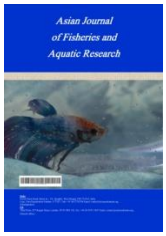

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Feasibility Analysis of Seaweed, *Gracilaria* sp., Cultivation in Polyculture System In Ponds: A Case Study From Domas Village, Pontang Serang Banten, Indonesia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This research aims to analyze business feasibility of cultivation of seaweed, *Gracilaria* sp., and factors that affect farmers' income in Domas Village, Pontang District, Serang Banten Regency. This research was conducted from April 2021 to June 2021 in Domas Village, Pontang Subdistrict, Serang Regency, Banten and was conducted by survey method. Location determination was done by the census sampling method. Sampling was conducted for 35 seaweed farmers in Domas Village. The data analysis used was a business feasibility analysis that includes income analysis, R/C ratio, Payback period, Break event point, sensitivity analysis, and multiple linear regression analysis. The result of the business feasibility analysis obtained was the profit value of *Gracilaria* sp., cultivation in Domas Village, which was 115,168,232 / year, R / C of 1.32% means that the business was worth running, the payback period value was 1.51 years since the company was established. The product's BEP (kg) value in this study was 1,320 kg. Meaning that the break-even point will be reached if the cultivation produces *Gracilaria* sp. So that the business can be developed. As for the sensitivity, the value increases acceptable operating costs by 5%. In

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addition, the calculation of sensitivity to the decline in selling value is known to be a very sensitive variable because it's 3% decrease will lower the of R / C value to less than 1. This indicates that variable selling prices are more sensitive to investment value than operating costs. Factors that affect the income of cultivators in Domas Village of Pontang Subdistrict are Modal (X_1), Total Production (X_2), *Gracilaria* sp. (X_5), and Bandeng Fish Seedlings (X_6) with a coefficient of determination of 91.8%.

Keywords: Business feasibility; gracilaria cultivation; polyculture system; domas village.

1. INTRODUCTION

Gracilaria sp. is one of the agar-producing aquatic plants with potential in its cultivation. In 2018, seaweed production was obtained by 10.18 million tons and continued to increase from 2014 to 2019. National seaweed exports grew an average of 6.53% per year. The export value of seaweed in 2019 in Indonesia was recorded at 324.84 million USD or grew 11.31% compared to 2018, which reached 291.83 million USD [1]. In addition, in the marine and aquatic sector, seaweed is one of the leading comudity with a selling point (Pratama, Nurhayati, Rizal, and Suryana 2021). Administratively, Serang Regency is located in Banten Province. It is located in the district. Pontang, Kec. Tanara and Kec. Tirtayasa with superior commodities of bandeng fish and seaweed. This place is the cultivation area of Minapolitan. One of the superior economic uses of Serang regency is *Gracilaria* seaweed. *Gracilaria* seaweed is one of the biological resources with great potential in Serang Regency. *Gracilaria* sp. It has potential in the industry, health, and agriculture. One example of *Gracilaria* sp products in Domas Village is gelatin and crackers. *Gracilaria* sp. These products contain potassium which is good for reducing blood pressure in the body [2].

Domas Village is located in Pontang District, Serang Regency, Banten. Domas Village, situated in Pontang Regency, is included in the northern coastal area of Banten Province, located at coordinates 5050' to 6021' South Latitude and 10500' to 106022' East Longitude. Domas village is included in one of the areas that are still actively producing in the use of aquaculture ponds with a polyculture system, one of which is the cultivation of seaweed *Gracilaria* sp. with milkfish (*Chanos chanos*). Utilization of the area carried out through a polyculture system in ponds can optimize land productivity while preventing disease attacks in milkfish cultivation because seaweed has a role as a protector of milkfish and produces oxygen [3].

From an economic point of view, seaweed is a commodity that is developed considering its nutritional value. Seaweed has a vital role in various products related to daily life. In addition, seaweed can be used as food ingredients such as gelatin, vegetables, cakes and produce algin, carrageenan, and various materials used in the pharmaceutical, cosmetic, and textile industries [4]. In addition, *Gracilaria* sp. can be used as animal feed [5] (Johnson et al., 2014). *Gracilaria* seaweed can contribute more than 66% of global production orders [6]. *Gracilaria* sp. polyculture ponds. Domas Village needs to be developed to increase the production of *Gracilaria* cultivation in the future.

Polyculture is a cultivation activity that preserves more than one commodity (species). The role of milkfish (Chanos chanos) in polyculture with seaweed, among others, can provide fertilizer which is used as a nutrient for seaweed derived from milkfish manure. In seaweed cultivation, bandeng fish and shrimp are usually polycultural stocked, intended to reduce moss in ponds because the presence of moss will reduce the quality of dried seaweed (Ratnawati and Mustafa 2003).

Seaweed cultivation is needed for increasing its production to meet the industrial demand on one hand and to conserve nature on the other [7]. Coastal communities are the main actors in developing seaweed cultivation to produce seaweed as cultivators. Cultivation of *Gracilaria* in ponds absorbs 50 workers/year/ha (KKP Serang 2018). Local traders, intercity traders, and exporters will emerge in the trade sector, which will also offer additional job opportunity. Downstream, the industrial sector engage a lot of laborer ranging from 100 to 500 workers [8].

2. METHODOLOGY

2.1 Time and Place

Research Analysis of Feasibility of Seaweed Cultivation With Polyculture System in Domas

Village Pontang District Serang Banten is located on Jalan Raya Domas District Pontang Serang Banten Province. The research was conducted from April to June 2021.

2.3 Research Methods

Primary and secondary data were collected for the present investigation. Primary data were collected using pre-tested questionnaire directly from 35 direct beneficiaries of Domas village who are cultivatiors of *Gracilaria* seaweed in ponds with bandeng fish. Secondary data were collected from different published information and from line department of the Government i.e. Department of Fisheries and Marine Affairs, Serang Regency, Banten.

2.4 Data Analysis Methods

All the data were subjected to statistical analysis using IBM Statistics 25 Program, Microsoft Office Excel 2016. Multiple linear regression analysis was done using IBM Statistics 25 Program and business feasibility analysis was done using Microsoft Office Excel 2016.

2.5 Business Feasibility Analysis

According to Sobari (2006), business feasibility can be determined by analyzing investment criteria. This business feasibility analysis is used to determine whether the seaweed cultivation business in Domas Village of Pontang District of Serang Banten Regency is feasible or not to be developed. The analysis was done by calculating income analysis, R/C (Return Cost Ratio), Payback Period (PP), BEP (Break-Even Point), and sensitivity analysis. Using following formulae.

2.5.1 Profit analysis

Profit analysis is the difference between total revenue and total cost (Suratiyah 2015). The purpose of income analysis is to determine the value of profits from the cultivation of *Gracilaria* sp. in a polyculture system [9]. The income formula is as follows.

$$\Pi = TR - TC$$

Description :

Π = Profit
TR = total revenue
TC = total cost

2.5.2 Return cost ratio (R/C)

Return Cost Ratio was used to calculate the comparison between the ratio and cost of the feasibility analysis of seaweed cultivation in a polyculture system. The formula for the Return Cost Ratio is as follows.

$$\text{R/C Ratio} = \frac{Total\ acceptance}{Total\ cost}$$

According to Soekartawi [10], the criteria for business feasibility are as follows.

1. Theoretically, with an R/C ratio = 1, it means that there is no profit and no loss; in this case fishers or producers can be stated in the break-even point (BEP).
2. R/C < 1, then the business is not feasible to carry out
3. R/C > 1, then the business is feasible to carry out

2.5.3 Payback Period (PP)

The payback period is the time it takes for a project's benefits to cover all previous (i.e capital and operational) project costs incurred, usually within an annual timeframe. The value of the money used is the actual value, i.e., in the prevailing price (not discounted), but it can also be in cash value (i.e., after discount) [11]. The formula used in calculating PP is as follows:

$$PP = n + \frac{a-b}{c-b} \times 1\ year$$

Description :

n = The last year where the amount of cash flow still cannot cover the original investment
a = amount of original investment
b = cumulative amount of cash flow in year n
c = cumulative amount of cash flow in year n + 1

2.5.4 Break Event Point (BEP)

Break Event Point is used to determine a point in both units and rupiah that shows costs equal to revenue. If this point can be known, then there is no profit or, in other words, no profit and no loss [12 224]. The following is the formula for calculating BEP.

1. BEP Production = $\frac{Total\ Production\ Cost}{Selling\ Price}$
2. BEP Price = $\frac{Total\ Production\ Cost}{Total\ Production}$

2.6 Analysis of Factors Affecting the Income of *Gracilaria* sp Cultivators

Multiple Linear Regression is used to determine the factors that affect the income of seaweed farmers in Domas Village, Pontang District, Serang Banten Regency. Then, multiple linear regression models can be obtained by estimating their parameters using specific methods. The multiple linear regression formula with the free variable p is as in the following equation.

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3+b_4X_4+b_5X_5+b_6X_6+b_7X_7+b_8X_8+ b_9X_9 + b_{10}X_{10}+e$$

Dengan :

Y = Cultivator's Income
a = Constant
X_1 = Capital (Rp)
X_2 = Total Production of *Gracilaria* sp. (tons)
X_3 = Total Production of milkfish (tons)
X_4 = Land (Ha)
X_5 = Seedling *gracilaria*.sp (kg)
X_6 = milkfish seeds (kg)
X_7 = Drying area (m^2)
X_8 = Medium size basket (unit)
X_9 = Price of seaweed *Gracilaria* sp. (Rp)
X_{10} = Price of milkfish (Rp)
E = *Error*

Before testing multiple linear regression analysis, a classic assumption test was performed. The classical assumption test consists of the normality, multicollinearity, and heteroscedasticity tests [13]. Then proceed with making a regression model with statistical tests consisting of the R-Square Test and ANOVA (F Test and T-Test).

3. RESULTS AND DISCUSSION

3.1 General Conditions of Domas Village, Pontang District, Serang Regency, Banten

This research was conducted in Pontang District, Domas Village. Domas Village is located in the northern region of Java Island, Pontang Subdistrict, Serang Regency, West Java Province. The distance traveled from Pontang District is about 5 km. The distance from the district government center is 38 km. It takes about 2 hours. There are two villages in Domas Village, namely Domas Village and Cerocoh Village. There are 4 RW and 12 RT. In Pontang District, its potential is a micropolitan area. Superior products produced from Domas Village, Pontang District, Serang Banten Regency are bandeng and seaweed *Gracilaria* sp.

3.2 Characteristics of Respondents

In this research, we used 35 respondents who were seaweed farmers in Domas Village Pontang District Serang Regency, Banten. The question In this research questionnaire containing 40 questions related to the variables was used to collect the primary data from the respondents.

Capital has a vital role in business because the amount of money determines the size of a business. The More significant the company's wealth, the more excellent the opportunity to develop the industry, and vice versa. Based on interviews with cultivators in Domas village, the highest percentage value in spending capital for seaweed cultivation with a polyculture system is Rp. 1,200,000-Rp 1,400,000.00 with 37%. As a comparison, there is one cultivator with the lowest rate of capital is 3%, with a capital expenditure of IDR 800,000.00-Rp 1,000,000.00.

Total production of seaweed *Gracilaria* sp. Very influential on the income of cultivators in Domas Village. The more production of *gracilaria* sp. Then the income of farmers will be higher. Based on the results of interviews with cultivators in Domas Village, from 35 cultivators, there were 16 cultivators with a total production of 1 ton - 2 tons per 3 months with a total percentage of 46%. At the same time, there are two cultivators with a total production of 5 tons - 6 tons in 3 months with a percentage value of 6%.

Amount of milkfish (*Chanos chanos*) production in the polyculture of *Gracilaria* sp. In Domas Village, Pontang District, Serang Regency, Banten, affected the income of cultivators. Based on interviews with 35 farmers, there were 14 farmers with milkfish production of 1 ton - 1.5 tons with a percentage of 40%, while there were nine farmers with an output of 1.5 tons - 2 tons with a total rate of 26%.

Pond land is an essential means of cultivating seaweed polyculture *Gracilaria* sp. with milkfish in Domas Pontang Village, Serang Regency, Banten Regency. Based on interviews with 35 farmers, 26 farmers used 1 ha - 1.5 ha of pond

land with 74%. Meanwhile, three cultivators use ponds with an area of 2 ha - 2.5 ha at a rate of 9%.

Seeds of *Gracilaria* sp. affected seaweed production and farmers' income in Domas Village. Based on the results of interviews with cultivators in Domas Village, 31 cultivators planted *Gracilaria* seeds weighing 1 ton – 1.5 tons with a percentage of 89%/ha. In addition, two cultivators planted *gracilaria* sp seeds as much as 1.5 tons - 3 tons with a rate of 12%/ha.

Based on fish seed stocking data, 24 cultivators sowed 20,000 fish/ha or 0.25 tons - 0.5 tons/ha, with a percentage of 69%. Meanwhile, there is one cultivator who sows seeds as much as 1 ton – 1.5 ton/ha with a total rate of 3%

At the drying stage, the length of the drying ground is effective in drying seaweed *gracilaria* sp. Based on interview results, there is 28 land with a length of drying land of 500-1000 m^2 with a percentage of 80%, while there are seven lands with a size of drying land along 1000-2000 m^2 with a rate of 20%.

Baskets are a tool for harvesting fish and seaweed. The more baskets, the more effective they will be in harvesting. Based on the interviews of 21 pond lands use baskets with the number of 1 basket unit each with a percentage of 60%. In addition, there is 14 pond land that uses baskets with the amount of each pond land two units with a percentage of 40%.

The price of *gracilaria* sp. affected the income of farmers. Prices are determined based on market prices. Based on the results of interviews with farmers in Domas Village, 21 farmers sell seaweed *Gracilaria* sp. with a price of Rp.4500.00 with a percentage of 60%; in addition, 12 farmers sell seaweed *gracilaria* sp. for Rp. 4000.00 with a rate of 34%, and two cultivators sell seaweed for Rp. 5000.00 with a rate of 6%. The price has been determined and adjusted to the market price

The price of fish affects the income of farmers. Prices are determined based on market prices. Based on interviews with cultivators in Domas Village, cultivators issued two price categories, namely Rp. 20,000.00 and Rp. 25,000.00. Eighteen farmers sell milkfish for Rp. 25,000.00 with a percentage of 51%, and 17 farmers sell milkfish production for Rp. 20,000.00 with a percentage of 49%.

3.3 Feasibility Analysis of Seaweed Cultivation *gracilaria* sp. With a Polyculture System in Domas Village, Pontang District, Serang Regency, Banten

Feasibility analysis of seaweed cultivation *gracilaria* sp. with the polyculture system in Domas Village, Pontang District, Serang Banten Regency is done to determine whether or not a business is worth in the village. Business feasibility analysis was conducted using investment criteria consisting of income analysis, R/C (Return Cost Ratio), Payback Period (PP), and Break-Even Point (BEP).

Based on the estimated cost results, the investment remains in the cultivation of *Gracilaria* sp. with a polyculture system in Domas Village, Pontang District, Serang Regency, Banten requires a fixed investment of Rp. 112.170.000 and working Rp. 29,666,917, so the estimated total funding requirement for this pond business is Rp. 141,836,917. The polyculture system in Domas Village, Pontang Subdistrict, Serang Regency, Banten. The cost of investing in this cultivation business consists of materials and equipment. The investment cost of this pond cultivation business is used to purchase *Gracilaria* sp cultivation support equipment. The Initial expenditure on the cultivation of *Gracilaria* sp. with a polyculture system Rp. 112.170.000. In the fourth year, equipment replacement costs increased, namely Rp. 113,764,881 with inflation of 4.5% per year, and the inflation determination refers to the Regulation of the Minister of Finance Number 96/PMK.03/2009. The operational costs incurred for ponds with operational time per year are divided into two parts, namely direct costs, and indirect costs.

Fixed costs consist of the purchase of products and the cost of human resources. The cost of purchasing products is incurred to obtain bandeng seed products, seaweed, urea fertilizer, SP-36, NPK, Organic, Medicines, and vitamins. The product's price is assumed to increase each year by 4.5%. In the first year, the number of product purchases amounted to Rp 60,403,000, with a projected harvest of 8 tons of fish and 60 tons of seaweed. Meanwhile, the cost of human resources included salary fees for cultivators, where salaries were adjusted to ensure that agriculture had been maintained. As for the amount of compensation every month from cultivators, that is, the number of human

resource costs in the first year amounted to Rp 286,000,300, the cost is assumed to rise 4.5% per year.

Maintenance costs incurred to pay for pond maintenance in running a pond business. Variable costs consist of site maintenance costs and depreciation costs. From these considerations, the determination of the budget for the maintenance of the pond budgeted at Rp. 70,000,000.00 assuming an increase of 4.5% per year. While the depreciation cost is calculated based on the economic life of each tool so that the amount of depreciation in the first four years is the same because the economic life of the tool remains standardized for four years. However, in the 5th year, the amount of depreciation increased to Rp. 33,441,203.00 due to inflation of 4.5% and the end of the economic life of the fixed assets set.

From the results of the calculation of the income analysis obtained from the current value of money from revenues minus the current value of money from the cost of the current investment period of 5 years, the profit is Rp. Rp 115,168,233 shows that this pond is feasible to run in terms of investment. R/C is one of the essential factors determining the feasibility of a project or business. The R/C level achieved for the 5-year investment period in aquaculture is 1.32%. The R/C level shows that this project/business is feasible because R/C > 1. This means that in 1 rupiah issued, and it can generate revenue of 1.32 rupiah.

PP analysis is used to determine the time required for a return on capital or initial investment. Using the estimated cash flow, PP has been obtained for 1.51 years since the business started. In that period, the cumulative value of cash has shown positive results so that it can be said that the payback period is below the investment age specified at the beginning, namely for 5 years, which means that the return on invested capital in the pond business can be obtained for 1 year 5 months and this shows a positive thing considering the remaining investment life, which is for 3 years and 5 months, is the profit from the investment made.

Break Event Point is used to determine a point in both units and rupiah that shows costs equal to revenue. If this point can be known, then there is no profit or, in other words, no profit and no loss. BEP calculation is presented in weight (kg) and price (Rp).

The results of BEP (price) calculation on the cultivation of seaweed *Gracilaria* sp. with a polyculture system obtained a value of 1,320 Kg, which means that the break-even point will be achieved when cultivation produces seaweed *Gracilaria* sp. as much as 1,320 Kg. Meanwhile, the price BEP (Rp) for seaweed *Gracilaria* sp., namely Rp2.291,00. This means that the break-even point will be achieved at the selling price of seaweed of Rp2.291,00/Kg.

Sensitivity analysis is used to anticipate unexpected conditions with the aquaculture business, so a sensitivity analysis is carried out on the estimates that have been made previously. Sensitivity analysis is used to see and anticipate the effects of changes related to the factors involved in investment financing. This research has determined to calculate the sensitivity of changes in the increase in operational costs and decrease in selling prices.

Changes that occur after calculating the sensitivity of the increase in operating costs. When operational costs increase by 5%, the value of this investment is still feasible because the R/C value is still more than 1. which can be accepted as 5%.

The sensitivity calculation to a decrease in selling value is a very sensitive variable because when there is a decrease of only 3%, the R/C value becomes smaller than 1. This shows that the selling price variable is more sensitive to the investment value than operating costs.

3.4 Multiple Linear Regression Analysis

Multiple linear regression calculation is used to analyze the factors that influence farmers' income in Domas Village, Pontang District, Serang Regency, Banten. Based on the calculation results, there are 10 variables analyzed. These variables include X_1 (capital)/Rp, X_2 (amount of seaweed production)/ton, X_3 (amount of milkfish production)/ton, X_4 (land), X_5 (*Gracilaria* sp.)/kg, X_6 (milkfish seeds).)/kg, X_7 (length of drying area)/m, X_8 (basket)/unit, X_9 (price of seaweed)/kg, X_{10} (price of milkfish)/kg.

Prior to forming the regression model, the classical assumptions were tested first so that the model formed gave a BLUE estimate (Best, Linear, Unbiased, Estimator). This assumption test consists of three tests, namely normality test, heteroscedasticity test, and mutikolinierity test.

Based on the SPSS output (Fig. 1), the Sig value is obtained. normality test using the Kolmogorov-Smirnovs method is 0.2. Because the p-value is more significant than alpha (0.2 > 0.05), it can be concluded that the residual data is usually distributed.

The heteroscedasticity test aims to test whether there is an inequality of variance in the regression model from the residuals of one observation to another observation. A good regression model is one with homoscedasticity or no heteroscedasticity. One of the methods used to detect the presence or absence of heteroscedasticity is to look at the graph plot between the predicted values of the dependent (dependent) variable, namely ZPRED, with the residual SRESID.

Based on the heteroscedasticity test image (Fig. 2), it can be seen that the points spread randomly, not forming a pattern, as well as the points spread both above and below zero on the Y-axis. It can be concluded that there is no heteroscedasticity in the regression model, so the regression model is feasible to use for subsequent analysis.

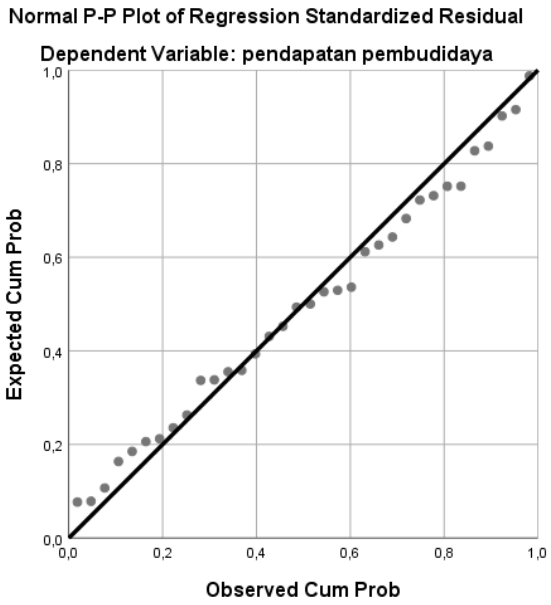

Fig. 1. Normality test

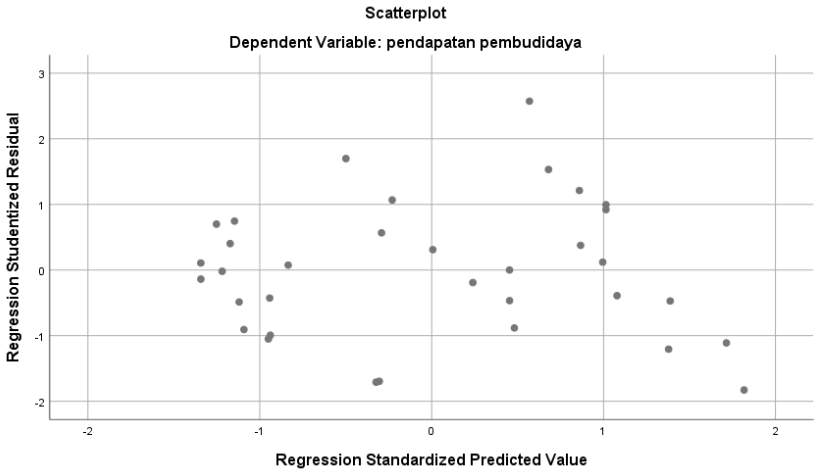

Fig. 2. Heteroscedasticity

The multicollinearity test aims to test whether there is a correlation between the free variables in the model. A good model doesn't have to be correlated with free variables. Based on the results of multicollinearity test data, the VIF values of all free variables are below 10. Based on these results, it can be concluded that there is no multicollinearity between free variables in the model.

In this research, multiple linear regression analysis is intended to determine the effect of the independent variable on the dependent variable. The goal is to predict or estimate the value of the dependent variable in a causal relationship to the value of other variables.

Based on the output above, the constant values and regression coefficients can be obtained so that multiple linear regression equations can be formed as follows:

$$Y = -500400{,}995 + 0{,}743X_1 + 138617{,}939X_2 - 162625{,}719\ X_3 - 113538{,}576\ X_4 - 152357{,}146X_5 - 318060{,}350X_6 - 35{,}439X_7 + 58480{,}579X_8 + 174{,}124X_9 + 7{,}821X_{10} + e$$

Pearson Product Moment correlation analysis is an analysis that is used to find a relationship and prove the hypothesis of a relationship between two or more variables if the variable data is in the form of an interval or ratio and the data sources of each variable are the same. Based on the interpretation table of the correlation coefficient presented above, the correlation coefficient of 0.958 indicates a solid relationship between the independent variables and the dependent variable. Based on the results of the calculation of the coefficient of determination, the value of the coefficient of determination is 91.8% which indicates that the effect of X_1 (Capital), X_2 (amount of seaweed production)/ton, X_3 (amount of milkfish production)/ton, X_4 (Land)/Ha, X_5 (*Gracilaria* Seeds)/ton, X_6 (Milkfish Seeds)/ton, X_7 (length of drying area)/m, X_8 (baskets)(Unit), X_9 (seaweed price)/kg, and X_{10} (milkfish price)/kg is 91.8% of Y (Cultivator's income) Rp/month. At the same time, the remaining 8.2% is influenced by other factors not observed in this research.

Simultaneous hypothesis testing is a hypothesis testing that aims to determine whether simultaneously or simultaneously the independent variables (independent) have a significant or no significant effect on the dependent variable (dependent).

Based on the results of the test F obtained a significance value of 0.000, because p-value (sig) > 0.05 (alpha 5%) or 0.00 < 0.05 then H0 is rejected meaning that free variables simultaneously affect bound variables. The value F calculates based on table 6 of 25,756, and the value of F table by 2.24. This can be interpreted as F count > F table, then H0 is rejected, and H1 is accepted, meaning there is a significant influence between independent bounds on the model that has been created.

Partial hypothesis testing aims to determine whether or not there is a partial or self-exerted influence of the dependent variable (X) on the independent variable (Y). Based on the analysis results obtained from the p-value for the variable X1 (Capital) of 0.002. Due to the p-value (sig) < 0.05 (alpha 5%) or 0.02 < 0.05 then H0 is rejected, meaning that X1 (Capital) has a significant effect on Y (Cultivator's Income) Rp/month. This shows that the high capital spent on the cultivation of seaweed *Gracilaria* sp., the higher the income earned by farmers. Based on field facts, it is shown that cultivators in Domas Village, Pontang District, Serang Regency, Banten still use internal capital or their capital, so that cultivators still find it challenging to save the results of the income they get. The income they earn can only be used for their daily needs.

Based on multiple linear regression analysis, the variable value of X2 (amount of seaweed production)/tonne is 0.012. Due to the p-value (sig) < 0.05 (alpha 5%) or 0.012 < 0.05 then H0 is rejected, meaning that X2 (amount of seaweed production)/ton has a significant effect on Y (Cultivator's Income) Rp/month. It can be said that the variable amount of seaweed production *Gracilaria* sp. positive impact on farmers' income. If the total production of *Gracilaria* sp. increases, farmers' income also increases. Based on the research site's facts, the minimum production of seaweed *Gracilaria* sp. of 1000 kg, and a maximum of 6000 kg. This indicates the production of seaweed *Gracilaria* sp. in the village of high Domas.

Tabel 1. R square test result

Model	R	R Square	Adjusted R square	Std. error of the estimate
1	,958[a]	,918	,882	155741,63857

Based on the results of multiple linear regression analysis, it is obtained that the variable value X3 with a p-value (sig) < 0.05 (alpha 5%) or 0.061 > 0.05 then H0 is accepted, meaning that X3 (amount of milkfish production)/ton has no effect. Significant to Y (Cultivator's Income) Rp/month. It can be said that the amount of milkfish production harms farmers' income. If the amount of milkfish production increases, farmers' income will decrease. This is caused by several factors, including the pond area, which is divided into six parts of a total area of 35 hectares, meaning that the pond land has a different area. If the pond land is getting wet, the opportunities to increase the productivity of milkfish production will increase. In addition, other factors that affect the amount of milkfish production are water quality and aspects of soil fertility in the pond.

Based on the multiple linear regression analysis results above, the p-value for X4 (Land)/Ha is 0.262. Due to the p-value (sig) > 0.05 (alpha 5%) or 0.262 < 0.05 then H0 is accepted, meaning that X4 (Land)/Ha does not have a significant effect on Y (Cultivator's Income) Rp/month. it means that if the area of land planted with seaweed increases, the income of farmers will decrease or even stay. The area of the land pool on seaweed cultivation *gracilaria* sp. in domas does not influence the income of cultivators because of the state of the vast land planted with *gracilaria* sp grass. Unlike the case of Domas, the village does not affect the income of cultivators because of the state of the vast land planted with *gracilaria* sp grass. Unlike the case with cultivators who only had narrow lands but their income increased because the land they possessed was fertile, cultivation methods were suitable. It is not the case with research conducted by Rahim [14] which states that in public business buildings, the wider the land, the greater the production produced by the soil. Likewise, vice versa, some cultivators had vast land areas, but their incomes declined. In addition, seaweed can also be stricken with the disease if there is a high tide; This is because sea fish enter the pond and eat seaweed *gracilaria* sp.

Based on the multiple linear regression analysis results for Variable X5 (Seeds *Gracilaria*)/ton of 0.044. Due to the p-value (sig) < 0.05 (alpha 5%) or 0.044 < 0.05, H0 is rejected, meaning that X5 (*Gracilaria* Seeds)/ton has a significant effect on Y (Cultivator's Income) Rp/month. which means that the more seeds of *Gracilaria* sp. to be planted, the higher the income of cultivators.

Based on the multiple linear regression analysis results, the p-value for the variable X6 (Milkfish Seed)/ton is 0.015. Due to the p-value (sig) < 0.05 (alpha 5%) or 0.015 < 0.05 then H0 is rejected, meaning that X6 (Milkfish Seed)/ton has a significant effect on Y (Cultivator's Income) Rp/month. It can be interpreted that the more milkfish seeds are planted in the pond, the higher the income of farmers in Domas Village. Based on the facts on the ground, with an average area of 1.52 ha of ponds planted with 20,000 individuals. It shows that the pond has been utilized optimally [15-19].

Based on the multiple linear regression analysis results, the p-value for the variable X7 (drying area length)/m is 0.639. Due to the p-value (sig) > 0.05 (alpha 5%) or 0.639 > 0.05 then H0 is accepted, meaning that X8 (drying area length)/m does not have a significant effect on Y (Cultivator's income) Rp/month. It can be interpreted that the longer the drying area, the farmer's income decreases.

Based on the multiple linear regression analysis results, the p-value for X8 (basket) (Unit) is 0.364. Due to the p-value (sig) > 0.05 (alpha 5%) or 0.089 > 0.05 then H0 is accepted, meaning that X8 (basket) (Unit) has no significant effect on Y (Cultivator's Income) Rp/month. It means that more baskets are used to harvest seaweed *Gracilaria* sp. and milkfish, then farmers' income will decrease or remain. Based on the facts in the field, the basket has a function as a tool that can speed up the harvest process to be more efficient.

Based on the regression analysis results, the p-value for the variable X9 (seaweed price)/kg was 0.106. Due to the p-value (sig) > 0.05 (alpha 5%) or 0.106 > 0.05 then H0 is accepted, meaning that X14 (seaweed price)/kg has no significant effect on Y (Cultivator's Income) Rp/month. It means that the higher the price of seaweed *Gracilaria* sp., then the income of farmers will decrease or remain. Based on the facts in the field, cultivators in Domas Village could not set a price, the price of seaweed *Gracilaria* sp. Seaweed traders or collectors have determined the regulation around the village with a price range of Rp. 4000.00 - Rp. 5000.00 / kg. In fulfilling the needs of daily life, cultivators in Domas Village are forced to sell their seaweed at a low price (Adhawati and Fudjadja 2020).

Based on the multiple linear regression analysis results, the p-value for the variable X10 (milkfish

price)/kg is 0.566. Due to the p-value (sig) > 0.05 (alpha 5%) or 0.566 > 0.05 then H0 is accepted, meaning that X15 (milkfish price)/kg has no significant effect on Y (Cultivator's Income) Rp/month. it can be interpreted that the higher the price of milkfish, farmers' income will decrease or remain. Based on the facts on the ground, farmers in Domas Village cannot determine the selling price of milkfish. It is because traders have set the price in the market with a price range of Rp. 20,000.00 – Rp. 25,000.00/kg

4. CONCLUSION

Based on the results of the research it can be concluded as follows:

1. Profit of Rp. IDR 115,168,233 indicates that this business is feasible from an investment perspective. The Payback Period (PP) value is 1.51 years from the start of the business. In addition, for the Break-Even Point (BEP) value, a value of 1,320 Kg is obtained, which means that the break-even point will be reached if the cultivation produces *Gracilaria* sp. as much as 1,320 Kg and the results of the calculation of the BEP price (Rp) for *Gracilaria* sp. seaweed, which is Rp. 2.291.00. Meanwhile, to determine the increase in operational costs accepted by 5%..
2. Factors that affect the income of cultivators in Domas Village, Pontang District, Serang Regency, Banten, namely Capital, Total Seaweed Production, Total Milkfish Production, *Gracilaria* Sp. Seeds, and Milkfish Seeds. Based on these variables, the most influential factor on the income of cultivators is the capital, with a significance value of 0.002. In addition, the coefficient of determination was obtained at 91.8%. It shows that the dependent variable influences the independent variable by 91.8%, while the remaining 8.2% is influenced by other factors not observed in this research.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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