especially through the attention of stakeholders in this district. The people must be given an understanding to realize that the refined product is more economically valuable than the fresh product, especially if it produced in a great number. Handling and processing intended to inhibit the decomposition process, in order to avoid the food waste, and to improve the income and welfare of society.

Conclusion

The potency of the seafood commodities in Southeast Maluku district is abundant both the types and the numbers (fish and non-fish including endemic species), however, the processing aspect of the product is still very low. The development opportunities of the seafood processed technology is still high considering the availability of raw material and also because of the less competition of the processed products in the local and external market.

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