

Seaweed Farm Development Strategy (*Eucheuma Cottonii*) in the District of Kokas Fakfak Regency

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Abstract. The problems of seaweed farming in the Kokas District of Fakfak Regency in this study were formulated as follows: (1) how much the total cost, revenue, and income of seaweed farmers per production cycle; (2) what are the internal and external factors that influence the development of seaweed farming (3) what are the priority strategies that can be applied in the development of seaweed farming. The objectives of this study are: (1) to determine the total cost, revenue and income of seaweed farmers per production cycle; (2) determine internal and external factors that can influence the development of seaweed farming; and (3) determine priority strategies that can be applied in developing seaweed farming. The basic method used in this research is descriptive analytical method, the respondent taking is done by purposive sampling, external, internal, SWOT analysis, and QSP matrix analysis. The results achieved in this study are the average total cost incurred during one production is Rp. 13. 305,666.67. Admission is an average of Rp. 30,600,000, and the average income is Rp. 17,294,333.33. Internal and external factors, namely strength: the availability of sufficient labor, easy cultivation is carried out, good quality seaweed. Weaknesses: limited capital, quality of resources is still lacking, promotion is still lacking. Opportunities: market share is still wide, demand is increasing, the development of technological progress. Threats: weather, lack of government role, rising prices of production facilities. The priority strategy in the development of seaweed farming based on QSP matrix analysis is strategy II, which is maintaining the quality of seaweed to meet the increasing demand.

Keywords: Strategy, Development, Farming, Seaweed, *Eucheuma Cottonii*

INTRODUCTION

One of the natural resource-based industries that has great potential to be developed is the seaweed-based industry. This is due to Indonesia's sea waters with a coastline of around 81,000 km believed to have very high seaweed potential. There are 555 types of seaweed in Indonesian waters, of which around 55 are known to have high economic value such as *Gelidium*, *Euchema sp.* and *Gracilaria sp* (Aslan, 2008).

Type of seaweed that is widely cultivated is *Euchema sp.* and *Gracilaria sp.* Aside from being a material for the food industry such as jelly, jelly food, and food mixes such as burgers, seaweed it can also function as raw material for the cosmetics, pharmaceutical, textile, paper, ceramics, photography and insecticide industries. With these broad benefits, this seaweed commodity has a good market opportunity with considerable potential. Seaweed as one of the export commodities which is a source of foreign exchange for the country and its cultivation is a source of income for farmers, can absorb labor, and is able to utilize coastal waters in the Indonesian archipelago which is very potential.

Almost all of the Indonesian archipelago has the potential to develop seaweed commodities including Fakfak Regency, West Papua Province. In 2016 the Kokas District of Fakfak Regency in one cycle (2 months per cycle) was able to produce 8-10 tons of raw seaweed (BPS, 2017). This figure shows a significant potential as a source of income for seaweed farmers. According to Priono (2016) states that seaweed cultivation contributes significantly to increasing community income sources and providing great employment opportunities, especially for people in coastal areas. This statement was supported by Asriany (2014) in his research concluded that financially seaweed farming is very beneficial for farmers. But on the other hand, around 40.5% of the population in the Kokas District live below the poverty line (BPS, 2017).

The problem faced by farmers to date is that seaweed is produced in raw form and is sold at low prices. In addition, the quality of seaweed is also still low. For this reason, a strategy is needed in the development of seaweed farming, especially in terms of cultivation techniques and postharvest handling. The development strategy will be influential in maintaining competitiveness and overcoming the problems that exist in seaweed farming. According to Irmayani (2015) that the quality of seaweed production is influenced by internal factors such as farmers' experience and cultivation techniques. In addition to internal factors, the development of seaweed farming is also influenced by external factors such as marketing, technology, and government policies (Imam, 2016 and Muthalib, 2017). From the results of these studies revealed that the development of seaweed farming is influenced by several internal and external factors. However, research on the development of seaweed farming in Kokas District Fakfak Regency has never been done. Based on this phenomenon, it is very important to conduct research on the development of seaweed farming in Kokas District Fakfak Regency.

RESEARCH METHOD

The basic method used in this research is descriptive analytical method, which is a method that focuses on solving current problems and actual problems. Respondents were taken by purposive sampling, namely 15 representatives from seaweed farmers, 5 from traders, and 1 from Disperindagkop. The type of data used in this study consists of two, namely primary and secondary data. Primary data were obtained from interviews with questionnaires while secondary data consisted of research supporting data such as the general condition of the research location, seaweed production data obtained from the Fisheries Service Office of Fakfak Regency and the Central Statistics Agency of Fakfak Regency. Data collection techniques used were observation, interviews, and recording. The business analysis includes the calculation of the average in one production that is total cost, revenue, and income. External and internal factor analysis uses SWOT analysis to identify key external factors and key internal factors. Formulation of alternative farming development strategies in Kokas District Fakfak Regency using SWOT matrix analysis. Determination and selection of priority strategies that are most effective in developing seaweed farming in Kokas District Fakfak Regency using the QSP Matrix analysis.

RESULTS AND DISCUSSION

The results of the diversity of seaweed farming in Kokas District Fakfak Regency

The results of the diversity of seaweed farming in the Kokas District of Fakfak Regency consisted of average total costs (Table 1), average revenue (Table 2) and average income (Table 3).

Table 1
Average Total Cost of Seaweed Farming in Kokas District, Fakfak Regency

No	Description	Average Cost
1	Average fixed costs	Rp. 3.681.666,67
2	Average variable cost	Rp. 9.624.000
	Total cost	Rp. 13.305.666,67

Source: Primary Data Analysis, 2019.

Table 2
Production and Value of Sales (Acceptance) Average Seaweed Farming in Kokas District, Fakfak Regency

No	Description	Average Cost
1	Production (kg)	Rp. 1.224
2	Price of 1 kg (rupiah)	Rp. 25.000
	Receipts (rupiah)	Rp. 30.600.000

Source: Primary Data Analysis, 2019.

Table 3
Average Revenue of Seaweed Farming in Kokas District, Fakfak Regency

No	Description	Average Cost
1	Receipt (Sales Value)	Rp. 30.600.000
2	Total cost	Rp. 13.305.666,67
	Revenue (rupiah)	Rp. 17.294.333,33

Source: Primary Data Analysis, 2019.

Development Strategy of Seaweed Farming in Kokas District, Fakfak Regency

Determination of the strategy to be carried out in the context of developing seaweed farming is carried out a qualitative approach using SWOT analysis (*Strength, Weakness, Opportunity, Threat*).

Internal Environmental Analysis

A. Strength

S1. Availability of labor force

The availability of manpower or human resources is a strategic factor that can be used as a force in the development of seaweed farming. Through the development of farming as a rural economic activity, it is expected to be able to create expansion of employment opportunities and increase income upstream and downstream. The source of labor for seaweed farmers in the Kokas District generally comes from their own families, the rest comes from outside the family. Outside labor is used when binding seaweed seeds, while when the cultivation is generally carried out by workers from within the farm family. This is in accordance with research conducted by Patang (2014). The development of these farms, will require quite a lot of labor. These needs can be met by a large number of local workers in the Kokas District. The development of seaweed farming can be used as a mainstay commodity in Fakfak Regency, especially in the Kokas District.

S2. The cultivation business is easy to do

The development of seaweed farming in Kokas District, Fakfak Regency, is carried out easily with simple cultivation techniques without the need for sophisticated technology. The cultivation method applied in the Kokas District is the long line method. In the opinion of Patang (2014) the long line method is the right cultivation method applied in dealing with seaweed diseases such as ais-ais disease. In addition, the location of seaweed farming is close to the location of seaweed farmers settlements.

S3. Good quality seaweed

The type of seaweed cultivated in the Kokas District of Fakfak Regency is *Eucheuma cottonii*. This type of seaweed is super because it has a large thallus size, with high carrageenan content. According to Sunnadji, Ratoe Oedjoe, and Felix Rebhung (2018) in addition to quality seaweed species, the quality of seaweed can be affected by post-harvest handling activities, especially in the use of drying equipment that can affect the quality of seaweed.

B. Weakness

W1. Limited capital

Capital is one of the four factors of production which in economics is considered necessary for a unity of production or business. Owned business capital is used to purchase seaweed seeds, labor costs, other material costs and equipment costs. The capital used is private capital. In the meantime capital is still fulfilled from own capital but for future business development, lending is urgently needed so handling credit provision is important to do, including by facilitating bureaucracy, managing credit, and guarantees that must be met by farmers can be eliminated, or with other schemes which is not difficult for seaweed farmers. This is consistent with the results of research conducted by Sunnadji, Ratoe Oedjoe, and Felix Rebhung (2018).

W2. The quality of resources is still lacking

Seaweed farming in Kokas District, Fakfak Regency still uses labor from each farming family. Seaweed cultivation techniques are obtained from previous experience (hereditary). Where the average level of education graduated elementary school (SD). According to Sunnadji, Ratoe Oedjoe, and Felix Rebhung (2018) Increasing human resources (farmers) can be increased through non-formal education through training. According to Patang (2014) to discuss the problem of low levels of education about related parties who discuss about the problem of the level of participation of seaweed farmers associated with cultivation methods, capital aspects, safety and coaching aspects.

W3. Promotion is still lacking

Rumput laut yang dihasilkan oleh para petani di Distrik Kokas Kabupaten Fakfak, dijual dalam the form of raw dried seaweed to collectors. Then, collectors sell their seaweed to big traders in Surabaya. This requires intervention from the government to promote seaweed produced by farmers to industries that are made from *Eucheuma cottonii* seaweed to establish partnerships with seaweed

farmers in the Kokas District of Fakfak Regency. According to research conducted by Patang (2014) one of the promotional activities that can be carried out is conducting counseling by educational institutions related to presenting / bringing together seaweed farmers with seaweed traders or exporters.

External Environmental Analysis

A. Opportunity

O1. Market share is still wide

Eucheuma cottonii seaweed is a type of carrageenan-producing seaweed used in the food, pharmaceutical and cosmetics industries. *Eucheuma cottonii* seaweed is one of the world's trade commodities, which has a bright and broad market share. According to the results of research conducted by Hidayati (2009) shows that seaweed marketing in Mangarabombang sub-district consists of 4 patterns and each seaweed marketing chain varies considerably, depending on the pattern of cooperation or bond formed between seaweed farmers and collectors. The difference in the pattern of marketing channels affects the price level, the amount of profits and costs, and the profit margins conducted by each seaweed marketing agent.

O2. Demand is increasing

The transportation route that connects Fakfak Regency with other regions is getting more crowded, thus allowing demand to increase due to *Eucheuma cottonii* seaweed is one of the world trade commodities, which has a bright and broad market share so that the number of requests increases. These opportunities must be utilized and managed properly for their sustainability. According to Sudarmi (2012) high market demand for seaweed communities is a factor of considerable opportunity to be utilized. Meeting the market needs of seaweed as a basic ingredient for food processing and cosmetics encourages community interest to develop seaweed cultivation businesses.

O3. Development of technological progress

Technological advancements can increase innovation towards improving seaweed cultivation techniques and seaweed processing. According to Patang's research (2014) the strategy for developing seaweed culture can be done through ecology-based aquatic environmental management, the appropriate application of technological aspects in seaweed cultivation and structuring of cultivation areas based on environmental carrying capacity.

B. Threat

T1. Weather

Fakfak Regency has high rainfall, so that it can affect the conditions that serve as seaweed cultivation. According to Aslan (2008) to anticipate uncertain weather it is better to use appropriate planting methods and times in accordance with the geographical conditions of the location.

T2. Lack of role from the government

The lack of role from the government can be seen from the condition of the seaweed business which has not been developed yet (diversification is not uniform). There is no training on processing, marketing for entrepreneurs, technology assistance for the development of seaweed. The government should find out the cause of the condition of the aquatic environment, especially in the Kokas District, which causes seaweed cultivation is hampered. This is in accordance with the research conducted by Ariadi (2001) who said that planning institutions at the local government level in East Java lacked the ability to develop island regions, causing them to have no attention. So that causes the strategy of developing seaweed business is still less planned. Even if there is attention from the government, it turns out that coordination is still lacking between agencies / agencies in the context of implementing the empowerment program especially in seaweed cultivation and capital strengthening as well as improving monitoring, controlling, and surveillance systems to obtain data on the progress of seaweed farming business integrated.

T3. Increase in prices of production facilities

According to seaweed farmers, one of the production facilities considered expensive and very influential on the amount of production is the high price of seeds and equipment. This condition requires the participation of the government in this case the Fakfak Regency Fisheries Department to provide seedlings and equipment assistance to seaweed farmers.

Identification of Strengths, Weaknesses, Opportunities and Threats of Farming Factors in the Kokas District of Fakfak Regency.

Table 4

Identification of Weaknesses and Strengths in Farming in the Kokas District of Fakfak Regency

Internal factors	Weakness	Strengths
Financial condition	1. Limited capital	-
Human Resources	2. The quality of human resources is still lacking	1. The availability of enough labor
Production	-	2. The cultivation business is easy to do
Marketing	3. Promotion is still lacking	3. Good quality seaweed

Source: Primary Data Analysis, 2019.

Table 5

Identification of Threats and Opportunities in Farming Development in the Kokas District of Fakfak Regency

Eksternal factors	Threats	Opportunities
Customer	-	1. Market share is still wide Permintaan semakin meningkat
Government policy	1. Lack of role from the government	-
Economic conditions	2. Increase in the price of production facilities	-
Technology	-	3. Development of technological progress

Source: Primary Data Analysis, 2019.

Table 6

Alternative SWOT Matrix Strategies for Farm Development in the Kokas District of Fakfak Regency

Opportunities (O) Peluang	Strenght (S) Strategy S-O	Weakness (W) Strategy W-O
	1) Maintaining the quality of production and market development (S1, S2, S3, O1, O2, O3)	1) Optimizing the quality of human resources with a safe environment (W1, W2, W3, O1, O2, O3)
	2) Utilizing technology for production efficiency (S1, S2, S3, O1, O2, O3)	
Threats (T)	Strategy S-T	Strategy W-T
	1) Manpower management and availability of raw materials (S1, S2, S3, T1, T2, T3)	1) Establish cooperation with related parties in dealing with capital (W1, T2)
	2) Uniformity of selling prices with the role of government oversight (S1, S2, S3, O1, O2, O3)	

Source: Primary Data Analysis, 2019.

Internal Matrix Analysis

Factors that become the main strengths and are expected to minimize the weaknesses that are owned to develop seaweed farming are the availability of a lot of raw materials with the largest score that is 1.2 with a weight of 0.4 and with a rating of 4. Then followed by the factor of the number of workers work with a score of 1,004. In addition, another factor that can be utilized is that cultivation business is easy to do with a score of 0.3. Calculation of internal factors can be seen in Table 7.

Table 7

Internal Analysis Factor Evaluation Matrix Development of Seaweed Farming in Kokas District Fakfak Regency

Internal factors	Weight	Rating	Score
Strenght			
The availability of enough labor	0,251	4	1,004
The cultivation business is easy to do	0,1	3	0,3
Good quality seaweed	0,4	4	1,2
Weakness			
Limited capital	0,078	2	0,156
The quality of human resources is still lacking	0,1	2	0,2
Promotion is still lacking	0,071	1	0,071
Total	1,000		2,931

Source: Primary Data Analysis, 2019.

The most significant weakness in sea crest farming lies in the lack of human resource quality with a score of 0.2. Furthermore, the factors that become weaknesses in the development of seaweed farming are limited capital with a score of 0.156, and less promotion with the lowest score is 0.071.

From the analysis of the calculation of internal factors obtained a total score of 2,931. The value obtained is above an average value of 2.5 which according to Firdaus M (2012) the value shows a fairly strong internal position, where the development effort to be carried out has the ability to be developed which is above average in utilizing strengths and anticipate internal weaknesses owned.

External Matrix Analysis

Increasing demand is a major opportunity with a weight of 0.343 and a rating of 4, resulting in a score of 1,372. Another factor that becomes an opportunity in efforts to develop seaweed farming is a broad market share with a score of 1. Furthermore, the opportunity factor that can be utilized for the development of seaweed farming is the development of technological progress with a total score of 0.45. An assessment of external factors can be seen in Table 8.

Table 8

External Analysis of Factor Evaluation Matrix for Seaweed Farming Development in Kokas District Fakfak Regency

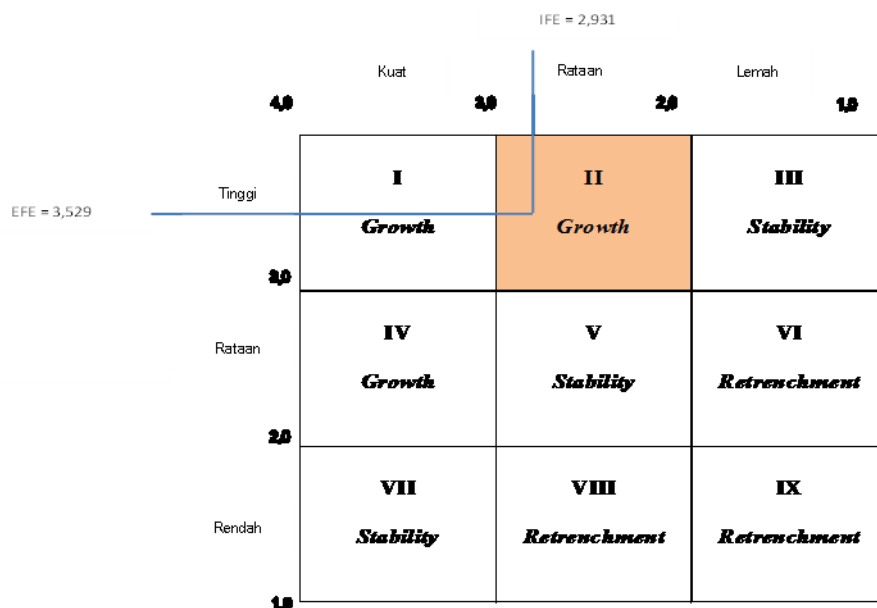
External Factors	Weight	Rating	Score
Opportunity			
Broad market share	0,25	4	1
Demand is increasing	0,343	4	1,372
Development of technological progress	0,15	3	0,45
Threat			
Weather	0,129	1	0,129
Lack of role from the government	0,128	1	0,128
Increase in prices of production facilities	0,15	3	0,45
Total	1,000		3,529

Source: Primary Data Analysis, 2019.

In addition to the opportunity factors that need to be utilized for the development of seaweed farming, the threat factor also needs to be considered so that it can be anticipated or addressed in an effort to minimize obstacles in the development of seaweed farming, namely the lack of the role of the government with the highest score of 0.128. Then the weather factor is followed by a score of 0.129. In addition, the threat factor that could be an obstacle in the development of seaweed farming in the Kokas District was the increase in the price of production facilities by a score of 0.45.

Internal-External Matrix Analysis

Based on IFE analysis, the value is 2,931 and the EFE value is 3,529. The combination of the two values shows that the seaweed farming development strategy is located in cell II, which is maintaining the quality of seaweed to meet the increasing number of requests.



Picture 1. IE Matrix Seaweed Farming Development in Kokas District, Fakfak Regency

Based on the description of the Internal-External matrix (IE) above which states that the development of seaweed farming in Kokas District, Fakfak Regency is to maintain the quality of seaweed to meet the increasing number of requests.

CONCLUSIONS AND SUGGESTIONS

According to the results obtained it can be concluded: (1) the average total cost incurred during one production is Rp. 13,305,666.67, average receipt of Rp. 30,600,000, and the average income is Rp. 17,294,333.33; (2) internal and external factors, namely strength: the availability of sufficient workforce, easy cultivation, good quality seaweed; weaknesses: limited capital, the quality of resources is still lacking, promotion is still lacking; opportunity: market share is still wide, demand is increasing, the development of technological progress; threats: weather, lack of government role, rising prices of production facilities; and (3) the priority strategy in the development of seaweed farming based on QSP matrix analysis is strategy II, which is maintaining the quality of seaweed to meet the increasing demand.

The suggestion from the author is that the Department of Fisheries and Maritime Affairs should follow up on issues related to the condition of the waters in the District of Coke so that the community can re-cultivate seaweed.

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