

Design of Agroindustry Development Strategy Based on Fisheries Catch of Merauke Regency

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Abstract. The potential fisheries catch in Merauke Regency is very large and diverse. The contribution of fisheries catches to Gross Regional Domestic Product (GRDP) Merauke Regency in 2016 amounted to Rp. 1,729 trillion or 56.6% of the total GRDP of the agricultural sector. During this time, fishery catch originating from the sea, rivers and swamps are only sold to meet the needs of consumers in fresh form to the local market and only a small part for other regions. As an effort to increase the added value of fisheries catch, namely by the development of fishery products-based agro-industries. The research objective is to design a fisheries catch based agroindustry development strategy for Merauke Regency. The research method used is purposive sampling design research, expert system research methods, and analysis techniques with exponential comparison method (MPE). The conclusions in this study, namely: (a) Agroindustry priorities that need to be developed in succession: freezing of shrimp, snapper fillets, freezing tilapia fish, and fish crackers, (b) Prioritized business scale of Small and Medium Enterprises, (c) Support from the Government, namely regulatory policies for determining potential locations, facilitating ease of use attract investment in fisheries agro-industry, and the ease of obtaining credit

1. Introduction

Papua Island, namely the Province of West Papua, Papua and Papua New Guinea as an area that has a high biodiversity of marine fisheries, but freshwater fish is only about 400 species [1]. Merauke Regency is one of the areas with the highest fishery production potential in Papua Province. Fishing catches come from marine, river and swamp fisheries [1,2,3,4]. This area mostly has a flat and swampy topography because it is located in the Trans-Fly Coastal Lowlands with extensive wetland areas in the form of flood swamps from large rivers flowing inside [5]. Some of the major rivers that flow in Merauke Regency such as the Bian River, Digul River, Kumbe River, Maro River and Buraka River are areas that are potential as freshwater fishing areas.

Fish is one of the people's food ingredients to meet the needs of animal protein. Diverse types and kinds of fish, but only partially commonly consumed and have economic value or market value. Some types of fish catch levels of marine fisheries and inland waters that have high economic value in Merauke namely baramundi (*Lates calcarifer*), red snapper (*Lutjanus altifrontalis*), white prawn



(*Penaeus indicus*), barred spanish macherel (*Scamberomorrus commersoni*), mangrove crab (*Scylla serrata*), snakehead fish (*Ophiocephalus striatus*), and tilapia fish (*Oreochromis mossambicus*) [6,7].

The potential fisheries catche in Merauke Regency is very large and diverse. The contribution of fisheries catche to Gross Regional Domestic Product (GRDP) Merauke Regency in 2016 amounted to Rp. 1,729 trillion or 56.6% of the total GRDP of the agricultural sector [6].

During this time, fishery catche originating from the sea, rivers and swamps are only sold to meet the needs of consumers in fresh form to the local market and only a small part for other regions. As an effort to increase the added value of fisheries catche, namely by the development of fishery products-based agro-industries. The research objective is to design a fisheries catche based agroindustry development strategy for Merauke Regency

2. Methodology

2.1. Research methods

Merauke Regency was chosen as a research location which was conducted purposively. Where this area is a coastal area that has fishery yield potential both in the catch of the sea, rivers and swamps. This study uses an expert system approach that is a research system that uses several experts in the field of fisheries who are expected to be able to give consideration, assessment, and thinking in the topics studied. The expert system is a system of artificial intelligence, which is built on the basis of deep expertise of a certain subject area (obtained from experts and specialists in the area). Expert systems are one of the few types of artificial intelligence systems that are widely used and have found practical application. Expert systems are a progressive trend in the field of artificial intelligence [8]. The increased interest is determined by the possibility of their application to problems of different fields of human. Data collection was obtained through the Indept Interview process in a Focus Group Discussion (FGD) [9]. Who became an expert in this research were 3 researchers, 1 bureaucrat, and 1 fishery entrepreneur.

2.2. Analysis Technique

The analytical technique used in this study is the Exponential Comparative Method (ECM) one of the methods to determine the priority sequence of decision alternatives with multiple criteria. This technique is used as a helper for individuals making decisions to use a well-defined model design at the process stage.

The steps that must be taken in ECM analysis are: (a) determine alternative decisions, (b) establish criteria that will be evaluated, (c) determine the degree of importance of each decision criterion used, (d) assess all alternatives on each criterion, (e) calculate the total score of each alternative, and (f) determine the order of priority of the decision based on the total value of each alternative [9]. The score calculation formulation for each alternative in the exponential comparison method is

$$\text{Value Total (TN}_i\text{)} = \sum_{j=1}^m (RK_{ij})^{TKK_j} \quad (1)$$

Where,:

TN_i = value total alternative to -i

RK_{ij} = the relative importance of the criteria to-j for decision choices to-i

TKK_j = the relative importance of the criteria decision to-j; TKK_j > 0;

n = number of decision choices

m = number of decision criteria

The score range used for weighting and assessing each of the criteria used in this study is between 1-9

Determining the importance of criteria is done by interviewing experts or through brainstorming agreements. Determination of alternative scores on certain criteria is done by giving the value of each alternative based on the value of the criteria. Advantages of the ECM Method:

- a. Reducing the bias that might occur in the analysis
- b. Score scores that illustrate the order of priorities into large (exponential functions) result in a more real priority sequence of decision alternatives [9]

3. Results and Discussions

In order to make it easier to understand this research subject, it is necessary to begin by determining the definitions of each of the criteria used in this study, as follows:

Table 1. Definition of each criterion in decision making

Num	Criteria	Definitions
1	Market Potential	The potential market is how much the level of consumer interest in buying a product resulting from a company
2	Availability of Raw Materials	That is the ability of an area to meet the main standard needs in producing a product
3	Value Added product	How much the value of a product increases after going through the product processing process
4	Workforce Absorption	As a measure of how much work opportunities can be created if the company is running
5	Availability of skilled workers	As a measure of the ability of a region to prepare skilled manpower needs in accordance with company requirements
6	Availability of processing technology	The level of availability of processing fisheries processing technology
7	Socio-Cultural Condition Support	That is assessing the level of support of socio-cultural norms of the local community towards the establishment of the fishery product processing company
8	Impact on the Environment	How much impact does the establishment of fisheries products have on the surrounding environment
9	Availability of Supporting Infrastructure	Namely how much infrastructure is available that can support the growth of fisheries agro-industry
10	Government Support	namely the level of government partiality in spurring growth and attracting interest in investment in the fisheries agro-industry sector

Furthermore, the experts were asked to determine the weight of each of the criteria used in this study. The value given by each expert is averaged by using the Geomean method to minimize the bias between expert judgment. Furthermore, the average weight that has been averaged, can only be used for ECM analysis. The weights of each of the following criteria in table 2 below:

Table 2. Determination of the weight of each criteria

Num	Criteria	Expert					Weight
		I	II	III	IV	V	
1	Market Potential	9	9	9	8	9	8,79
2	Availability of Raw Materials	9	7	9	8	9	8,36
3	Value Added product	6	5	6	7	6	5,97
4	Workforce Absorption	7	8	7	7	7	7,19
5	Availability of skilled workers	6	6	7	6	6	6,19
6	Availability of processing technology	5	4	5	6	5	4,96
7	Socio-Cultural Condition Support	7	7	7	8	8	7,38
8	Impact on the Environment	5	6	5	6	5	5,38
9	Availability of Supporting Infrastructure	7	6	6	8	8	6,94
10	Government Support	5	6	4	4	4	4,54

Diversity of marine fisheries catch levels and public waters in Merauke and based on technical and economic considerations of experts then determined 7 agro-industry fisheries potential alternatives to be developed. For this reason, the agro-fisheries need to set priorities that need to be developed. Furthermore, the experts provide an assessment of each alternative agro-industries will be developed by each of 10 criteria to offer. The range of values between 1-9, where the value is given each expert is the result of an integrated assessment according to the background respective expertise. The results of the assessment, as follows:

Table 3. Alternative product values for each criterion

Num	Criteria	Weight	Alternative agroindustry fisheries						
			FS	FC	FT	DS	TE	DG	SF
1	Market potential	8,79	9	8	8	7	6	5	8
2	Availability of raw materials	8,36	8	7	8	8	6	8	8
3	Value added product	5,97	8	6	8	5	5	5	8
4	Workforce absorption	7,19	8	7	8	8	6	8	8
5	Availability of skilled workers	6,19	6	6	6	8	6	8	6
6	Availability of processing technology	4,96	7	7	7	6	6	6	7
7	Socio-cultural condition support	7,38	8	8	7	8	6	8	8
8	Impact on the environment	5,38	6	6	6	6	6	6	6
9	Availability of supporting infrastructure	6,94	6	6	6	6	6	6	6
10	Government support	4,54	7	7	7	7	7	7	7

Notes: FS=freezing of shrimph, FC=, FT= freezing of tilapia, DS=dried shrimp, TE=terasi, DG=dried gabus fish, and SF= snapper fillets

Then the results of the assessment in table 3, ECM analysis performed to determine the priority ranking of agro-fishery to be developed as in table 4, as follows:

Table 4. The total value of ECM

Num	Alternative agroindustry fisheries	Total value of ECM	Rank
1	Freezing of shrimph	244.477.215,87	1
2	Fish crackers	104.668.713,02	4
3	Freezing of tilapia	127.696.071,71	3
4	Dried shrimp	70.731.064,46	5
5	Terasi	11.434.360,21	7
6	Dried gabus fish	45.283.560,39	6
7	Snapper fillets	130.618.118,25	2

The ECM calculation results in table 4 show that the 4 main priorities of fisheries agro-industry that need to be developed in Merauke Regency are sequential, as follows: freezing of shrimph, snapper fillets, freezing of tilapia, fish crackers. Shrimp, snapper, tilapia fish, and other types of fish caught so far have only been sold in the form of fresh fish in the local market which must be sold in a very short time. This is because the fresh fish has decreased in quality over time in open space as long as it is not treated. Of course, fresh fish that are not sold for a long time will quickly reduce the selling price even in the next time it starts to rot and not sell well. Usually the freshness of the fish lasts between 5-6 hours, then the fisherman/trader will experience a loss.

The level of fish consumption in Merauke Regency, which is 34.77 per capita per year, is still far below the national level of fish consumption of 41.1 kg per capita per year [7]. However, actually to meet the needs of animal protein, indigenous Papuans are usually obtained from catches in the forest such as deer, pigs and kangaroos. This is a challenge consisting of continuing to suppress movements like eating fish. The impact of the habit of consuming prey animals from the forest, actually greatly disturbs the sustainability of the animal's life which is classified as protected and extinct animals.

Until now, in Merauke Regency there is still a very small number of small medium enterprise (UKM) is moving to process the fishery products. For this reason, the development of agro-industries that process fishery products is an effective solution which is certainly very useful to: (a) increase the added value of fishery products, (b) improve the competitiveness of fishery products, (c) open new employment opportunities, improve the welfare of fishermen and their families, (d) encourage the availability of fisheries products, provide support for increasing GRDP, (e) minimize the occurrence of social insecurity and poverty in rural areas, and (f) encouraging the growth of Industrial linkage from upstream to downstream.

Based on brainstorming with experts, it was agreed that the most appropriate business scale capable of running a fishery agro-industry is small medium enterprise (UKM). The advantage in the business scale is that it requires small investment, simple processing technology, and can be developed in the distric / village centers producing raw materials. Areas that have the potential to develop fisheries agroindustry are Merauke District and Naukenjerai District. Both districts in terms of distance are relatively easy to reach, the availability of infrastructure is relatively more adequate, and the center of fish catches. It is expected that the future will spur local economic growth and equitable distribution of public welfare.

The important thing that needs to be needed is support from the central and regional governments. For the sustainability and sustainability of fisheries agro-industry development, the government support is one of the driving forces to stimulate the growth of small medium enterprises in fisheries. The role of the government includes: regulatory policies to determine potential locations, facilitating the ease of use of attracting investment in the fisheries agro-industry, and the ease of obtaining credit.

It is expected that the results of this study for further research include multidisciplinary integrated business plan, spatial planning for fisheries agro-industry, and market mapping and marketing design

4. Conclusions

(a) Agroindustry priorities that need to be developed in succession: freezing of shrimp, snapper fillets, freezing tilapia fish, and fish crackers, (b) Prioritized business scale of small and medium enterprises, and (c) Support from the government, namely regulatory policies for determining potential locations, facilitating ease of use attract investment in fisheries agro-industry, and the ease of obtaining credit

5. References

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