



Feasibility analysis of the neocaridina ornamental shrimp cultivation business in Gunung Mulya Village, Tenjolaya District, Bogor Regency

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Abstract - Currently, fish farming activities are carried out not only to meet people's consumption needs, but many farmers also use the waters to cultivate ornamental shrimp, one of which is the freshwater ornamental shrimp type Neocaridina. This research was conducted in Gunung Mulya Village, Tenjolaya District, Bogor Regency. This research aims to determine innovation and technical cultivation as well as the feasibility of cultivating freshwater ornamental shrimp of the Neocaridina type in Gunung Mulya Village, Tenjolaya District, Bogor Regency, which includes identifying costs, revenues, profits, and business feasibility. The research method used in data collection is quantitative methods to identify costs, revenues, profits, and business feasibility, which aim to determine whether or not the freshwater ornamental shrimp cultivation business in Gunung Mulya village, Tenjolaya subdistrict, Bogor Regency, is feasible to run. Based on the results of the data analysis, it was concluded that cultivating freshwater ornamental shrimp of the Neocaridina type in Gunung Mulya village, Tenjolaya subdistrict, Bogor Regency, was profitable, with the total profit obtained in 1 production cycle being IDR. 15,413,334. The financial aspects of business feasibility indicators obtained show an R/C ratio of 2.60 and a B/C ratio of 1.60. Thus, the freshwater ornamental shrimp cultivation business in Gunung Mulya Village, Tenjolaya subdistrict, Bogor Regency, is feasible. This research provides insight into the techniques and innovations used in cultivating Neocaridina ornamental shrimp.

Keywords: financial analysis, neocaridina, ornamental shrimp

1 Introduction

Indonesia is a country rich in natural resources, including aquatic resources. The vast area of water makes Indonesian people use it for fish farming activities to meet personal consumption needs and as an effort to increase commercial value. As time goes by and people's lifestyles change, fisheries cultivation is now not only focused on fulfilling consumption, but many business people are also interested in cultivating ornamental fish. As previously stated [1], ornamental fish are one of the fisheries commodities that is a potential trade commodity at home and abroad.

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The success of ornamental fish cultivation activities is currently driven by the increasing demand for ornamental fish on the market. Recent data shows [2] that the increase in world demand for ornamental fish in 2017–2021 experienced an average increase of 4.35% each year. It was recorded that the value of world demand for ornamental fish in 2017 was USD 315.12 million, increasing to USD 366.61 million in 2021. In 2021, the world value of ornamental fish imports increased sharply by 22.48% compared to 2020, from USD 299.31 million to USD 366.61 million.

In the written regulations by the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 67/Permen-kp/2018 [3], fish are all organisms whose whole or part of their life cycle is in the aquatic environment. Hobbyists generally cultivate ornamental fish in aquariums designed to suit their natural habitat. As previously stated [4], freshwater ornamental shrimp is one of the aquatic fauna commodities in the freshwater ornamental fish trade.

One type of freshwater ornamental shrimp widely cultivated is the Neocaridina type. As stated by S. Weber [5], Neocaridina is a small and productive shrimp species abundant in various inland water habitats such as lakes, ponds, rivers, and streams. Neocaridina shrimp is a type of ornamental shrimp that is strong and adaptable. Several recent studies [6, 7, 8, 5] show that this shrimp can reproduce in various water qualities and temperatures.

Compared to consumption shrimp, ornamental shrimp have their appeal for cultivation because quality is the main focus and quantity is not a consumer consideration in the transaction process. Neocaridina ornamental shrimp have more diverse colors. As stated previously [8], ornamental shrimp have attractive red, yellow, and cherry blossom colors. Apart from that, Jabłońska A et al. [9] stated that the Neocaridina ornamental shrimp has a body length of 13 mm to 24.5 mm. With their relatively small size, ornamental shrimp cultivation activities can save costs because they do not require a large cultivation area. Several recent studies [10, 11, 12, 9] show that the ornamental shrimp Neocaridina is a trendy aquarium pet worldwide, including Europe.

Bogor Regency, especially Tenjolaya District, is located at the foot of Mount Salak, which is rich in natural resources, so it has the potential for developing fisheries cultivation. One of the fisheries businesses widely cultivated in Tenjolaya District, Bogor Regency, especially in Gunung Mulya Village, is the cultivation of Neocaridina ornamental shrimp.

The large number of businesspeople and people in Gunung Mulya Village interested in cultivating Neocaridina ornamental shrimp does not prevent this cultivation business from having problems. The problems found include the need for more research regarding the cultivation of Neocaridina ornamental shrimp, and it is known that business actors still need to carry out a feasibility analysis of the Neocaridina ornamental shrimp cultivation business.

Based on these problems, the author is interested in knowing business activity techniques and the feasibility of cultivating Neocaridina ornamental shrimp, starting with calculating costs, income, and profits and analyzing the B/C ratio and R/C ratio. According to S. Weber [5], Neocaridina has significant potential economically and ecologically. However, there is only some basic information regarding its biology [13]. This research can provide insight into cultivation techniques and the feasibility of cultivating Neocaridina ornamental shrimp.

In this research, the topic raised is the Feasibility Analysis of Neocaridina Ornamental Shrimp Cultivation Businesses in Gunung Mulya Village, Tenjolaya District, Bogor Regency, so the reference for comparing this research is research that is still related to the feasibility analysis of ornamental shrimp cultivation businesses, one of which is the research conducted by Teguh Vant Restu, Mohamad Sam'un, and Luthfi Nur'azkiya [4] The research aims to analyze the income and feasibility of the Caridina-type freshwater ornamental shrimp cultivation business. The results of this

research are the calculation of business feasibility with an R/C ratio value of 2.178, which means that the Caridina ornamental shrimp cultivation business is worth pursuing.

There are similarities to previous research, such as the analysis of the feasibility of cultivating freshwater ornamental shrimp and the chosen location. However, there are several differences, including differences in the types of ornamental shrimp analyzed, research objectives, and methods used in the research. This research was conducted on the Neocaridina ornamental shrimp cultivation business, while the research by Teguh Vant Restu, Mohamad Sam'un, and Luthfi Nur'azkiya [4] was on Caridina ornamental shrimp. The research was conducted using quantitative methods, and the data source was obtained from Mr. Nurdin, a Neocaridina ornamental shrimp entrepreneur who has been running a cultivation business since 2012 in Gunung Mulya Village, while research by Teguh Vant Restu, Mohamad Sam'un, and Luthfi Nur'azkiya [4] used descriptive-analytical methods with census sampling techniques in Tenjolaya sub-district. This research aims to determine the feasibility of cultivating Neocaridina ornamental shrimp and discover what innovations Neocaridina ornamental shrimp entrepreneurs use in their cultivation activities. In contrast, research by Teguh Vant Restu, Mohamad Sam'un, and Luthfi Nur'azkiya [4] aims only to analyze income and business feasibility.

2 Materials and methods

2.1 Time and place of research

This research was carried out at Mr. Nurdin's Neocaridina freshwater ornamental shrimp farming business, which is located in Gunung Mulya Village, Tenjolaya subdistrict, Bogor Regency, in May 2023. The location was chosen deliberately, considering that Gunung Mulya is one of the villages that carry out the business—cultivating freshwater ornamental shrimp of the Neocaridina type from hatching to sales.

2.2 Research methods

The research method is quantitative, considering that a series of measurements and measurement results can be expressed as numbers. The data used in this research is primary data.

2.3 Data collection technique

The data collection technique in this research uses observation and interview techniques; apart from that, the data collection tool uses a questionnaire in the form of questions containing research needs, which are then addressed to business actors.

2.4 Data Analysis Techniques

In carrying out a feasibility analysis of the Neocaridina-type freshwater ornamental shrimp cultivation business, several business feasibility analysis methods are used, namely as follows:

2.4.1 Fixed Cost

As previously stated [14], fixed costs are defined as relatively fixed in amount and have no effect on the size of the quantity produced. With the following formula:

$$FC = \sum_{i=1}^n Z_i P_i \quad (1)$$

Information:

FC : fixed cost
n : input type
 X_i : Physical quantities that make fixed costs
 P_i : fixed input prices

2.4.2 Variable Cost

As previously stated [14], variable costs are defined as the amount of production that influences constantly changing costs and sizes. The variable cost formula is as follows:

$$VC = \sum_{j=1}^n Z_j P_j \quad (2)$$

Information:

VC : variable cost
n : input type
 X_j : the physical quantities that make up variable costs
 P_j : variable input price

2.4.3 Total Cost

As previously stated [14], the sum of fixed and variable costs produces total expenses. With Formula [15]:

$$TC = FC + VC \quad (3)$$

Information:

TC : Total Cost
FC : Fixed Cost
VC : variable cost

2.4.4 Cash receipts and Profits

As previously stated [14], cash receipts differ between farming cash receipts and farming cash expenditures. Previous research shows [16] The formula used to calculate revenue is as follows:

$$TR = Q \cdot P_q \quad (4)$$

Information:

TR : Total receipts
Q : number of products sold
 P_q : Price of each product unit

Previous research [17] shows how to calculate business profits using the following formula:

$$I = TR - TC \quad (5)$$

Information:

I : revenue (profit)
TR : Total revenue
TC : Total cost

2.4.5 B/C Ratio (Benefit Cost Ratio)

B/C ratio (benefit cost ratio) is a measure of the comparison between income (benefit B) and total production costs (cost C). Previous research [18] shows the formula used to analyze the B/C ratio (benefit-cost ratio):

$$\text{B/C ratio} = \pi/\text{TC} \quad (6)$$

Information [19]:

π : profit

TC : Total cost

With assumption:

B/C Ratio > 0 = feasible to run

B/C Ratio < 0 = not worth running R/C Ratio (Revenue Cost Ratio) [20]

As previously stated [14], revenue and cost balance analysis. [21] (R/C ratio) is used to see the benefits of cash business from several revenues obtained by farmers for every rupiah spent on their farming business. Previous research [22] shows the formula used is:

$$\text{R/C ratio} = \text{TR}/\text{TC} \quad [22] \quad (7)$$

Information:

TR : Total revenue

TC : Total cost

With the assumption [23]:

R/C ratio > 1 = profitable

R/C ratio < 1 = loss

R/C ratio = 1 = break even (no profit and no loss)

3 Results and discussion

3.1 Neocaridina ornamental shrimp cultivation techniques

Neocaridina ornamental shrimp cultivation activities start with pond preparation. The pool used is a permanent wall pool, measuring 100 cm × 160 cm × 50 cm; each pool is fed by water from a spring with the help of a 1-inch paralon pipe, and each paralon in each pool is provided with a 0.5 cm hole. Try to ensure that the pool water is no more than 35 cm from the bottom of the pool.

The following process involves placing water plants or moss, which will become a shelter for the Neocaridina ornamental shrimp, before the shrimp are ready to be put into the pond. [24] Providing shade from plants will ensure the shrimp feel safe, comfortable, and protected. The stage of sowing ornamental shrimp seeds is in the afternoon or evening, when the pond water is calm. The age of the stocked shrimp seeds is between 2 and 2.5 months, with a size of 1.2 cm. Each pond can accommodate a maximum of 700 Neocaridina ornamental shrimp. The comparison between male and female shrimp is exemplary.

Maintenance starts with checking the water to ensure there are no blockages or dry water, especially for Neocaridina ornamental shrimp. Jabłońska A, et al. [9] show that the ornamental shrimp Neocaridina has a body length of 13 mm to 24.5 mm. So, the amount of feed given does not need to be significant; in one pond, the pellet feed given is just 1 gram. Several recent studies [25, 12, 5] showed that the ornamental shrimp Neocaridina feeds on algae, biofilms, and detritus but not vascular plants. Feeding is done in the afternoon.

After one month of scattering the seeds, the ornamental shrimp are ready to lay eggs. Usually, ornamental shrimp that lay eggs are separated in a particular pond to avoid predators and other shrimp that would harm the eggs. [24] Neocaridina shrimp will hold their eggs for 2–3 weeks until the eggs hatch, and each shrimp can have 20–30 eggs. From the results of observations, it is known that Neocaridina ornamental shrimp cultivation businesses use innovation in the ornamental shrimp breeding process. The innovation is to reduce the volume of water flow specifically for ponds used as egg-hatching places. Reducing the volume of water flow can reduce the stress when ornamental shrimp are laying eggs and make it easier to isolate themselves; reducing the water flow can maximize breeding results.

Harvesting Neocaridina ornamental shrimp can be done after the chicks are 1.5 months old or their size has reached 1 cm. Neocaridina ornamental shrimp ready to be harvested have healthy criteria, meaning they have agile movements and are bright in color, not pale.

3.2 Financial Analysis of Neocaridina Freshwater Ornamental Shrimp Cultivation Business

3.2.1 Fixed Costs of Neocaridina Freshwater Ornamental Shrimp Cultivation Business

Previous research [26] stated that it is called a fixed cost because the amount of cost incurred is unrelated to the number of products produced. The large number of Neocaridina ornamental shrimp produced will not affect the size of the production costs. [27] Equipment depreciation costs are included in the fixed costs of the Neocaridina ornamental shrimp cultivation business. The components included in the fixed costs of the Neocaridina ornamental shrimp cultivation business are presented in Table 1. Based on the table below, the largest fixed costs incurred for Neocaridina ornamental shrimp cultivation business activities are the costs for constructing cultivation ponds, namely IDR. 40.000.000, and the smallest cost incurred was purchasing a plastic ladle amounting to IDR. 5000. So, the total fixed costs incurred by the Neocaridina freshwater ornamental shrimp cultivation business are IDR. 40.775.000, with depreciation costs of IDR 2.866.667/year, or IDR. 716.666/production cycle.

Table 1. Fixed costs of cultivating Neocaridina ornamental shrimp

No	Description	Volume	Unit	Unit Price (Rp)	Economic Age (Years)	Total (Rp)	Depreciation (Rp/Cycle)
1	Cultivation Pond	1	Units	40.000.000	15	40.000.000	666.667
2	Oxygen tube	1	Units	700.000	4	700.000	43.750
3	Plastic Basin	4	Units	5.000	3	20.000	1,666
4	Drain	2	Units	25.000	3	50.000	4,167
5	Large Plastic Ladle	1	Units	5.000	3	5.000	417
Total Fixed Costs						40.775.000	716.666

3.2.2 Variable Costs of Neocaridina Freshwater Ornamental Shrimp Cultivation Business

Variable costs are costs incurred by business actors cultivating freshwater ornamental shrimp of the Neocaridina type during each production cycle, and the size of the costs incurred depends on the amount of production produced. As previously stated [26], variable costs mean that every production decision will always affect variable costs.

The variable costs of the Neocaridina freshwater ornamental shrimp cultivation business include Neocaridina freshwater ornamental shrimp seeds, feed, labor costs, electricity, rubber bands, and plastic. The details of the variable costs incurred by the Neocaridina-type freshwater ornamental shrimp cultivation business in one production cycle over three months are presented in Table 2 below.

The table shows that the total variable costs incurred by the Neocaridina-type freshwater ornamental shrimp cultivation business are IDR 8.870.000/production cycle/three months. The most significant costs incurred were for labor, amounting to IDR 4.700.000, and the cost of purchasing ornamental shrimp, amounting to IDR 4000.000, while the minor costs were for purchasing rubber bands for binding, amounting to IDR 5000.

Table 2. Variable costs of cultivating *Neocaridina Ornimental shrimp*

No	Description	Volume	Unit	Unit Price (IDR)	Total IDR (Per Cycle)
1	Neocaridina Ornamental Shrimp	4000	Tail	1.000	4.000.000
2	Feed	1	Kg (Hiro)	60.000	60.000
3	Labor Costs	1	Person	50.000	4.700.000
4	Electricity	1	Month	10.000	30.000
5	Fastening rubber band	1	Sir	5.000	5.000
6	Plastic 30 X 45 Cm	10	Sir	7.500	75.000
	Total Variable Costs			133.500	8.870.000

3.2.3 Total Cost of Neocaridina Freshwater Ornamental Shrimp Cultivation Business

In previous research [26], total costs are the overall costs of resources or inputs used in production. Total costs consist of fixed costs and variable costs. The total costs for each company will vary depending on the fixed and variable costs incurred by each business activity concerned. The total costs of cultivating freshwater ornamental shrimp of the Neocaridina type are presented in Table 3 below.

The table above shows that the total fixed costs incurred by the Neocaridina-type freshwater ornamental shrimp cultivation business are IDR 716.666/three months or one production cycle. The total variable costs are IDR 8.870.000/three months or one production cycle. The total costs incurred by the Neocaridina-type freshwater ornamental shrimp cultivation business are IDR 9.586.666/three months or one production cycle.

Table 3. Total cost of Neocaridina ornamental shrimp cultivation business

No	Fee Type	Total (IDR/Cycle)
1	Fixed cost	716.666
2	Variable Costs	8.870.000
	Total	9.586.666

3.2.4 Cash Income and Profits from the Neocaridina-Type Freshwater Shrimp Cultivation Business

As previously stated [28], cash income is the ability of a farming business to generate cash. Farming cash income is the difference between farming cash receipts and farming cash expenditures. The details of the revenue and gross income of the Neocaridina freshwater ornamental shrimp cultivation business can be seen in Table 4 below.

Table 4. Receptions and Gross Income of the Neocaridina Ornamental shrimp cultivation business

No	Type	Volume	Unit	Unit Price (IDR)	Total (IDR/Cycle)
1	Neocaridina Ornamental Shrimp	25.000	tail	1.000	25.000.000

The table above shows that in one production cycle or three months, the Neocaridina-type freshwater ornamental shrimp cultivation business can sell 25.000 ornamental shrimp, with an average selling price of IDR 1,000 per head. So, the receipt/gross income of the Neocaridina-type freshwater ornamental shrimp cultivation business is IDR 25.000.000/cycle (three months).

Based on previous research [29], profit is the difference between sales proceeds and costs incurred (Rp/month). The profits obtained by the Neocaridina ornamental shrimp cultivation business can be seen in the following table.

Table 5. Benefits of Neocaridina Ornamental shrimp cultivation

Description	Amount (IDR/Cycle)
Total Receipts	25.000.000
Total cost	9.586.666
Profit	15.413.334

The table above shows that the total costs incurred were IDR 9.586.666, while the revenue obtained from selling Neocaridina ornamental shrimp was IDR 25.000.000. The profit from total revenue minus total costs in one production cycle (three months) is IDR 15.413.334.

3.3 Feasibility Analysis of Neocaridina Ornamental Shrimp Cultivation Business

3.3.1 R/C Ratio Analysis (Revenue Cost Ratio)

R/C Ratio (Revenue Cost Ratio) compares total revenue and production costs incurred by the Neocaridina-type freshwater ornamental shrimp cultivation business in one production cycle (three months). The revenue and cost analysis results can also show a farming business's benefits by calculating the R/C ratio. The results of the R/C ratio (revenue cost ratio) analysis in one production cycle (three months) can be seen in the following table.

Previous research [30] states that the decision criteria used to see the results of the R/C Ratio (Revenue Cost Ratio) analysis guide that an agribusiness business can be said to be profitable if the R/C Ratio (Revenue Cost Ratio) value is greater than 1 [21]. Then, conversely, the agribusiness business is declared to have experienced a loss if the R/C ratio (revenue cost ratio) value is less than 1. An agribusiness is said to break even (no profit or loss) [31]. If the R/C ratio (revenue-cost ratio) value is the same, The decision criteria used to see the R/C Ratio (Revenue Cost Ratio) analysis results guide that an agribusiness business can be profitable if the R/C Ratio (Revenue Cost Ratio) value exceeds 1. The agribusiness business is declared to have experienced a loss if the R/C ratio (revenue-cost ratio) value is less than 1. An agribusiness is said to break even (no profit or loss) [31]. If the R/C Ratio (Revenue Cost Ratio) value equals 1,.

Table 6. R/C ratio feasibility analysis for the *Neocaridina ornamental shrimp* cultivation business.

Description	Mark
ResultsTotal Receipts	25.000.000
Total cost	9.586.666
R/C Ratio	2.60

The table above shows that the R/C ratio (revenue cost ratio) value for the Neocaridina-type freshwater ornamental shrimp cultivation business is 2.60. So, cultivating freshwater ornamental shrimp of the Neocaridina type is profitable and feasible. The R/C Ratio (Revenue Cost Ratio) value is 2.60, meaning that for every IDR 100 spent, the Neocaridina ornamental shrimp cultivation business makes a profit of IDR. 260.

3.3.2 B/C Ratio Analysis (Benefit Cost Ratio)

B/C Ratio (Benefit Cost Ratio) analysis compares the total profit value and the total value of production costs incurred by the Neocaridina-type freshwater ornamental shrimp cultivation business in one production cycle (three months). The following table analyzes the B/C ratio (benefit-cost ratio) for cultivating Neocaridina freshwater ornamental shrimp.

Tabel 7. B/C Ratio analysis of Neocaridina ornamental shrimp cultivation business

Description	Mark
Total Profit	15.413.334
Total cost	9.586.666
B/C Ratio	1.60

Previous research [32] states that calculations from the B/C Ratio (Benefit Cost Ratio) analysis illustrate that if the B/C Ratio (Benefit Cost Ratio) value is > 0 , then an agribusiness business is feasible to run; conversely, if the B/C Ratio (Benefit Cost Ratio) value is < 0 , then an agribusiness is not feasible to run. The table above shows that the B/C Ratio (Benefit Cost Ratio) value of 1.60 means that for every IDR 100 cost incurred by the Neocaridina ornamental shrimp cultivation business, it gets a profit of IDR 160. So, cultivating freshwater ornamental shrimp of the Neocaridina type is profitable and feasible.

4 Conclusion

Based on the results of the data analysis, it was concluded that cultivating freshwater ornamental shrimp of the Neocaridina type in Gunung Mulya village, Tenjolaya subdistrict, Bogor Regency, was profitable, with the total profit obtained in 1 production cycle being IDR. 15,413,334. The financial aspects of business feasibility indicators obtained show a ratio of 2.60 and a B/C ratio of 1.60. Thus, the freshwater ornamental shrimp cultivation business in Gunung Mulya Village, Tenjolaya subdistrict, Bogor Regency, is feasible. The feasibility of this business is also supported by innovation in the ornamental shrimp breeding process. by reducing the volume of water flow specifically for ponds used as egg-hatching places, which can maximize breeding results.

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