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Analysis of seaweed cultivation business in Ped village, Nusa Penida district, Klungkung regency

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Abstract. Seaweed is one of the potential marine biological resources which functions as a source of income for the government and community. Ped village located in Nusa Penida has a relatively wide seaweed cultivation area covering around 32 ha, with the number of farmers being 325 families. The kinds of seaweed suitable to be cultivated using the off-bottom method in Nusa Penida is Euchema spinosum and euchema cottonii. Seaweed cultivation is very easy, requiring no fertilizers and pesticides as in rice plantation. Another advantage is that it can be planted throughout the year, and it has a short harvest age, which is about 42 days. The quality of seaweed is largely influenced by the type of seeds, the age of harvest, and, most importantly, the drying process. Drying is done using the following method: the seaweed is placed on a tarp put on the ground and exposed it to the sun. As a consequence, the amount of dirt contained in the dried seaweed is still high, leading to its low price. This research was conducted using survey method. The data collected consisted of primary and secondary data. Primary data relating to socioeconomic and business circumstances are collected through interviews and questionnaires. Secondary data were obtained from the Nusa Penida Sub-district, and the Central Bureau of Statistics of Klungkung Regency, as well as other references related to the study. The results of this study showed that the cultivation of seaweed using off-bottom method was quite effective, RCR = 1.29, meaning that such method was profitable and reasonably feasible. The net income derived from an area of 4 acres was Rp. 1.800.000 per period. This opens up business and employment opportunities for the surrounding community, although this income is still highly dependent on the national tend-to-fluctuate market price of dried seaweed.

Keywords: seaweed, off-bottom method, business feasibility, return cost ratio.

1. Introduction

Seaweed is one of potential bio-resources of Indonesian sea. Seaweed cultivation and fishing activities has potential to increase people's income, widening job opportunity and business chance as well as the state foreign exchange producer (Pontoh, 2012).

Nusa Penida is a Sub-district that consists of three islands those are the Lembongan Island, Ceningan Island, and the biggest is the Nusa Penida Island. The three islands are located at South-eastern side of Bali Island which is included in Klungkung Regency territory, which in the present time has succeed in developing seaweed cultivation by targeting for export. Nusa Penida Sub-district territory area is 202.84 km^2, with total population of 47,786 (Klungkung in Number, 2012). By the success of seaweed cultivation, many farmers change to be seaweed cultivator, especially those who are living in the North coastal area of Nusa Penida. Seaweed cultivation is very easy, by using simple equipment and local materials, except for the nylon rope and raffia that should be bought. Seaweed cultivation does not need any fertilizer or pesticide like in those for rice and other plants (Anggadiredja et al., 2006; Aslan, 2002).

Seaweed cultivation in the present time has become the main activity to people of north coastal area of Nusa Penida Island, because seaweed demand to fulfill export market is high. Dried seaweed is sent

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to Denpasar or Surabaya, and furthermore to be exported to destination countries such as Japan, China, Taiwan, Australia, the United States, England, and other countries.

To find out whether a business in this case is seaweed cultivation business has any good prospect or in contrary, it needs financial analysis which is related to the cultivation activity such as availability of seed, equipment, manpower, materials, etc. Until today there has not found yet a scientific report that analyze the financial matter about investment cost and operational cost and feasibility analysis of a seaweed cultivation business at Ped Village, Nusa Penida Sub-district of Klungkung Regency. The aims of this research were to estimate the return cost ratio (RCR) of seaweed cultivation business, as indicator of the efficiency of project investment.

2. Research Method

This research was performed at Ped Village, Nusa Penida Sub-district of Klungkung Regency. Subject or respondents in this research are the seaweed cultivators who cultivate seaweed by using off-bottom method (Poncomulyo et al., 2006), with total respondents of 18 people (Colton, T. 1984). This research was performed by using survey method. Data collected consist of primary data and secondary data. Primary data are related to the social economy condition and the condition of the business until the present time and they are collected through direct interview and questionnaire filling in. Secondary data are collected from the head village office, Nusa Penida Sub-district in Number, and the Central Bureau of Statistic (BPS) of Klungkung Regency and other references related to the research.

The primary data obtained from the subject or respondents of seaweed cultivator are furthered to be processed and analysis descriptively. According to Waldiyono (2008) whatever the business is there is only known two types of cost those are the fixed cost and the variable cost. Furthermore, financial analysis is to find out the business feasibility counted by using the following formula (Abdelrhman HA et al., 2016; Elida et al., 2012; Waldiyono, 2008):

$$\begin{aligned} II &= TR - TC \\ &= TR - (TVC + TFC) \\ &= (Y.PY) - (X1.PX1 + TFC) \\ &= (Y.PY) - [(X1.PX2) + (X2.PX2) + (X3.PX3) + D\} \end{aligned}$$

Where:

Π	:	net income (Rp/acre/ production period)
TR	:	gross income (Rp/acre/ production period)
TC	:	total cost (Rp/acre/production period)
Y	:	total production (kg/acre/ production period)
Py	:	product price (Rp/kg)
TVC	:	total variable cost (Rp/acre/ production period)
TFC	:	total fixed cost (Rp/acre/ production period)
X1	:	total seaweed seed (kg/acre/ production period)
PX1	:	cost of seaweed seed (Rp/kg)
X2	:	total of maintenance width (acre/production period)
PX2	:	cost of maintenance (Rp/acre)
X3	:	total of manpower (HOK/acre/production period)
PX3	:	salary of manpower (Rp/HOK/ production period)
D	:	depreciation (Rp/unit/ production period)

To find out business efficiency it is used the criteria of Return Cost Ratio (RCR), which is analyzed with the following formula:

$$RCR = TR/TC$$

Where:

RCR	=	return cost ratio
TR	=	total demand (Rp/acre/ production period)
TC	=	total cost (Rp/acre/production period)

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With criteria, if RCR > 1, seaweed cultivation business is said to be efficient and profitable, and it is proper to be developed; RCR < 1, the seaweed cultivation business is not efficient and not profitable; RCR = 1, the seaweed cultivation business is in breakeven (not profitable neither loss).

3. Result and Discussion

The seaweed cultivation business with off-bottom method is started from area preparation that is to clean the bottom of the sea, installing of stakes, tying seed to plastic rope, tying plastic rope to stakes, maintenance, harvesting after 42 days old, drying, storing, and marketing. Financial analysis has purpose to find out whether a business is feasible or not to be developed. Analysis basic uses the calculation of fixed cost, variable cost, total cost, gross income, and net income (Haron AJ, 2016). Calculation of fixed cost for an area with size of 1 acre or 10 m x 10 m showed in Table 1.

Table 1. Fixed cost calculation

Description	Unit		Unit Price (Rp)	Total (Rp)
Field cleaning	1	Are	100.000	100.000
wood pole	40	Pcs	20.000	800.000
Nylon rope	3	Rol	250.000	750.000
Plastic rope	2	Rol	50.000	100.000
Total				**1.750.000**

`The greatest fixed cost component is the wood stake supplying which take portion for about 45.71% from total fixed cost. And the second position is the nylon plastic rope supplying for 42.85%. Considering that the stake supplying cost is big then it needs to do regular maintenance in order that the stakes are able to hold out longer by cleaning the stick dirt.

Furthermore, calculation of variable cost is done such as shown in Table 2. Deprecation is calculated based on supposition depreciation that occurs about 20% per period (Rochmanhadi, 1984). The greatest production cost component is the seed supplying cost for about 45.16% from total production cost, followed by the maintenance cost for 32.25%.

Table 2. Production cost and income per period

No	Description	Unit		Price piece (Rp)	Total (Rp)
1	Production cost				
	Wet seaweed seed	140	Kg	5.000	700.000
	Maintenance personal	1	People	500.000	500.000
	Tool's depreciation	0,20		1.750.000	350.000
				Production cost	**1.550.000**
2	Income				
	Dried seaweed sale	250	Kg	8.000	2.000.000
	Net income				450.000
3	Eficiency				
	RCR				**1.29**

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Whereas, income is influenced by total dried seaweed produced, and price in market is around Rp. 8,000/kg. Calculation of RCR efficiency value obtained around 1.29 or greater than 1 which means that the seaweed cultivation business with off-bottom method is quite profitable and suitable to be developed.

A seaweed cultivator can work the land for about 4 acres (400 m^2) so net income obtained is about Rp. 1,800,000.00 per period, where one period duration is 42 days.

4. Conclusion and Suggestion

Conclusion

1. From the calculation of above table the cost needed in area preparation with width of 1 acre (10 m x 10 m) with off-bottom method is Rp. 1,750,000, and the operational cost (production cost) needed is Rp. 1,550,000 per period.
2. With RCR value = 1.29 it means that 1.29 > 1 is feasible to be developed to open business opportunity and job chance for surrounding people.

Suggestion

To improve seaweed production it needs to give training and illumination in order that the seaweed cultivators will have proper knowledge and skill in seaweed cultivation technique by using off-bottom method, and also the marketing management expected can improve people's income and welfare.

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