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FINANCIAL AND NON-FINANCIAL FEASIBILITY ANALYSIS VANNAMEI SHRIMP (*Litopenaeus vannamei*) WITH DIFFERENT TECHNOLOGY IN PURWOREJO, EAST LAMPUNG

ANALISIS KELAYAKAN FINANSIAL DAN NON FINANSIAL BUDIDAYA UDANG VANAME (*Litopenaeus vannamei*) DENGAN TEKNOLOGI BERBEDA DI PURWOREJO, LAMPUNG TIMUR

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ABSTRACT

This research aims to analyze the financial and non-financial feasibility of Vannamei shrimp cultivation using three different cultivation technologies, namely simple, semi-intensive and intensive in Purworejo, Pasir Sakti Lampung, East Lampung. This research is a survey with a total of 13 respondents. The research results showed that the BEP volume for each technology was 151.94 kg, 4,825.55 kg and 5,755.12 kg. BEP prices for each technology are IDR38,491.07, IDR47,939.79 and IDR69,398.88. B/C ratio for each technology is 1.97, 2.49 and 2.39. The payback period for each technology is 2.29 years, 0.55 years and 0.66 years. The IRR for each technology is 69%, 58% and 50%. Thus, cultivating Vannamei shrimp using semi-intensive and intensive technology is very feasible to develop, while simple technology is quite feasible to develop. Sensitivity analysis of a 10% increase in feed prices has a sensitive impact on semi-intensive and intensive technology shrimp cultivation. The non-financial feasibility analysis of three cultivation technologies includes market, technical, technological, legal and socio-economic environmental aspects of implementation in accordance with the Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 75/PERMEN-KP/2016 concerning General Guidelines for Raising Tiger Prawns and Vannamei Shrimp, so that it can be declared worthy to continue.

Keywords: cultivation technology, financial, non-financial, vannamei shrimp.

ABSTRAK

Tujuan penelitian ini adalah menganalisis kelayakan finansial dan non finansial budidaya udang Vannamei dengan menggunakan tiga teknologi budidaya yang berbeda yaitu teknologi sederhana, semi intensif dan intensif di Purworejo, Pasir Sakti Lampung Timur. Penelitian ini merupakan survei yang dilakukan dengan jumlah responden sebanyak 13 orang. Hasil penelitian menunjukkan BEP volume masing-masing teknologi sebesar 151,94 kg, 4.825,55 kg, dan 5.755,12 kg. BEP Harga masing-masing teknologi adalah Rp38.491,07, Rp47.939,79, dan Rp69.398,88. B/C Ratio masing-masing teknologi adalah 1,97, 2,49 dan 2,39. Payback period masing-masing teknologi adalah 2,29 tahun, 0,55 tahun, dan 0,66 tahun. IRR masing-masing teknologi adalah 69%, 58% dan 50%. Oleh karena itu, budidaya udang Vannamei dengan teknologi semi intensif dan intensif sangat layak, sedangkan teknologi sederhana cukup layak. Kelayakan non finansial yang dianalisis dari tiga teknologi budidaya tersebut adalah aspek pasar, teknis, teknologi, legalitas, dan lingkungan sosial ekonomi yang penerapannya sesuai atau tidak dengan Peratuan Menteri Kelautan dan Perikanan Republik Indonesia Nomor 75/PERMEN-KP/2016 Tentang Pedoman Umum Pembesaran Udang Windu dan Udang Vannamei, sehingga dapat simpulkan layak untuk dilanjutkan.

Kata kunci: teknologi budidaya, finansial, non finansial, udang Vannamei.

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INTRODUCTION

The fisheries and marine sectors in Indonesia are extremely auspicious and will continue to develop. This is evident from the substantial demand from international consumers, which creates opportunities for all business actors and the fishery industry to expand their operations and achieve financial gains. Indonesia is projected to produce 1.21 million tons of shrimp worth IDR 79.21 trillion in 2021, according to data from the Ministry of Maritime Affairs and Fisheries (KKP, 2021b); this figure represents a 9.20% increase over the previous year's output of 1.11 million tons valued at IDR 66.53 trillion. According to Alsy *et al*., (2023) estimate that 943,481.18 tons of cultivated shrimp, valued at IDR 63.2 trillion, can be produced in 2020, whereas the harvest from the sea will amount to 247,501.15 tons in 2021, valued at IDR 14.59 trillion. The prawn production derived from inland public waters amounted to 18,183.47 tons and was valued at IDR 1.43 trillion. This increase is consistent with the average export volume in 2018, which rose from 220,000 tons to 260,000 tons (Nkuba *et al*., 2021). Of this volume, 60% was exported to the United States, 19% to Japan, and 5% to Europe.

Shrimp, as a production product (commodity), is highly sought after in the fisheries industry and possesses substantial market value on both domestic and international markets. Regarding export production, Vannamei shrimp are the most prevalent (Rubel, *et al.,* 2019). In Lampung Province, where shrimp ponds are particularly prevalent, an additional 61,200 hectares of land remain cultivable in Indonesia (Bank Indonesia, 2015); shrimp cultivation fisheries occupy 26,651 hectares (KKP, 2021). According to Ministry of Maritime Affairs and Fisheries (2015), Lampung Province achieved the highest national production of 72,051 tons of Vannamei shrimp (Litopenaeus Vannamei) in 2013. However, by 2020, that figure had declined to 63,310.45 tons (KKP, 2021). . The province's Vannamei shrimp was cultivated using simple, semi-intensive, and intensive technologies in a number of coastal districts, including Tulang Bawang, South Lampung, Tanggamus and Pesawaran, and East Lampung. The pond potential of East Lampung Regency is 8,775 hectares, of which three distinct cultivation technologies are utilized: intensive technology encompasses 1,190 hectares, semi-intensive technology encompasses 590 hectares, and simple technology encompasses 3,800 hectares. These cultivation technologies are implemented in two sub-districts, Labuhan Maringgai and Pasir Sakti (Regional Secretariat East Lampung Regency, 2020).

Although the majority of management is still uncomplicated (traditional), the potential for brackish water cultivation in Pasir Sakti District, and Purworejo Village in particular, is quite substantial. It would be intriguing to investigate whether basic technology is more profitable in both financial and non-financial terms than existing semi-intensive and intensive technologies, or if there are additional determinants at play. Variations in cultivation technology are evident in the state of the pond structure, technology implementation, fish production, feed and nutrition, and pharmaceuticals. Witjaksono (2017) posits that cultivation technology can be distinguished by factors such as the density of fry stocking, the amount of artificial feed utilized, and the administration of water quality and cultivation media.

Shrimp farmers encounter several primary challenges, including insufficient capital, inadequate skills, and a lack of mastery in cultivation technology to enhance modern facilities. Consequently, the majority of these farmers operate as home-based businesses that utilize technology without explicitly designing cost structure calculations (Aulia *et al.,* 2019). Cost structure and non-cost factors are, in fact, elements that every organization must give precedence to. Utilized in shrimp cultivation operations is a cost plan for each technology. The cost structure is a significant determinant in assessing the viability and profitability of prawn cultivation endeavors (Farionita *et al.*, 2018). The objective of this study is to assess the economic and non-economic viability of Vannamei shrimp farming in Purworejo Village, Pasir Sakti District, East Lampung Regency, Lampung Province, using three distinct technologies: simple, semi-intensive, and intensive.

RESEARCH METHODS

This research was conducted from December 2021 to January 2022 in Purworejo Village, Pasir Sakti District, East Lampung Regency, Lampung Province. The research location was deliberately selected, with Purworejo Village in particular benefiting from the subdistrict's status as a hub for white prawn farming and its substantial development potential. This research works with simple, semi-intensive, and intensive technologies to conduct a survey of Vannamei shrimp habitats in Purworejo Village, Pasir Sakti, East Lampung, Lampung. The survey method is an established research approach utilized to gather records (data) pertaining to beliefs, ideas, characteristics, behavior, and variable relationships from samples selected from specific populations. Its purpose is to investigate and validate various hypotheses concerning sociological and psychological variables (Sugiyono, 2016).

Data was collected through observation, documentation, interviews, and questionnaires. Financial feasibility aspects include Break Even Point (BEP), Benefit Cost Ratio (B/C Ratio), Net Present Value (NPV), Payback Period (PP), and Internal Rate of Return (IRR). Furthermore, non-financial feasibility aspects include market aspects (demand, supply, and price), technical aspects (location, business scale, production process), technology (equipment, availability of spare parts), legal aspects (land ownership status and business license), and environmental aspects (impact environment and labor).

Research subjects comprise the entire population (Sugiyono, 2016). The population under study comprises 227 individuals engaged in Vannamei shrimp cultivation using simple, semi-intensive, and intensive technologies. Among these, 163 individuals employ simple technology, 53 individuals utilize semi-intensive technology, and 21 individuals utilize intensive technology (BPD Purworejo, 2020). he sample for this study consisted of thirteen individuals who had direct connections to Vannamei shrimp cultivation activities. These individuals included shrimp cultivators, officials from Purworejo Village, technicians in shrimp cultivation, and instructors in fisheries. The sample was determined using a purposive sampling technique. The pond area per individual ranges from 0.5 to 1 ha, and the location of cultivators employing simple, semi-intensive, and intensive technology is centralized; thus, this sample size is considered to be representative of the population.

A sample size of 5–10 percent can adequately represent the characteristics of respondents from a population of more than 100, according to Nazir (2011). Table 1 presents the numbers and responsibilities of the research respondents.

Table 1. Research Respondents

No	Respondent	Amount (person)	Information
1	Simple Technology Cultivator	3	Vannamei shrimp cultivator
2	Semi Intensive Technology Cultivator	3	Vannamei shrimp cultivator
3	Technology Intensive Cultivator	3	Vannamei shrimp cultivator
4	Purworejo Village Apparatus	2	Village Officials (secondary data source)
5	Pond Technician	1	Technician
6	District Fisheries Extension Officer Maringgai Labuan	1	Extension agent (secondary data source)
	Total responden	13	

Analysis of Financial Feasibility Data

Break Even Point (BEP)

The break-even point (BEP) is the company's output volume when it is not profitable or losing money. Any rise in output from this point results in a profit, but any drop results in a loss. This point is typically depicted in a cost/revenue (C/R) chart as the position where the total revenue (TR) line intersects the total cost (TC) line (Triyatmo *et al*., 2016). It can be expressed mathematically as follows:

$$BEP\ (unit) = \frac{\text{Fixed cost}}{\text{Selling Price Per Unit-Variable Costs per Unit}}$$

(1)

$$BEP\ (currency) = \frac{\text{Fixed cost}}{\text{1-(Variable Cost per Unit/Selling Price per Unit)}}$$

Benefit Cost Ratio (B/C Ratio)

The limit value of the B/C ratio can be used to determine whether or not a business is profitable. A business is regarded practicable and successful if the B/C ratio value is greater than zero (0); the higher the B/C ratio value, the bigger the profit from the firm (Hernandez & Zarain, 2011). It can be expressed mathematically as follows:

$$B/C\ ratio = Benefit/(Total\ Production\ Cost) \quad (2)$$

Net Present Value (NPV)

Net Present Value (NPV) is the difference between the present value of an investment and the present value of future net cash receipts. The NPV calculates the increase in current net worth as a result of project implementation (Pasqual *et al*., 2013).

$$NPV = \sum_{t=i}^{n} \frac{Bt - Ct}{1 - i^{\,t}} \quad (3)$$

Payback Period (PP)

The payback period (PP) is the time or return period for the complete amount of investment issued, computed from the start of the project to the flow of extra net production until the total amount of capital investment issued is reached using cash flow. The initial investment is repaid from the project's net proceeds (Ardalan, 2012). It can be expressed mathematically as follows:

$$PP = \frac{Investment\ Cost}{Benefit} \times 1\ year \quad (4)$$

Internal Rate of Return (IRR)

Internal Rate of Return (IRR) is one approach for determining the degree of investment. IRR is an interest rate that indicates whether the whole net present value (NPV) equals all project costs or NPV equals zero. This can be expressed mathematically as follows:

$$IRR = i' + \left[\frac{NPV'}{NPV' - NPV''} (i'' - i') \right] \quad (5)$$

Analysis of Sensitivity

Sensitivity analysis is the process of re-analyzing a project to see what would happen if it is not implemented as intended (Septiana *et al.,* 2020). Sensitivity analysis is used to determine and assess how much an increase in costs (cash out flow) or a change in income (cash in flow) will affect the financial feasibility of a company plan. Sensitivity analysis is used in this study to examine the cost of Vannamei shrimp feed under the premise of a 10% rise from the initial price and a 20% drop in production (Auliya *et al.,* 2018).

Analysis of Non-Financial Data

Data on non-financial feasibility was analyzed descriptively. This data includes market, technological, regulatory, and environmental information. Market feasibility analysis is performed because it is related to demand efforts, product selling price, potential and market share, as well as marketing strategies and estimating sales that can be obtained by a business, including Vannamei shrimp cultivation, where the technological aspect is more focused on efforts to increase production results (Lutfi *et al.*, 2018). The legality or legal element is designed to confirm if Vannamei shrimp agriculture land is owned by persons or non-individuals (Soetjipto *et al.*, 2019). Environmental factors must be investigated because they affect water quality and other environmental quality standards (Senarath & Visvanathan, 2001).

RESULTS AND DISCUSSION

Financial Feasibility of Vannamei Shrimp Cultivation using Simple, Semi-Intensive, and Intensive Technology

Fixed capital

Fixed capital, such as machinery, factories, and production equipment, is capital that offers services to the manufacturing process over a relatively long period of time and is unaffected by the amount produced (Nurfiana, 2018).

Costs of production

The costs of production are the costs incurred by growers in order to obtain the inputs required for production business activities. Table 2 shows the average production costs per hectare of simple, semi-intensive, and intensive technology ponds in one production cycle.

Table 2. Production Costs for Cultivating Vannamei Shrimp using Simple, Semi-Intensive and Intensive Technology

No	Component	Per cycle/ha (IDR)		
		Simple Technology	Semi-intensive Technology	Technology Intensive
1	Fixed cost			
	Land tax	50,000	200,000	250,000
	Shrinkage	1,173,000	23,147,400	33,026,400
	Total fixed costs	1,223,000	23,347,400	33,276,400
2	Variable Costs			
	Fry	2,400,000	36,000,000	38,880,000
	Feed	4,800,000	240,000,000	265,920,000
	Probiotics		13,250,000	15,900,000
	Drugs	500,000	22,625,000	49,500,000
	Fertilizer	640,000	1,500,000	1,800000
	Vitamin C		12,000,000	24,000000
	Fuel	160,000	2,400,000	2,400000
	Electricity	400,000	16,000,000	24,000000
	Labor	1,500,000	6,000,000	14,000,000
	Harvest wages	480,000	1,200,000	1,280,000
	Rent a pond		3,000,000	3,000,000
	Total variable costs	10,880,000	353,975,000	440,680000
3	Total Production Costs	12,103,000	377,322,400	473,956,400

Table 2 provides information that the fixed costs of cultivating shrimp using simple, semi-intensive, and intensive technology are used to finance land taxes and depreciation. According to information from Purworejo Village officials, the amount of pond tax is determined by the typology of the pond, whether simple, semi-intensive, or intensive. These costs represent all costs used in Vannamei shrimp cultivation activities in one period without affecting the production results obtained and their value will not change (Mulyadi, 2012). This statement is in line with the opinion of Alsy *et al*., (2023) which states that total fixed costs (TFC) are costs used by companies or cultivators that do not affect the output produced by these fixed costs.

Each cultivator's variable costs are utilized to purchase shrimp seeds (fry), feed, fermentation, and diesel, as well as wages and energy. The amount of time that the above characteristics are used can change at any time, including changes in market pricing values, making them variable costs.

Changes in the quantity of these variable expenditures incurred can have an impact on the amount of production. Total variable costs (TVC) are costs whose quantity varies with the number of products produced, according to Saeri (2018).

Revenue

Revenue is calculated by multiplying the yield by the selling price of shrimp at harvest. Several partial harvests result in acceptance of semi-intensive and intensive technology in a single production cycle. Table 3 shows the acceptance of Vannamei shrimp cultivation utilizing three different technologies.

Table 3. Revenue of Vannamei Shrimp Cultivation Business using Simple, Semi-Intensive and Intensive Technology

No	Information	Simple Technology		Semi-intensive Technology		Technology Tntensive	
		Amount Harvest (kg/ha/cycle)	Revenue (IDR1,000)	Amount Harvest (kg/ha/cycle)	Revenue (IDR1,000)	Amount Harvest (kg/ha/cycle)	Revenue (IDR1,000)
1	Partial 1			1,500	75,000	1,800	90,000
2	Partial 2			1,500	90,000	1,800	108,000
3	Partial 3			1,500	97,500	1,800	117,000
4	partial 4					1,800	153,000
5	Total harvest	300	22,800	7,600	646,000	6,600	630,300
	TOTAL	300	300	22,800	12,100	908,500	13,800

The amount of income generated by Vannamei shrimp growing firms employing simple, semi-intensive, and intensive technology is calculated by multiplying the number of catch by the price of shrimp depending on the proper size at the moment. Higher income will result from a maximum overall harvest and a high selling price for shrimp, and vice versa. After 100-120 days of cultivation and weighing 16-20 grams per head, Vannamei shrimp are collected. The revenue generated by each technology will be used to cover the entire expenditures incurred during the manufacturing process. If there is a margin on operational costs, profits will be obtained. According to Mafut (2017), income is defined as all money from sales at a specific price. If the producer produces a product as a result of each production activity, the product will be sold to customers, and the producer will profit from each product generated.

Revenue is determined by the survival rate (SR), and the larger the value, the better the results gained, but the size of the shrimp controls the feed conversion ratio (FCR), and the lower the value, the better the commercial circumstances, because feeding is more efficient. According to Untara (2018), the survival rate is classed as good if it is greater than 70%, moderate if it is 50-60%, and low if it is less than 50%. The lower the FCR figure, the better, because it shows that the lower the feed costs, the larger the profits obtained.

Benefit

Benefit is the difference between revenue and manufacturing expenses. Table 4 shows the benefits of farming Vannamei shrimp using easy, semi-intensive, and intensive technology.

Table 4. The Benefits of Growing Vannamei Shrimp using Simple, Semi-Intensive, and Intensive Technology

No	Description	Cultivation Technology		
		Simple (IDR)	Semi-Intensive (IDR)	Intensive (IDR)
1	Revenue	22,800,000	908,500,000	1,098,300,000
2	Total cost	11,547,320	364,342,400	458,032,640
Total Profit		11.252.680	11,252,680	544,157,600

Profit is the difference between receipts and total costs incurred during one production cycle. Profits from Vannamei shrimp cultivation using simple, semi-intensive, and intensive technology are IDR 11,252,680, IDR 544,157,600, and IDR 640,267,360, respectively. If there is income, then this business is profitable and acceptable for implementation. According to Bastian (2015), profit is the entry or other addition to an entity's assets or the settlement of obligations (or a combination of the two) when delivering or producing goods and providing services, which are the main or ongoing activities of the central entity.

Analysis of the Financial Feasibility of Cultivating Vannamei Shrimp With Three Different Technologies

Before starting a business, it is necessary to conduct a business feasibility analysis. If the business is already up and going, a business feasibility analysis must be performed right away. A business feasibility analysis is an in-depth examination of a business or commercial activity to determine whether the business is viable (Kasmir, 2016). Net Present Value (NPV), B/C Ratio, Break Even Point (BEP), Payback Period (PP), and Internal Rate of Return (IRR) are the factors used to assess feasibility. Financial analysis is usually completed within a year of manufacturing. This study, on the other hand, looked at one cycle of Vannamei shrimp cultivation utilizing three distinct technologies, with a compound rate of 3% per cycle. Table 5 shows the financial feasibility of farming Vannamei shrimp using simple, semi-intensive, and intensive technology.

Table 5. Analysis of the Financial Feasibility of Cultivating Vannamei Shrimp Using Simple, Semi-Intensive, and Intensive Technology

No.	Information	Technology Type		
		Simple	Semi-Intensive	Intensive
1	NPV (IDR)	17,899.427	2,564.365.667	2,989.399,723
2	B/C Ratio	1.97	2.49	2.39
3	BEP Volume (kg)	151.94	4,852.55	5,755.12
4	BEP Price (IDR)	38,491.07	47,939.79	69,398.88
5	Payback Period (years)	2.29	0.55	0.66
6	IRR (%)	69	58	50

The Net Present Value (NPV) for three different technologies is shown in Table 5. By predicting cash flows for five production cycles at a compound factor level of 3% every cycle and obtaining a result greater than zero, it is possible to infer that the three Vannamei shrimp cultivation companies in the village of Purworejo are worthwhile to implement. The current worth of future net profits is referred to as the Net Present worth (NPV). The net present value (NPV) is the difference between the present value of the profit stream and the present value of the cost stream. The three technologies used have an NPV of IDR 17,899,427 for simple technology, IDR 2,564,365,667 for semi-intensive technology, and IDR 2,989,399,723 for intensive technology.

The break-even points for the three Vannamei shrimp cultivation systems are determined by the BEP volume and BEP price values acquired. As a result, the income generated by the overall production and selling price of Vannamei shrimp exceeds the BEP volume and price. As a result, it is possible to conclude that the Vannamei shrimp farming company in Purworejo Village has the potential to be lucrative. Break Even Point (BEP) analysis or break-even point is a method of examining the link between costs, profits, and sales or production volume, according to Pulungan *et al*. (2015). f the value of each variable exceeds the BEP (Break Even Point) calculation result, the break even point feasibility test criteria have been met.

Table 5 shows that the three technologies employed by Vannamei shrimp cultivators in Purworejo Village generate profits based on the B/C ratio analysis calculation of each cultivator's income in one cycle divided by total costs incurred. According to Makalingga *et al*. (2019), the Net B/C Ratio is the ratio of positive current values to negative current values. It is possible to determine whether a business is profitable or not by looking at the B/C number. If the profit from the profit to cost ratio (B/C ratio) study is more than zero, the business is said to be feasible and profitable. According to Maulana *et al.* (2022) research, this sentence has a Net B/C score of 6.9. This means that every IDR 1 spent on production costs can result in a profit of IDR 6.9, and in terms of Net B/C calculations, this operation is achievable if the Net B/C value indicator is larger than one (Net B/C > 1).

The time required to return the capital in Vannamei shrimp cultivation using simple, semi-intensive and intensive technology is 2.29 years, 0.55 years and 0.66 years. The payback period is obtained from investment costs divided by the income earned in one period each year. According to Djumanto *et al*. (2016) payback period is the period required to pay back the initial investment in cash flow based on the amount of income minus all costs.

The Internal Rate of Return (IRR) values for the three technologies applied in Purworejo Village are 68.67%, 58.50%, and 49.55%, respectively, which is greater than the current bank interest rate of 12% per year. In this sense, a company's evaluation criteria are said to be profitable. If the IRR value exceeds the interest rate used, the shrimp cultivation business using these three technologies is practical to undertake. The IRR criterion, according to Triyanti dan Hikmah (2015), is a standard or criterion used to evaluate the level of efficiency of capital users by comparing the IRR value to the Compound Rate (interest rate). If the IRR is larger than the interest rate, the business is practicable; if the IRR is less than the interest rate, the business is not feasible.

Analysis of Sensitivity

Sensitivity analysis can be used to determine the amount of sensitivity in the Vannamei shrimp cultivation company. This research illustrates how much the variable expenses of shrimp feed prices or authorized income will rise in order for the shrimp cultivation business to be profitable or continue.

If the price variable for shrimp feed in Simple Technology cultivation is increased by 10% from the baseline price, from IDR 16,000.00 to IDR 17,600.00, the sensitivity value is 0.79%, indicating that there is no sensitive effect because the value is less than 1%. Furthermore, in semi-intensive and intensive Vannamei shrimp farming, a 10% increase in shrimp feed price from IDR 16,000.00 to IDR 17,600.00 resulted in sensitivity values of 1.44% and 1.43%, respectively. This means that a 10% increase in feed prices has a significant impact on cultivation businesses because the value is greater than 1. According to Nardianto & Affandi (2019), sensitivity analysis is used to estimate a company's profitability in reaction to changes in the economic level, such as price adjustments and production capacity.

Shrimp production fluctuates, which means it might increase or decrease. Several factors contributed to the reduction in Vannamei shrimp output, including illness outbreaks caused by bacteria and viruses. Shrimp sickness, according to Lilisuriani (2020) , is one of the links in the chain that leads to production failure, particularly in the cultivation of tiger shrimp (Penaeus monodon) and white shrimp (Litopenaeus vannamei). Shrimp farming at high stocking densities, whether intense or super intensive, can result in restricted space for shrimp to move, large amounts of food waste, and heaps of pond bottom sedimentation, resulting in high organic matter content. If the amount of oxygen in the environment decreases, the process of decomposing organic matter is hampered, resulting in high concentrations of nitrite (NO_2) and ammonia (NH_3), which can cause shrimp poisoning and even death, resulting in reduced production and income for shrimp farmers (Nkuba *et al.,* 2021).

Analysis of Non-Financial Design

Non-financial variables examined in this study include market aspects, technical aspects, manufacturing facility aspects, managerial aspects, legal aspects, socioeconomic aspects, and environmental aspects (Rosyid, 2014). Table 6 provides a quick overview of these elements. Table 6 shows that an examination of the market potential for Vannamei shrimp is achievable, owing to the fact that there is a big market opportunity for Vannamei shrimp production in terms of demand, supply, and price (Irwanto *et al.,* 2018). The Vannamei shrimp cultivation sector has a lot of potential because demand is strong and not matched with supply. Aside from that, the high selling price indicates that the Vannamei shrimp production firm can make profits.

Table 6. Analysis of Non-Financial

Aspect	Technology Type		
	Simple	**Semi-Intensive**	**Intensive**
Pasar			
a. Request	Simple market	Local and regional markets	Local and regional markets
b. Offer	Whatsapp Media simple pattern	Using social networks	Using social networks
c. Price	Agreement between seller and buyer	Already using market prices	Already using market prices
Technical			
a. Business location	Located near irrigation lines	Located near irrigation lines and partly in rice fields that have been converted into ponds	Located near irrigation lines and partly in rice fields that have been converted into ponds
b. Scale enterprises	Small (simple)	Medium (semi intensive)	Intensive
c. Harvest size	100, 80, 55	100, 80, 55	100, 80, 55
d. Number of harvests	300 – 100 kg/Ha	10 – 12 Tons/Ha	10 – 15 Tons/Ha
e. Production process	Land preparation, sowing, maintenance, harvesting	Land preparation, water preparation with probiotics, distribution of fry, maintenance, waste management, harvesting	Land preparation, water preparation with probiotics, distribution of fry, maintenance, waste management, harvesting
Technology			
a. Equipment used	Water pump, net, ancho	Water pumps, windmills, guard houses, feed and equipment warehouses, electrical installations, water quality checking equipment, generators, alcons and other cultivation facilities.	Water pumps, windmills, guard houses, feed and equipment warehouses, electrical installations, water quality checking equipment, generators, alcons and other cultivation facilities.
b. Availability of spare parts	There isn't any	Provide limited stock or spare equipment.	Provide limited stock or spare equipment.
Legality			
a. Land ownership	Ownership, mostly rent and work	Ownership and rental	Ownership and rental
b. Business license	-	Environmental permits and local sub-district permits	Environmental permits and district permits
Environment and Socio-Economics			
a. Influence on the environment	Relatively safe	It has quite an effect on the presence of waste	It has quite an effect on the presence of waste
b. Labor	Do it yourself	2-4 people	2-4 people
c. Business Orientation	Enough for family needs	Enterprise / business	Enterprise/Business

Markets in East Lampung Regency, such as Labuhan Maringgai and Pasir Sakti Districts, are local level shrimp selling destination places, while markets in Teluk Betung Bandar Lampung to

Muara Angke Jakarta are regional level destination markets. Shrimp costs vary according on size, ranging from 100 to 30 cents per kilogram. The prices and sizes of shrimp were obtained based on the interview results, and are shown in Table 7.

Table 7. Size and Price of Vannamei Shrimp at Farmer's Level

No	Vannamei shrimp size (head/kg)	Price (IDR)
1	30	84,000
2	40	79,000
3	50	69,000
4	60	65,000
5	70	63,000
6	80	60,000
7	90	56,000
8	100	54,000

According to Table 7, the larger the shrimp size (the lower the size value), the higher the price of Vannamei shrimp. The high and low prices of Vannamei shrimp have an impact on pond farmers' income and earnings. According to Suhartini *et al.* (2021), price is the most important component because it serves as a reference for consumers when purchasing things and affects the company's earnings. Failure to adopt pricing levels can have an impact on both customers and the market. Prices for shrimp in East Lampung are relatively steady. Prices would rise ahead of holy holidays such as Eid al-Fitr and Eid al-Adha, according to growers. When the harvest is plentiful, shrimp prices tend to fall.

Purworejo Village's shrimp ponds are generally (60%) located in regions fairly far from the sea as the primary source of salt water. Farmers, on the other hand, employ irrigation channels to fill their ponds. Water enters Vannamei shrimp ponds using basic technology straight from the irrigation canal, but water used in semi-intensive and intensive technology ponds is collected first in prepared ponds. This condition is consistent with the Minister of Maritime Affairs and Fisheries Regulation of the Republic of Indonesia (2016), which is part of the basic implementation of Vannamei shrimp raising, in which water is collected in a holding plot, disinfected, and then placed in the rearing plot before spreading the fry. To reduce pond waste, intensive ponds must be outfitted with Waste Water Treatment Plants (IPAL).

The technological side of Vannamei shrimp farming comprises the selection of devices and equipment that are closely related to the technology used, such as a water wheel to add oxygen, which is particularly important in semi-intensive and intensive technology (Novriadi *et al.*, 2021). According to the findings, supporting facilities and equipment (1 work unit) are in compliance with applicable regulations. Different technology used to cultivate shrimp result in legal discrepancies. Shrimp ponds using simple technology, pond farmers simply have environmental licenses and authorization from the village, and the majority of the property is leased. The business permit that must be obtained for semi-intensive and intensive technologies is an integrated permit from the district, where the majority of firms run are individual businesses, so there are not too many licensing concerns (East Lampung District Regulation, 2012).

Every year, the implementation of Vannamei shrimp cultivation in Purworejo Village has a positive impact on the economic and social aspects of the surrounding community, namely by increasing per capita income, increasing socio-economic changes (the presence of stalls, workshops, and so on), and improving modes of transportation and access. improved roads, communication networks (telephone, internet), access to clean water, and adequate electrical sources, so that people's business performance improve. According to Lutfiana *et al.* (2019), economic implications of fish farming include improving family income, offering up employment prospects, both as business players and in the surrounding community, such as industry or dealers of feed, fish seeds, medicines, and equipment.

CONCLUSION AND SUGGESTION

Conclusion

Break even point (BEP), cost benefit ratio (B/C Ratio), net present value (NPV), payback period (PP), and internal rate of return (IRR) analysis for Vannamei shrimp cultivation with simple, semi-intensive, and intensive technology in Purworejo Village, Pasir Sakti District, East Lampung Regency is feasible and sustainable. A 10% rise in feed prices has an insensitive influence on simple technology Vannamei shrimp agriculture and a sensitive impact on semi-intensive and intensive technology cultivation, according to sensitivity analysis. Furthermore, it is expected that sickness causes a 20% drop in output, which has a sensitive influence on the three Vannamei shrimp cultivation technologies. A non-financial feasibility analysis of the three Vannamei shrimp farming systems that encompasses market (commercial), technical, technological, legal, and socioeconomic elements might be judged practical and worth pursuing and developing.

Suggestion

Vannamei shrimp cultivators in Purworejo Village, Pasir Sakti District, East Lampung, who utilize simple technology, are encouraged to move to semi-intensive technology, which yields higher income. To lessen the risk of disease and pests in Vannamei shrimp, Vannamei shrimp farmers who utilize semi-intensive and intensive production methods are urged to modify the drainage system.

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