

Feasibility Analysis of Patin Fish (*Pangasionodon hypoptalamus*) Nursery Business in Sukamandijaya Village, Ciasem District Subang Regency

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Submitted: 5 July 2024

Revised: 07 September 2024

Accepted: 12 September 2024

ABSTRACT

Keywords:

Break Even Point;
Business
Feasibility
Analysis; Fish
Nursery; Patin
Fish; Revenue

Fish breeding is one of the businesses that many fisheries farmers are involved in Sukamandijaya Village is one of the areas producing freshwater fish seeds, especially patin fish (*pangasius* fish). The production process of patin fish nurseries takes 4-5 weeks. Farmers will receive their income if all patin breeds are sold. There are several obstacles for patin fish nursery farmers related to capital, which still uses personal funds that hamper the next production process. Patin nursery farmers who have narrow marketing will need more time so that all fish breeds are sold, thus hampering farmers' income. This study aims to analyze the average costs required, revenue, income feasibility, and related evaluation of the patin fish breeding business in Sukamandijaya Village. The number of respondents in this study was 28 respondent farmers in Sukamandijaya Village. The analysis used in this study is the calculation of farm income, R / C Ratio, price BEP, production BEP, and revenue BEP. The results showed that the patin fish breeding farm in Sukamandijaya Village had fulfilled the feasibility criteria. The average variable cost required in one production is Rp 4.477.357, and the average fixed cost required in one production is Rp 1.636.801. The average total cost for Rp 6.109.417/production with total revenue obtained of Rp 13.178.610/ production and total income of Rp 7.069.193/production. Analysis of business feasibility obtained an R/C Ratio value of 2,15. Price BEP was obtained at Rp 41.72/head/production, production BEP of 27.542 heads/production, and revenue BEP of Rp Rp 2.472.818,18/production.

INTRODUCTION

Nowadays, people have easy access to various information, one of which is about the need for the amount of daily nutritional intake, especially the nutritional benefits contained in fish. Fish contains protein that can support the repair of body cells and also for the growth of children. This has led to an increase in people's purchasing power, thus affecting the level of demand for fishery products. The need for fish consumption, both freshwater fish and marine fish, continues to increase from year to year.

In the fisheries sector, Subang Regency is also one of the areas where farmers cultivate freshwater fish such as patin fish, tilapia, goldfish, patin fish, and gourami. Some of these farmers also carry out the hatchery process, which is the process of hatching fish with human intervention as an intermediary starting from broodstock breeding, hatching, to breeding. The demand for fish supply, especially patin fish, continues to increase but is not matched by the availability of production quantities, especially the continuity of patin fish seeds (Sitinjak, 2019). In general, a hatchery is a place and control of fish starting from the fish spawning process for fish hatcheries and including environmental control of fish during the hatching period to nursery activities until the age of about 4-6 weeks.

Patin hatchery or nursery farmers in Sukamandijaya Village have different decisions. Those who conduct spawning and breeding are different business operators. The quality of fish produced by farmers also tends to decline. In conducting their business, farmers use personal capital and there is no calculation related to the amount of revenue and income that must be received in one nursery production. Distribution costs and replacement costs due to damage or death of fish seedlings become a burden for farmers for further production activities. Some nursery farmers have a fairly narrow marketing channel that hampers capital turnover, so analyses and solutions are needed to ensure the sustainability of the patin fish nursery business.

LITERATURE REVIEW

Patin fish is a type of fish that is tolerant of the acidity (pH) of water. Therefore, patin fish can survive in waters with a slightly acidic pH range (low pH) to alkaline waters (high pH) with a pH range of 5 - 9. The content of dissolved oxygen content needed by patin fish is 3 - 6 ppm, while tolerance to carbon dioxide (CO₂) is 9 - 20 ppm, alkalinity value 80 - 250. The optimal maintenance media water temperature is in the range of 28 - 30°C (Adhitiya, *et al* 2023). The habitat of patin fish is on the banks of large rivers and in the estuaries of rivers and lakes. Judging from the shape of the patin fish mouth which is located slightly downward, the patin fish includes fish that live at the bottom of the water (Firman, *et al.* 2015).

Patin fish that will be used as broodstock are 2.5-5 years old both male and female with a weight of 1.5-2 Kg. The water used for rearing patin fish must meet the optimal needs of the fish. The water used must be of good quality. Some factors are used as parameters in assessing the quality of a water body, including dissolved oxygen (O₂) levels between 3 - 7 ppm, optimally 5 - 6 ppm Temperature 25 - 33°C, water pH 6.5 - 9.0,

optimally 7 - 8.5, carbon dioxide (CO²) not more than 10 ppm, ammonia (NH₃) and sulfuric acid (H₂S) not more than 0.1 ppm., hardness 3 - 8 dGH (degrees of German total Hardness).

A business feasibility study is a business research and planning that looks at whether the business is feasible to build and operate regularly to achieve maximum profit within a certain period of time (Umar, H. 2015). Production costs include all budget costs incurred by a business actor in one production process (Susanti and Arina, 2020). The amount of business revenue is related to the number of products produced and the sales price. Revenue is highly dependent on market conditions so the total revenue earned by business people is very uncertain. Revenue is obtained through the difference between expenses and revenue for production activity in u (Septiawan, et al. 2017).

If the value of the sales volume is greater than the costs incurred, a business is likely to make a loss and the sales proceeds are only able to meet part of the total costs incurred, or it is concluded that the value is below the break-even point. The purpose of using break-even analysis is to determine the level of activity when revenue is equal to the sum of all fixed costs and variable costs (Heru, 2019). R/C analysis can explain quantitatively whether the company is profitable or not, the efficiency of its business performance is considered profitable if the R/C value is >1. The revenue-cost ratio (R/C ratio) shows how much revenue is generated for each cost spent on production. In other words, a reasonable analysis of production costs can be used to measure the profitability of business activities.

METHOD

The research was conducted in Sukamandijaya Village, Ciasem District, Subang Regency, West Java. Research activities were carried out from December 2023 to January 2024. The research was conducted purposively based on the productivity of patin fish breeder farmers who are active or still producing sustainably about declining productivity and market competition.

Data Collection Techniques

The research uses data collection techniques in the forms of interviews, documentation, and literature studies. The author as an interviewer will collect data through questions and answers with respondents as in-depth information to obtain direct data. The results of the interview will be archived in the form of minutes, and the data obtained will be processed and used to complete and validate information related to the research topic (Kusumastuti, *et al.* 2020).

According to Kusumastuti (2020) Documentation is a collection of verbal data from the research conducted. Data collection through extracting information from literature studies, namely in the form of collecting data as well as information related to research originating from literature in the form of scientific articles or journals both physically and accessed through sites related to scientific studies, reading books, and previous research results.

Data Types and Source

The data used in this study are primary data and secondary data. Primary data is data obtained directly through organizations, institutions, and individuals related to research objectives obtained through measurements, calculations, questionnaires, observations, and interviews (Priadana and Sunarsi, 2021). Secondary data is obtained from other sources, both organizations, institutions, bodies and institutions that are already available and make it easier for researchers to adjust to the research variables being carried out (Abdullah, *et al.* 2022).

Data Analysis Method

Total Production Cost

In production, companies must measure the costs incurred as a basis for determining product prices. The total cost of production is the accumulation of all fixed costs and non-fixed costs in a production (Susanti and Arina, 2020). The total production cost formula is as follows:

$$TC = FC + VC$$

Information:

TC = Total Cost

FC = Fixed Cost

VC = Variable Cost

Revenue

Revenue is the total amount of income calculated by multiplying the price and quantity of an item. To get the value of total revenue (TR) can be calculated by the formula:

$$TR = P \times Q$$

Information :

TR : Total Revenue

P : Price

Q : Production Quantity

Income

Farm income is the total revenue received by farmers minus the costs incurred in the production process including variable costs and total costs or the total amount of depreciation costs in one growing season (Fadhilah and Rochdiani, 2021). According to Soekartawi in Fadhilah and Rochdiani, the formula for calculating income is as follows:

$$I = TR - TC$$

Information :

I : Income

TR : Total Revenue

TC : Total Cost

Break Even Point (BEP)

The break-even point (BEP) is defined as a situation where the company does not make a profit but also does not experience a loss. According to Ken Suratiyah (2020), to determine the BEP value using the formula:

a. Price Break-Even Point (Price BEP)

$$\text{Price BEP} = \frac{\text{TC}}{\text{TP}}$$

Information:

TC = Total Cost (Rp)

TP = Total Production (kg)

b. Production Break-Even Point (Production BEP)

$$\text{Production BEP} = \frac{\text{FC}}{\text{P}-\text{AVC}}$$

Information:

FC = Fixed Cost

P = Harga (Rp)

AVC = Average Variable Cost

c. Revenue Break Even Point (BEP)

$$\text{Revenue BEP} = \frac{\text{FC}}{1-\left(\frac{\text{VC}}{\text{TR}}\right)}$$

Information :

FC = Fixed Cost

VC = Variable Cost

TR = Total Revenue

Revenue Cost Ratio (R/C Ratio) Analysis

According to Ken Suratiyah (2020), R/C (Revenue Cost Ratio) is a comparison between total revenue and total cost. The formula used to determine the value of the R / C ratio is as follows:

$$\text{R/C} = \frac{\text{Total Revenue}}{\text{Total Cost}}$$

Information:

R/C : Revenue Cost Ratio

TR : Total Revenue

TC : Total Cost

Decision Criteria:

R/C > 1: The patin fish breeding business is declared feasible

R/C < 1: The patin fish breeding business is declared not feasible

R/C = 1: The patin fish breeding business is declared at the break-even point.

In this study, the patin fish breeding business at the TR (Total Revenue) value states all the revenue obtained from the sale of patin fish. TC (Total Cost) value states all costs incurred during the treatment process.

RESULTS AND DISCUSSION

Breeding and Nursery Process

Patin fish that will be used as broodstock in spawning are more than 2 years old. The weight of the mother patin fish to be spawned is more than 2kg. Patin broodstock that is ready for the spawning process will be moved to a 3x10 meter sorting pond. The spawning and hatchery sorting ponds must be ensured to be clean, have sufficient light, not too closed, and have good air circulation.

The process of sorting patin fish broodstock is generally carried out before 9 a.m. to prevent the sun from scorching and increasing the air temperature so that the fish broodstock is not stressed. The broodstock is in a special pond for one day with 2-3x feeding a day. Female patin broodstock that are ready to spawn have a soft, slippery abdomen, and sex parts that are already open. Some nursery farmers use a catheter system to ensure the presence of mature eggs. Male patin fish broodstock that is ready to spawn have white liquid and genital parts that stand out reddish when pressed (Iskandar, *et al.* 2022).

The qualified broodstock for the spawning process will be injected with Chorulon – Human Chorionic Gonadotropin (HCG) at 0.5ml per kilogram of fish weight. The hormone injection process is usually done in the morning or evening in a shady atmosphere. The stripping process is carried out on the broodstock at 12-14 hours after the hormone injection. In the stripping process, both male and female patin fish broodstock will be spawned. The NaCl liquid and anesthesia would be given to Patin broodstock before the spawning process.

Egg cells and sperm cells will be collected in a medium-sized basin or tub. During the fertilization process, water or sterile NaCl solution will usually be added. Fertilized eggs that have been rinsed with water will be taken to the tub or hatching pond. The atmosphere around the hatching pond should be clean with a room temperature of 30°C. Patin fish eggs will be hatched within 18 hours to 24 hours after treatment.

The nursery process begins when the hatched patin fish begins to adapt to the water for 18 to 24 hours. Nursery farmers will order patin fish seeds one week before the hatchery or spawning process takes place. In this study, hatchery farmers or patin fish seeders used an estimate on the number of scoops or spoonfuls. It is estimated that each sendo contains 10,000 patin fish seeds.

Patin fish breeders will prepare the nursery ponds first. The ponds used by farmers in Sukamandijaya Village are conventional ponds located inside buildings. Farmers use permanent buildings for fish nurseries. The ponds measure 1.5 x 3 meters with a height of 100cm. The number of ponds varies according to the size of the land, usually an even number. There is an additional pond of the same size as the nursery pond or larger that serves as a settling pond. Water collected in the settling pond will be channeled through taps connected to each pond.

Patin fish breeds will get food 4-6 hours after stocking in the nursery pond because Patin fish breeds at the age of 24 hours still have egg yolk sacks so they still have nutrients.

The first feed received by patin fish breeds is artemia. In the first week, patin fish breeds increase in size so that their shape can be seen. When the fish breeds are at that age, the feed will be replaced with silkworms with a frequency of 2-3x a day. Each pond requires 6 - 7 liters of silkworms to feed for 7 days. Nursery farmers will spread salt or eco enzyme to neutralize or balance water pH and prevent the development of bacteria. Patin fish breeds that are 2 weeks old or more than 14 days old will begin to be fed with pellets. Feed is given 2-4x a day until the patin fish is 4 weeks old. Feed pellets will be mixed with an inroflox booster for endurance and as nutrients to support the growth rate of patin fish.

Business Feasibility Analysis

1. Fixed Cost

The high amount of production will reduce the unit value of fixed costs to be lower and vice versa (Sherly and Widia, 2021).

Table 1. Average Fixed Costs of Patin Nurseries in Sukamandijaya Village, Ciasem District

No.	Input	Average Cost (Rp)	Percentage (%)
1	Hatchery Ponds and Buildings	Rp 154.522	9,44
2	Fish Drag Nets	Rp 425	0,03
3	Used Gallons	Rp 1.676	0,10
4	Genset	Rp 19.079	1,17
5	Buckets	Rp 678	0,04
6	Water Blower	Rp 4.860	0,30
7	Oxygen Cylinder	Rp 16.016	0,98
8	LPG Gas Cylinder	Rp 995	0,06
9	Basin	Rp 377	0,02
10	Lamp	Rp 39.522	2,41
11	Labor Wages	Rp 1.367.857	83,57
12	Tax	Rp 8.181	0,50
13	Oxygen Refill	Rp 20.946	1,28
14	Stove	Rp 1.667	0,10
Total		Rp 1.636.801	100

Source: Primary Data Processed (2024)

The table above shows that the average expenditure or fixed costs required by patin fish nursery farmers in Sukamandijaya Village is Rp 1.636.801 in one production process. The average value is obtained with an average farmer having 10 ponds of patin fish seedlings. Total fixed costs are the budget for managing patin fish nurseries up to 1 inch in size or one production process for 4-5 weeks. The highest depreciation is in labor wages of Rp 1.367.857 and investment in ponds and buildings

of Rp 154.522. The tax that farmers must pay on their land is Rp 98.174 per year or Rp 8.181 per month.

2. Variable Cost

The variable costs required adjust to the company's production activities and the total amount will increase or decrease proportionally to advance business activities and become a source of income for the company (Badriah and Faridah, 2023).

Table 2. Average Variable Costs in Sukamandijaya Village

No	Input	Average	Units	Average Cost (Rp)	Percentage (%)
1.	Patin Seeds	21485.71	Ekor	Rp 1.251.429	28
2.	Artemia	1	Kaleng	Rp 800.000	18
3.	Silk Worm	72.5	Liter	Rp 1.375.000	31
4.	Booster	1.14	Bungkus	Rp 37.000	1
5.	Fish Pellets	4.52	Kg	Rp 91.143	2
6.	Salt	1	Bungkus	Rp 35.321	1
7.	Chorulon	1	Ampoule	Rp 185.000	4
8.	Eco Enzyme	1	Bungkus	Rp 90.000	2
9.	Packaging	1,7	Pack	Rp 69.857	2
10.	LPG 3Kg Refill	3	Unit	Rp 66.000	1
12.	Electricity Bills	-	Rp.	Rp 476.607	11
Total				Rp 4.477.357	100

Source: Primary Data Processed (2024)

The table above shows that the average non-fixed expenditure required by patin fish breeder farmers in Sukamandijaya Village is Rp 4.477.357 in one production process. The average value will have different calculations based on the number of ponds managed by farmers. The total variable cost is the budget for managing patin fish nurseries up to 1 inch in size or one production process for 4-5 weeks.

3. Total Production Cost

Table 3. Average Total Production Cost of Patin Hatchery in Sukamandijaya Village Ciasem Sub-district

No.	Production Cost	Average Cost (Rp)	Percentage (%)
Fixed Cost			
1	Equipment Depreciation	Rp 80.524	

No.	Production Cost	Average Cost (Rp)	Percentage (%)
2	Ponds and Building Depreciation	Rp 154.552	
3	Labor	Rp 1.367.857	
4	Oxygen Refill	Rp 20.946	
5	Tax	Rp 8.181	
Total Fixed Cost		Rp 1.632.060	26,71
Variable Cost			
1	Patin Fish Seeds	Rp 1.251.429	
2	Fish Feeds	Rp 2.266.143	
4	Salt	Rp 35.321	
5	Medicine	Rp 312.000	
6	Electricity Bills	Rp 476.607	
7	Packaging	Rp 69.857	
8	LPG 3Kg Gas Refill	Rp 66.000	
Total Variable Cost		Rp 4.477.357	73,29
Total Production Cost		Rp 6.109.417	100

Source: Primary Data Processed, 2024

Based on the data table above, shows that the average total production cost required in the process of breeding patin fish is Rp 6.109.417. The average total variable costs required by patin fish nursery farmers in one production process is Rp 4.477.357, and the average total fixed costs required is Rp 1.632.060 in one production process of patin fish seeds.

4. Revenue

The average amount of production of patin fish seedlings is 146.429 fish with an average stocking of 10 ponds. The average selling price of patin fish seedlings at 1-inch size is Rp 90,-.

Table 4. Average Revenue of Patin Fish Nursery Business in Sukamandijaya Village, Ciasem District

Description	2023		
	Production (Heads)	Price (Rp/Heads)	Income (Rp)
Average	146.429	Rp 90,-	Rp 13.178.610

Source: Primary Data Processed, 2024

In the table, it is known that the total average revenue obtained by patin fish breeder farmers in Sukamandijaya Village is Rp 13.178.571. The amount of revenue is obtained during one production with a span of 4 to 5 weeks or a total of

30 days of breeding. The fish seedlings produced are 1 inch in size and have previously been ordered by farmers or consumers.

5. Income

According to Cemda and Sihombing (2022) income is a receipt in the form of money or goods that provides a change in value in the form of redistributive transfers. Income in farming is obtained from the calculation of the difference between total revenue and total costs used and interest on outside capital with a result that is net value.

Table 4. Average Income of Patin Fish Nursery Business in Sukamandijaya Village, Ciasem District

Description	2023
	Average Income (Rp/Production)
Revenue	Rp 13.178.610
Total Production Cost	Rp 6.109.417
Income	Rp 7.069.193

Source: Primary Data Processed, 2024

The data in Table 5 shows that the average income of patin fish nursery farmers in Sukamandijaya Village is Rp 7.069.193 in one production. The profit obtained by patin fish nursery farmers is a net profit. The income of patin fish nursery farmers is also related to the number of ponds owned, stocking density, and weather conditions that affect the survival ability of patin fish seedlings.

6. Break Even Point (BEP)

Break-even point analysis is a method to plan profits fundamentally by studying the relationship between fixed costs, and variable costs, with the volume of production activities and profits to be obtained.

1. Revenue BEP

It is known that the costs required in the production process of patin fish seedlings include fixed costs of Rp 1.636.801 and variable costs of Rp 4.477.357. The revenue obtained by farmers in one breeding process is Rp 13.178.610.

$$\text{Revenue BEP} = \frac{FC}{1 - \left(\frac{VC}{TR}\right)}$$

$$\text{Revenue BEP} = \frac{\text{Rp } 1.6336.801}{1 - \left(\frac{\text{Rp } 4.477.357}{\text{Rp } 13.178.610}\right)}$$

$$\text{Revenue BEP} = \frac{\text{Rp } 1.632.060}{1 - 0,34}$$

$$\text{Revenue BEP} = \frac{\text{Rp } 1.632.060}{0.66}$$

$$\text{Revenue BEP} = \text{Rp } 2.472.818,18$$

After analyzing the BEP average revenue, a value of Rp 2.472.818.18 was obtained in the production process. The results of the analysis show that patin fish breeding farmers experience a break-even point at Rp 2.472.818.18.

2. Price BEP (P)

It is known that the total cost required is Rp 6.109.417 and the value of the total production in the table is 146.429 fish seedlings.

$$\text{Price BEP} = \frac{\text{TC}}{\text{TP}}$$

$$\text{Price BEP} = \frac{\text{Rp } 6.109.417}{146.429}$$

$$\text{Price BEP} = \text{Rp } 41,72$$

In the price BEP analysis, it is known that the total price BEP value is Rp 41.72,-/head in one breeding process. Based on field observations, Patin fish nursery farmers sell fish seeds at prices above the BEP value, which is Rp 90,-/head with a minimum purchase of 10.000 fish.

3. Production BEP (Q)

The costs required in the production process of patin fish seeds include fixed costs of Rp 1.636.801 / production and variable costs of Rp 4.477.357 / season and the amount of revenue obtained by farmers in one growing season is Rp 13.178.610 / production.

$$\text{Production BEP} = \frac{\text{FC}}{\text{P}-\text{AVC}}$$

$$\text{Production BEP} = \frac{\text{Rp } 1.636.801}{\text{Rp } 90 - \frac{\text{Rp } 4.477.357}{146.429}}$$

$$\text{Production BEP} = \frac{\text{Rp } 1.636.801}{\text{Rp } 90 - 30,57}$$

$$\text{Production BEP} = \frac{\text{Rp } 1.636.801}{59,43}$$

$$\text{Production BEP} = 27.542 \text{ heads}$$

In the production BEP analysis, it is known that the break-even point value of the amount of production that must be obtained by farmers is 27.542 fish per season. Estimated seedling mortality experienced in the nursery process is between 10% - 50%. If seedling mortality is already at 50%, farmers may not be able to reach the production BEP value and experience losses. Patin fish nursery farmers in Sukamandijaya Village are able to produce an average of 146.429 patin fish seedlings with an estimated mortality of 30%.

7. Revenue Cost Ratio (R/C Ratio)

The patin fish nursery business in Sukamandijaya Village requires a total production cost of Rp 6.109.417 in one nursery process. The total average revenue obtained by nursery farmers is Rp 13.178.610. Then the calculation of the RC ratio is as follows:

$$R/C = \frac{\text{Total Revenue}}{\text{Total Cost}}$$

$$R/C = \frac{\text{Rp } 13.178.610}{\text{Rp } 6.109.417}$$

$$R/C = 2.15$$

After conducting the R/C ratio analysis, a value of 2,15 was obtained. The R/C ratio value obtained exceeds 1. Based on these results it can be concluded that the patin fish breeding farm in Sukamandijaya Village is feasible to run and develop. In accordance with the analysis criteria, if the R/C ratio value obtained >1 means that the patin fish breeding business is feasible to develop. Based on the criteria determined, this amount is a value that states that the business being pursued is feasible to do and develop.

CONCLUSION

In the study of Feasibility Analysis of Patin Fish Breeding Business in Sukamandijaya Village, Ciasem District, Subang Regency, it can be concluded that patin fish breeding farmers in Sukamandijaya Village have an average total cost for one production of Rp 6.109.417 for their business. Farmers are able to produce an average of 146.429 fish seedlings in one production with an average number of 10 ponds. The total average revenue obtained from the production process is Rp 13.178.610 and the total income obtained by farmers in one production period is Rp 7.069.193.

Feasibility testing analysis of the business, further analysis is needed in the form of calculating the break-even point (BEP) and revenue cost ratio (R/C Ratio). The break-even point (BEP) analysis includes the production BEP obtained of 27.542 patin fish seedlings that farmers must produce on average ownership of 10 patin fish nursery ponds. In the calculation of the BEP price obtained selling price of Rp 41.72, -/head. BEP value of revenue that should be obtained by farmers amounted to Rp 2.472.818,18. On average, all respondent farmers have an R/C ratio of 2,15. Based on the results of the analysis, the patin fish seed business is declared feasible for further implementation because it has exceeded the break-even value. R / C ratio criteria > 1 while in the patin fish breeding business the R / C ratio value is 2,15.

ACKNOWLEDGEMENT

First of all, I would like to thank my lecturers who have provided guidance on this research. My gratitude goes to the Sukamandijaya Pangasius Group for sharing information and experiences with me, especially those related to the content of the research. I also thank the reviewers and proofreaders who have given me the opportunity to submit scientific article and are pleased to read and provide input for my scientific research article.

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