

Analysis Of The Feasibility Of Seaweed Farming In Pangkep District

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Abstract. Pangkep District is one of the provinces in South Sulawesi, which produces many *Eucheuma cottonii* seaweed. The coastal communities, mostly fishermen, cultivate this type of seaweed almost along Pangkep District's coast. Seaweed has a relatively short cultivation cycle, and relatively small business capital requirements can provide opportunities for household entrepreneurs to cultivate seaweed. This study aimed to determine seaweed farming's feasibility in Pitue Village, Ma'rang Subdistrict, Pangkep District. This study's sampling method was a simple random sampling method, with the number of respondent farmers as many as 40. Methods of data collection are done using observation, interviews, and documentation. The data analysis technique used analyzes income and business feasibility with the R/C ratio analysis tool. The results showed that seaweed farming was feasible and profitable to operate. The average income obtained by farmers for one harvest was IDR 3,358,384, with 1.43 income from the production costs incurred.

Keywords: the feasibility, seaweed farming

INTRODUCTION

The development of seaweed cultivation is one of the coastal areas' developments to increase the people's economy. In Indonesia, the existence of coastal villages is very dependent on traditional fisheries. As the population increases and fishing activity increases, alternative sources of income are becoming more important. One of them is the cultivation of seaweed, which since the 1980s was introduced in various regions (Blankenhorn, 2007).[1] Indonesia has enormous seaweed production potential globally, with 17,508 large and small islands and a coastline of 81,000 km. Assuming that the average stretch of seaweed cultivation can reach 200 m, Indonesia has the potential for seaweed cultivation of 1,620,000 ha. It is estimated that only 60 percent of the land area can be used for seaweed cultivation. With the addition of a bay that can expand seaweed cultivation, it is estimated that Indonesia has the potential for sustainable land for seaweed. Cultivation of 1.2 million ha. This area is considered reasonable if we refer to the data that Indonesia has shallow waters covering an area of 24 million ha. However, until now, the level of

utilization is still deficient. Indonesia is currently only able to exploit 3 percent of the existing land potential (Kemenperin, 2011).[2]

The seaweed commodity is one of the mainstay commodities in the fisheries and marine sector, which is very strategically developed in the fisheries revitalization program and shrimp and tuna[2]. Seaweed farming has generated substantial socio-economic benefits to marginalized coastal communities in developing countries, most of which have reduced access to alternative economic activities. In some communities, seaweed farming has emerged as the most relevant livelihood strategy (Valderrama, 2012).[3] In addition, a relatively short cultivation cycle of 45 days and requires low costs, minimal technology and technical expertise, [4,5,6] provides opportunities as a livelihood for coastal households [7,8,9,10,11] in cultivating seaweed. Seaweed is also an irreplaceable commodity because there is no synthetic product, so the cultivation business is very prospective. Several types of seaweed can be used as food and material for the food, pharmaceutical, cosmetic, paint, textile, and even paper industries so that they have the opportunity to become a commodity with added value. There are good opportunities for the seaweed market to meet domestic needs as well as export demand (Kemenperin, 2011) [2]

Pangkep District is one of the provinces in South Sulawesi, which produces many *Eucheuma cottonii* seaweed. Coastal communities, mostly fishermen, cultivate this type of seaweed almost along the coast of Pangkep District, including the islands with a sea area of 17,000 km² and specifically the potential land for seaweed cultivation, namely 26,700 hectares. In 2006, Pangkep District produced a seaweed production of 19,920 tons with an economic value of 29.8 billion (BPS, 2007).[12] With the available potential, seaweed cultivation is an alternative to empowering coastal communities in Pangkep District and increasing farmers' income, especially in Pitue Village.

The problems faced by farmers include fluctuating production from seaweed cultivation, which affects the income earned. This problem is caused by a lack of knowledge and capital in cultivating seaweed. The low production has been caused by farmers' limited production factors, such as seeds, labor availability, land area, and the number of ropes. In managing seaweed, farmers get low income because of low production. Based on these conditions, the researchers are encouraged to research by analyzing seaweed farmers' income in Pitue Village, Ma'rang Subdistrict, Pangkep District.

MATERIAL AND METHOD

This research was conducted in Pitue Village, Ma'rang Subdistrict, Pangkep District. The research location was determined purposively, considering that this location is one of the *Eucheuma cottonii* seaweed production centers in Pangkep District. The next step is to determine respondent farmers' selection by simple random sampling by taking 20 percent of 197 people. The selected respondents are 40 people.

The analysis used is descriptive qualitative, and quantitative. Descriptive analysis is used to describe seaweed cultivators' characteristics, while quantitative analysis is used to analyze the income, costs, and feasibility of seaweed farming. Soekartawi (1994) [13] net income or profit from agricultural business can be formulated as follows:

$$II = TR - TC$$

Information:

II = Profit

TR = Total Revenue

TC = Total Cost

One way to determine a business's feasibility is to compare the income with the total costs incurred in farming (Soekartawi, 2002)[14]. The formula used is as follows:

$$R/C \text{ ratio} = \frac{TR}{TC}$$

With the test criteria: if the R/C ratio >1, then the business being run is efficient, feasible to run. Conversely, if the R/C ratio <1, then the inefficient business is not feasible to run.

RESULTS AND DISCUSSION

Respondent Characteristics

Characteristics of respondents are characteristics inherent in individuals that can differentiate them from other individuals. Each individual has characteristics that differ from one another. These characteristics are several aspects that affect the skills of farmers in managing their farms [15]. This study's respondents include various information about internal conditions, including age, level of formal education, number of family dependents, and experience in cultivating seaweed. For more details, see the following table.

Table 1. Characteristics of Seaweed Farmers in Pitue Village, Ma'rang District

No.	Characteristics	Max.	Min.	Mean
1	Age (year)	65	23	45.05
2	Formal Education (year)	12	2	6.68
3	Number of family dependents (person)	13	8	4.83
4	Farming experience (year)	30	2	10.02

Source: Primary data, 2020 (processed)

Respondent Age

Age level affects farmer productivity because physically, they still have a good enough ability to carry out farming activities. The average respondent farmer is 45 years old, with a minimum age of 23 years and a maximum of 65 years. Thus, most farmer respondents are of productive age and still have excellent physical and energy

skills in conducting seaweed farming. Farmers who are in productive age are generally easier to receive new information and innovations and make decisions more quickly in determining the technology to be applied in his farming.

Respondent Formal Education

Education has an essential role in improving human intelligence and skills, including advancing the socio-economic life of farming communities. The level of education also affects the success in managing a business that they do. The higher the level of education, the more responsive farmers are in accepting and implementing innovations. Most of the farmers only have a primary school education. Low education can affect the mindset of farmers in carrying out their business activities. Besides, education will also influence farmers to absorb new information and innovations and technology transfer applied in farming activities.

Respondent Family Dependents

Many family dependents for farmers will motivate them to increase their income to support their families because they are their backbone. The average number of dependents for farming families is four people with a range of at least two people and a maximum of 13 people. The number of family dependents usually influences the farmer as the household head to meet household needs. The number of family members, in this case, as family workers, has a share in seaweed farming activities because it can make a positive contribution to business capital.

Respondents' Business Experience

The experience of farmers in seaweed cultivation is an average of more than 10.02 years. Most of the farmers have more than ten years of experience with a minimum range of 2 years and a maximum of 30 years. This data shows that the seaweed farmers in the study area are quite experienced in cultivating seaweed. This experience is expected to increase farmers' production and income. Respondents already know the proper cultivation technique and season, but seaweed cultivation is highly supported by natural conditions, namely challenging waves and the rainy season. Hard waves can wash away and break the seaweed, while the rainy season can cause moss infestation on the seaweed.

Characteristics of Seaweed Business

Business characteristics are the characteristics of the resources used to produce a product, in this case, seaweed. The characteristics of the seaweed business can be seen in the following table:

Table 2. The characteristics of seaweed business in Pitue village, Ma'rang Subdistrict

No.	Characteristics	Max.	Min.	Mean
1	Total Man Power	20	3	7
2	Number of stretch straps (rope)	1.000	150	447
3	Number of seaweed seeds (kg)	3.000	200	1.229
4	Seaweed Production (kg)	1.250	200	670

Sources: Primary data, 2020 (processed)

Total Manpower

Labor is one of the vital production factors and needs to be considered in the production process, labor numbers, and availability. Farmers generally use seven workers to tie the seaweed seeds to a rope stretched over the seawater. Respondent farmers use a maximum workforce of 20 people and a minimum of 3 people.

Number of Ropes stretched

The farmers' stretch rope is a size eight rope that is stretched about 15 meters long. A float from a used mineral water bottle was used to prevent the stretch rope from sinking. For each stretch, there are 3-4 bottles. The number of stretch ropes used by the farmer is 484 stretch ropes with a maximum of 2,000 stretch ropes and a minimum of 150 stretch ropes.

Number of Seaweed Seeds

Generally, seaweed seeds are obtained by farmers from traders who provide loans or capital assistance. The type of seed used is *Eucheuma cottonii*. The seedlings are tied to rope size No.2, on each stretch of rope that is approximately 15 meters long. The rope's length between the seedlings is about 6-7 cm, and the number of seeds needed for each stretch is about 4 kilograms. The number of seaweed seeds used by farmers is an average of 1,229 kg, a maximum of 3,500 kg, and a minimum of 200 kg.

Seaweed Production

The average seaweed production produced by farmers is 670 kg, which is dry and ready for sale. The maximum seaweed production produced by farmers is 1,250 kg and a minimum of 200 kg.

Seaweed Farming Revenues, Costs, and Income

In general, net income is the difference between gross income and total expenditure. According to Soekartawi (2002), [14,15] farm revenue is the multiplication of production and selling price. Meanwhile, the costs incurred by farmers are fixed costs and variable costs. The sum of fixed costs and variable costs is the total cost. So operating income is the difference between revenue and all costs that are actually incurred by the producer. The level of income is influenced by the selling price and the amount of production. Revenue, costs, and income obtained by seaweed farmers can be seen in table 3.

Table 3. Average Revenue, Cost, and Income of Seaweed Farming in Pitue Village Pangkep District

Number	Description	Value
1	Revenue	
	a. production (kg)	670
	b. price	16.550
	Total Revenue	11.088.500
	Fixed Cost	
	a. boat	160.250
	b. boat engine	16.725

Number	Description	Value
	c. floor mat	15.975
2	Total Fixed Cost	192.950
	Variable Cost	
	a. main rope	30.100
	b. medium rope	26.254
	c. rope binding seed	15.200
	d. seeds	7.225.000
	e. plastic bottles	10.200
	f. gasoline	80.000
	g. labor cost	150.412
3	Total Variable Cost	7.537.166
4	Total Cost (2 + 3)	7.730.116
5	Income (1 – 4)	3.358.384
6	R/C	1,43

Sources: Primary data, 2020 (processed)

The average revenue from seaweed farming is IDR 11,088,500, with an average production of 670 kg of dry seaweed. The average selling price is IDR 16,550 per kg. The number of production factors will be related to the amount of sacrifice in obtaining these production factors. The greater the use of production factors, the higher the costs incurred for seaweed cultivators. Production costs that are calculated are the sum of fixed costs and variable costs. Fixed costs incurred by farmers consist of maintenance costs and depreciation of equipment used by farmers, including boats, engines, tarp nets as a base for drying the seaweed. The average amount of fixed costs incurred by farmers is IDR 192,950, while the variable costs incurred consist of costs for seeds, foundation ropes, stretch ropes, ropes, plastic bottles, labor wages, and gasoline. Total variable costs incurred IDR 7,537,166. The average total cost incurred by seaweed farmers is IDR 7,730,116.

The analysis results show that the average income of seaweed farmers is IDR 3,358,384 per harvest season. The results of the analysis show that the ratio between revenue and costs is 1.43. This result shows that seaweed cultivation is profitable and feasible for cultivation because every hundred rupiahs spent will provide an income of one hundred and forty-three rupiahs.

CONCLUSION

Based on this study's results, it can be concluded that; The income of seaweed farmers for one harvest season in Pitue Village, Ma'rang Subdistrict, Pangkep District is IDR 3,358,384. The result of comparison analysis between revenue and seaweed business costs is 1.43. Thus seaweed cultivation is feasible because of the value of $R/C > 1$.

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