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Business Feasibility Analysis of Vannamei (Litopenaeus Vannamei) Shrimp Enlargement in Pond Intensive and Superintensive Sistems

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A B S T R A C T

The cultivation of vannamei shrimp (Litopenaeus vannamei) intensive and superintensive systems have high profit potential, with high risk. The potential economic feasibility of the two aquaculture systems needs to be assessed to determine the proper cultivation system to be developed in the community. . Financial aspects will be carried out with an analysis of investment costs, revenue, profits, R/C ratio, Break Event Point (BEP) and Payback Period (PP). Based on the results of the study note that the cultivation of vannamei shrimp superintensive system is feasible compared to intensive sistems. The R/C value ratio of Vannamei shrimp pond superintensive system owned by CV. Riz Samudra is able to reach 1.56. While on the intensive system is only able to produce the highest R/C ratio of 1.38. The application of the cultivation of a superintensive system must be supported by the use of a water wheel that is more proportional than the intensive system, and is assisted by a blower to supply dissolved oxygen. Payback period analysis, pond system superintensive CV. Riz Samudra is able to reach 0.23 which means that it can return capital costs within 0.23 years (1 cycle), shorter than the maximum period of 3 cycles. BEP analysis, the results and prices show a value that is acceptable because overall it is above the minimum BEP limit.

Keywords: business feasibility, R/C ratio, business, intensive, vannamei.

1. Introduction

Intensive and super-intensive farming of Vannamei shrimp (Litopenaeus vannamei) has high profit potential but also carries significant risks. To determine which system is suitable for development in the community, the economic feasibility of both farming systems needs to be assessed.

This study will analyze technical production activities descriptively, providing an overview of the technical aspects of Litopenaeus vannamei farming, including pond preparation, seedling release, maintenance, water management, and harvesting. The financial aspects will be analyzed by examining investment costs, revenue, profit, the R/C ratio, the break-even point (BEP), and the payback period (PP).

Based on the research findings, super-intensive Vannamei shrimp farming was determined to be more viable than intensive systems. The R/C ratio of the super-intensive shrimp farming system owned by CV Riz Samudra is 1.56. Riz Samudra can reach 1.56. Meanwhile, the intensive system can only achieve a maximum R/C ratio of 1.38. Implementing the super-intensive farming system requires using more proportional water pumps than the intensive system and assisted blowers for supplying dissolved oxygen. The payback period analysis for CV. Riz Samudra shows a value of 0.23. This means that the capital costs can be recovered within 0.23 years (one cycle), which is shorter than the maximum period of three cycles. The BEP analysis based on results and prices shows an acceptable value because it is above the minimum BEP threshold overall.

2. Methods

This research method is descriptive. Its purpose is to systematically, factually, and accurately describe, depict, or illustrate the facts, characteristics, and relationships of the phenomena being investigated.

According to Siyoto (2015), descriptive research is used to analyze data by describing the collected data as it is without drawing general conclusions. This method only describes the state of a recorded and processed phenomenon according to its function. The results of the data processing are presented as numbers, making the meaning and intent more easily understandable to anyone needing information related to the phenomenon.

3. Data Analysis

Technical Aspects

This study will descriptively analyze technical production activities in intensive and super-intensive Vanamei shrimp (Litopenaeus vannamei) farming systems. It will provide an overview of the following activities: preparation of grow-out ponds, stocking of seedlings, maintenance, water management, and harvesting.

Marketing Aspects

This study will analyze marketing aspects descriptively and qualitatively by providing an overview of marketing activities in intensive and super-intensive Vanamei shrimp farming operations.

Financial Aspects

Cost and revenue analysis is used to determine the costs involved in production. It is also used to determine the revenue generated from the business. The formula for calculating production costs is as follows:

Production Costs

To determine costs, cost components are categorized into fixed costs and variable costs. Fixed cost components include: management staff salaries, depreciation of equipment and buildings, and land rent. Variable cost components include: raw material procurement costs, overhead costs, seed procurement costs, transportation costs, and wages for temporary/daily labor or contract workers (Suriadi, 2015).

According to Suratiyah (2015), total cost is calculated by adding fixed cost (FC) and variable cost (VC) using the following formula:

TC = FC+VC

Explanation:

TC = Total Cost

FC = Fixed Cost

VC = Variable Cost

Revenue (total revenue)

According to Suratiyah (2015), total revenue (TR) is calculated by multiplying the quantity produced (Y) by the selling price (Py) and is expressed by the following formula:

TR= Py x Y

Explanation:

TR = Total Revenue

Py = Product price

Y = Production quantity

Revenue Cost Ratio (R/C Ratio)

The Revenue Cost Ratio (R/C ratio) method is a calculation that compares the value of revenue with the total costs incurred during the production process. The R/C ratio calculation is also a way to determine the feasibility of a business action (Suratiyah, 2015). The formula used to calculate the R/C ratio is as follows:

$$\textbf{R/C} = \frac{\text{Total Revenue } (\boldsymbol{TR})}{\text{Total Cost } (\boldsymbol{TC})}$$

Explanation:

Revenue = Amount of income earned

Cost = Amount of expenses

incurred There are three criteria in the calculation, namely:

a. If R/C > 1, it means that the farming business is profitable.

b. If R/C = 1, it means that the farming business is breaking even.

c. If R/C < 1, it means the farming business is unprofitable.

Profit

Profit can be calculated by subtracting the total revenue from the total costs incurred in production. Suratiyah (2015) states that income is the difference between total revenue (TR) and total costs (TC) and is expressed by the formula:

I = TR – TC

Explanation:

I = Income

TR = Total Revenue

TC = Total Cost

Break-Even Point (BEP)

According to Rachmina (2017), break-even point analysis is management information that describes the minimum sales volume that must be achieved so that the company does not lose money and does not make a profit. This break-even point is influenced by income and cost levels. With the break-even point, a company's managers can determine the expected sales level to avoid losses and make the right decisions for the coming period.

The Break-Even Point (BEP) is a state indicating that a company is at break-even. Here, break-even means that the company is financially neither profitable nor incurring losses. BEP also illustrates the relationship between the values of variables in a company's production. The BEP calculation can include BEP in terms of price and BEP in terms of production (Sofyan, 2018).

$$\textbf{BEP Harga} = \frac{\textbf{TC}}{\textbf{Y}}$$

The BEP price indicates the minimum production price that must be achieved

$$\textbf{BEP produksi} = \frac{\textbf{TC}}{\textbf{P}}$$

The production BEP indicates the minimum production volume that must be achieved.

Explanation:

TC = Total Cost

Y = Production Volume

P = Price

Payback Period (PP)

The payback period (PBP) method is a method of calculating investment capital to determine the length of time required for the capital that has been spent to be recovered (Adalina, 2016). The payback period can be calculated using the following formula:

$$\textbf{PBP} = \frac{\text{First investment X 1 year}}{\text{Period Acceptance}}$$

In the above formula, there is a multiplication factor in the form of a time unit, namely 1 year, which means that the payback period calculation uses a maximum production time limit of 1 year (12 months) to return the investment capital. If the payback period value is lower than the maximum payback limit, the business is considered feasible, and vice versa.

Result and Discussion

R/C Ratio Feasibility Analysis

Recapitulation of Cost, Revenue, Profit, and R/C Ratio

Location	(TC)	Acceptance	Profit	R/C
Tambak Intensif				
Tefa Busmetik SUPM Tegal	265.715.550	290.581.295	24.865.745	1,09
Tambak Dampyak 1	235.462.500	282.000.000	46.537.500	1,20
Tambak Dampyak 2	365.884.577	504.776.414	138.891.837	1,38
Tambak Dampyak 3	368.799.220	504.225.331	135.426.111	1,37
Tambak Panggung	109.605.912	144.878.832	35.272.920	1,32
CV. Riz Samudra	599.294.706	721.748.980	122.454.273	1,21
Tambak Super intensif				
Tefa Busmetik SUPM Tegal	2.426.608.825	3.040.010.188	613.401.363	1,26
CV. Riz Samudra	762.804.034	1.193.077.442	430.273.407	1,56

The intensive pond system owned by Tefa SUPM Tegal is at 1.09. The intensive systems of Dampyak 1, Dampyak 2, Dampyak 3, Panggung, and CV. Riz Samudra are 1.20, 1.38, 1.37, 1.32, and 1.21, respectively. It can be seen that the highest average intensive system value in this study is only 1.38.

Feed Conversion Data

Location	Total Feed Consumption (kg)	TotalProduction (kg)	FCR
Superintensif			
CV. Riz Samudra	10.470	18.037,03	1,54
Tefa Busmetik SUPM Tegal	64.925	45.012,79	1,44
Intensif			
CV. Riz Samudra	18.325	12.061,64	1,52
Tefa Busmetik SUPM Tegal	5.775	3.838,94	1,50
Tambak Dampyak 1	4.025	3.300	1,22
Tambak Dampyak 2	8.642	6.534,47	1,32
Tambak Dampyak 3	9.975	7.769,22	1,28
Tambak Panggung	3.010	2.229	1,35

Feed requirement data used in each pond in the form of average values by calculating the Food Conversion Rate (FCR), which is the ratio between total feed requirements (kg) and total production volume (kg).

Highest R/C Data in Intensive Systems with Lowest R/C in Superintensive Systems

Location	TC	Acceptance	Profit	R/C	FCR	SR	Average Size	Average Price
Tambak Dampyak 2 (Intensif)	**365,884,577**	**504,776,414**	**138,891,837**	**1,38**	**1,32**	**107%**	**60**	**75,791**
Tefa Busmetik SUPM Tegal (Superintensif)	2,426,608,825	3,040,010,188	613,401,363	**1,26**	1,45	97%	76	65,103

It appears that the R/C ratio of the Dampyak 2 intensive system pond is higher (1.38) than that of the super-intensive system at the Tefa SUPM Tegal pond (1.26). The intensive Dampyak 2 pond is able to reduce feed requirements (FCR 1.32) compared to feed requirements in the super-intensive Tefa

Busmetik SUPM Tegal pond (FCR 1.45). Feed costs in the Dampyak 2 pond account for 35.41% of total production costs, which is lower than the 39.23% in the Tefa

Analisa Break Even Point (BEP)

Location	**Average Price (Rp)**	**BEP Price (Rp)**	**Production (kg)**	**BEP Results (kg)**
Tambak Intensif				
Tefa Busmetik SUPM Tegal	72,812,50	71.041	3.838,94	1.854
Tambak Dampyak 1	72.000,00	71.693,37	3.300,00	1.635,16
Tambak Dampyak 2	75.791,67	56.095,80	6.534,47	4.829,47
Tambak Dampyak 3	53.960,00	47.838,70	7.769,22	6.837,29
Tambak Panggung	62.959,00	49.172,46	2.229,01	1.740,91
CV. Riz Samudra	54.688,30	49.784,13	12.061,64	10.976,52
Tambak Super intensif				
Tefa Busmetik SUPM Tegal	65.103,33	54.316,70	45.012,79	38.197,46
CV. Riz Samudra	48.492	41.420,82	18.585,30	15.773,30

It can be seen that the selling price (average) has exceeded the BEP price, meaning that the minimum threshold for selling shrimp has been surpassed. Similarly, the production value has also exceeded the BEP yield, meaning that the volume of shrimp sold has surpassed the minimum threshold.

Analisa Payback Period (PP)

Recapitulation of Payback Period (PP) Data for Intensive and Super-Intensive Pond Systems

No.	**Loccation**	**Investment Value (Rp)**	**Profitt (Rp)**	**PP**
Tambak Intensif				
1	Tefa Busmetik SUPM Tegal	61.413.000	24.865.745	2,47
2	CV. Riz Samudra	78.996.000	122.454.274	0,65
3	Tambak Dampyak 1	68.530.500	46.537.500	1,47
4	Tambak Dampyak 2	45.266.500	138.891.837	0,33
5	Tambak Dampyak 3	28.557.001	135.426.111	0,21
6	Tambak Panggung	15.058.345	35.272.920	0,43
Tambak Super Intensif				
1	Tefa Busmetik SUPM Tegal	399.184.500	613.401.363	0,65
2	CV. Riz Samudra	99.696.000	427.704.716	0,23

The payback period value for the Tefa SUPM Tegal intensive pond is the highest (2.47), meaning that the cultivation business carried out there is estimated to return the capital value in approximately 2.5 years or around 29-30 months. If we assume that one cultivation cycle is 4 months, then the capital value will be returned after approximately 8 cycles.

Conclusion

The feasibility of super-intensive and intensive vannamei shrimp farming systems based on R/C ratio calculations differs. The super-intensive farming system owned by CV. Riz Samudra has an R/C ratio of 1.56, which is higher than the intensive farming system at Dampyak 2 pond, which has an R/C ratio of 1.38. When considering the payback period for investment capital recovery, the super-intensive system at CV. Riz Samudra is deemed viable (0.23) as it is estimated to recover the invested capital within 3 months or one production cycle. Technically, the application of vannamei shrimp farming with high stocking density (super-intensive system) must be balanced with adequate oxygen supply and supported by sufficient use of aerators and blowers. Additionally, it requires adequate operational management.

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