# Financial Feasibility Analysis of Crab (*Portunus* sp.) Catching Business Using Traps in Tegal Regency, Central Java

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**A B S T R A C T :**

The study examines the financial viability of crab fishing using traps in Tegal Regency, Indonesia. Crab fishing is economically important in this area due to its high value and export potential. The research focused on Suradadi Subdistrict, where most fishermen use traps for catching crabs. The study analyzed financial aspects using methods like Net Present Value, Revenue Cost Ratio, and Payback Period. They surveyed 137 crab fishermen using purposive sampling. The fishermen use small wooden or fiberglass boats (less than 5 GT) for daily fishing trips, mainly using folding traps at night. The financial analysis of the crab fishing business in Tegal Regency shows that with an initial investment of IDR 65,220,000 and annual operational costs of IDR 48,120,750, the business generates an annual income of IDR 123,565,000. The Revenue to Cost (R/C) ratio of 1.82 indicates the business is profitable, as each IDR 1 spent yields IDR 1.82 in revenue. The Net Present Value (NPV) over a 10-year period is IDR 382,895,901, reflecting strong financial viability. Additionally, the payback period of 1 year, 3 months, and 29 days Based on these results, the crab fishing business in Suradadi Subdistrict is considered profitable and financially viable. The study suggests further research on sustainable crab management to avoid overfishing.

**Keywords**: Business Feasibility, Crab fisheries, Fishermen's welfare, Sustainability, Tegal Regency

## 1. Introduction

Tegal Regency is one of the regencies located in the administrative area of Central Java Province that has the potential for crab (portunus sp.) capture fisheries. Suradadi Subdistrict in Tegal Regency serves as the hub for crab fishermen, where most are traps, fishermen primarily catching crabs. Crab itself is one of the catches that has high economic value with a relatively stable price and has export quality. This is also reinforced by Husni et al. (2021), that crab has an important economic value and has been exported to various countries in fresh and processed form.

The high economic value of crab needs to be considered for its management so that the crab resources remain sustainable. The government itself has issued regulations related to the management of crab in WPP NRI. This aims to keep the management of crab sustainable and avoid overexploitation. Crab fishermen in Tegal Regency also realize that the crab fishing grounds are now further away than before. This is reinforced by Huda et al. (2021), the status of crab utilization is already in a fully-exploited condition, especially in WPP 711 and 712, and the condition has even reached the over-exploited level, which means that the fishing rate must be reduced.

Trap fishermen in Suradadi Subdistrict although the majority of crab catches, but the level of welfare is still relatively low. This is influenced by a variety of factors such as water conditions, social and economic fishermen and fishing facilities and infrastructure. These factors will directly affect the main income of fishermen, which will indirectly affect the needs of fishermen's lives. This is also reinforced by Nabilla and Aisyah (2023), the lifestyle of fishermen will be influenced by their income, influencing factors include working capital, labor and distance at sea.

Based on these events, it is necessary to conduct research to analyze the financial aspects of crab capture fisheries in Tegal Regency to determine the feasibility level of the capture business. The feasibility level of crab catching business will affect the welfare of fishermen and their management. The financial aspects used in this study are using the criteria of Net Present Value (NPV), Revenue Cost Ratio (R/C Ratio) and Payback Period of crab catching business.

## 2. Research Method

This research was conducted on July 8, 2024 until July 26, 2024 in Suradadi Subdistrict, Tegal Regency. In this study, the object was fishermen who caught crabs using traps. The analysis used in this research is descriptive quantitative, where the descriptive method is used to find out information about fishing activities while the quantitative method is used to analyze the feasibility of the crab catching business. The sampling method used is purposive sampling method, which is a method of drawing samples by determining certain criteria. The criteria used are fishermen who have the main catch in the form of crabs. According to Makwana et al. (2023), in purposive sampling, individuals are selected to be sampled based on their relevance to the research objectives or often called deliberate sampling.

The sampling method used is the Slovin method with a population of 415 crab fishermen in Suradadi Subdistrict who are members of the Joint Business Group (KUB). Based on the Slovin formula used with an error rate of 7%, 137 samples was obtained. The following is the Slovin formula (Sugiyono, 2017):

$$n = \frac{N}{1+Ne^2} \qquad (1)$$

Where:

n   : desired sample size
N   : total population
e   : error (%)

The data collection methods in this research are observation, interview and literature study. The data required are primary data and secondary data. Primary data is obtained from interviews using questionnaires to crab fishermen. Primary data needed include:

1. Technical aspects, including fishing grounds, catch rates, fishing season, and vessels used in catching crab.
2. Financial aspects, including capital, costs, revenue and profit from crab catching.

Secondary data used in this study are data on the amount of crab production, the number of fishing fleets, the number of fishing households in the Tegal Regency Fisheries Service. Furthermore, the financial analysis methods used in this study include NPV analysis, R/C Ratio and Payback Periods (Riyadi & Wijayanto, 2012); (Mardianto et al., 2015); (Kartikasari, 2021).

The formulas of the methods used are as follows:

a. Net Present Value (NPV)

$$NPV = \sum_{t=1}^{n} \frac{CFt}{(1+K)^t} - Io \qquad (2)$$

Where:

NPV   : net present value (Rp)
CFt   : cash flow per year in period t
Io   : initial investment value in year 0 (Rp)
K   : interest rate or discount rate (%)

b. Revenue Cost Ratio (R/C Ratio)

$$R/C\ Ratio = \frac{TR}{TC} \qquad (3)$$

Where:

TR   = total revenue (Rp/Kg/trip)
T.C   = total cost (Rp/trip)

c. Payback Periods (PP)

$$PP = n + \left[ \frac{(a-b)}{(c-b)} \ x\ 1\ year \right] \qquad (4)$$

Where:

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

## 3. Result and Discussion

Tegal Regency is geographically located at the coordinates 108°57'6" - 109°21'30" east longitude and 6o50'41" - 7o15'30" south latitude. The boundaries of Tegal Regency include Tegal City and the Java Sea to the north, Brebes Regency and Banyumas Regency to the south, Brebes Regency to the west and Pemalang Regency to the east (BPS Tegal Regency, 2024). The coastal area of Tegal Regency consists of Warureja, Kramat and Suradadi Subdistrict, which are dominated by small-scale fishers with fishing fleets of less than 5 GT. The number of Joint Business Groups (KUB) in Tegal Regency is as follows.

**Table 1 - Average Investment Capital for Folding Trap Fishing Business.**

| No. | Subdistrict | Total KUB |
|---|---|---|
| 1 | Kramat | 6 |
| 2 | Suradadi | 28 |
| 3 | Warureja | 1 |
| 4 | Kedungbanteng | 5 |
| | **Total** | **41** |

Based on the table, it is known that the largest number of KUBs is in Suradadi Subdistrict with 28 KUBs. Suradadi Subdistrict itself is dominated by fishermen with traps whose main catch is crab. The following is the amount of crab production in Tegal Regency in 2023.
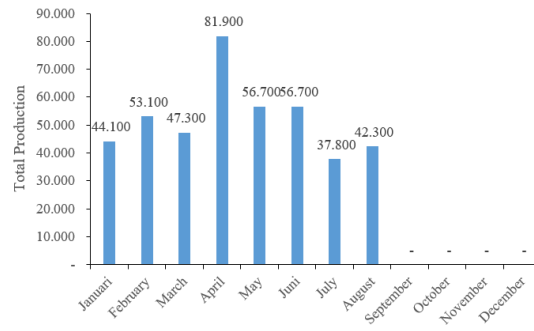


**Fig. 1 - Production graph of king crab in Tegal Regency in 2023.**

Based on the graph, it is known that the largest amount of crab production in Tegal Regency occurred in April at 81,900 kg. In September to December there was no production of crab, this was because there were no fishermen who went to sea during that period. This was influenced by poor water conditions and limited capital. In the information on the amount of crab production in Tegal Regency in 2023, it was known that the trend of crab fishing decreased, especially in the second semester. According to Baihaqi et al. (2021), the increase in fishing effort is one of the factors in the decline of crab resources, as is the case in the Java Sea which experienced an increase in effort of more than 25% per year and resulted in a sharp decline in resources.

### 3.1. Technical Aspects

The vessels used by fishermen in Suradadi Subdistrict to operate traps are wooden and fiberglass vessels with a size of <5 GT. The engine used is a yanmar diesel engine with a power of 8.5 PK. The length of the fishing trip carried out by traps fishermen in Suradadi Subdistrict is daily or one day fishing with the catch area in the Java Sea Waters or WPPNRI 712. The operation of the traps itself consists of setting, immersing and hauling with a duration of immersing for 7 to 8 hours. The main catch of this traps is crab. According to Putri et al. (2023), traps is operated by fishermen at night by adjusting the behavior of crabs which tend to be more active at night.

The type of traps used by fishermen in Suradadi Subdistrict is folding traps. The construction of this trap consists of a frame, body and mouth, where the frame of this fishing gear is made of iron and on the body, there is a polyethylene (PE) net. The use of this fishing gear is also required bait in the form of low fish as an attractor for crabs. The construction of the folding traps can be seen in the following table.

**Table 2 - Construction of Folding Traps.**

| No. | Folding Trap Construction | Description |
|---|---|---|
| 1 | Framework | The framework used in folding traps is made of iron which is cut into 9 parts, namely the base, body and folding parts. On the left and right sides of the center piece of the base section there is a traps ring that serves to fold the traps, the base section is 41 cm wide and 27 cm long, the body section is 26 cm long and 27 wide, the folding section is 15 cm long and 15 cm wide. |
| 2 | Body | The body of the folding traps is made using a net whose size is adjusted to the framework that has been made. The base and wall parts of the folding traps are sewn with PE rope using a needle. |
| 3 | Mouth | The mouth shape of the folding traps consists of two doors on the right side and the left side which are made using a net so that it can make it easier for crabs to enter. |
| 4 | Bait holder | The bait holder is located on the inside of the traps. The bait holder is made of iron with a length of 12 cm in the center which serves to hold the bait in place. |
| 5 | Door Opener Hinges | The door to remove the catch is located in the center by opening the hinge. The door opening hinge is made of iron. |
| 6 | Weights | Stones are used as weights and tied using monofilament rope. |
| 7 | Buoy | A medium sized aqua bottle and 1 deregen are used as floats and tied using a monofilament rope 8 meters long. |

### 3.2. Financial Aspects

A business can be said to be feasible or to be known by several aspects, namely capital, costs, income and profit. Analysis of the feasibility level of crab catching business used the following assumptions:

1. The projection age of 10 years is adjusted to the economic life of investment goods used in the activities of the traps catching business field;
2. Capital used is own capital and credit from the Bank or others;
3. The first year of traps fishing business operates in the fourth month so that the income in the first year is not full but only 9 months;
4. There is a 3% growth each year (inflation) in income, capital/investment and total costs.

**Table 3 - Financial Analysis of Crab Catching Business in Suradadi Subdistrict.**

| Description | Average per Business Unit |
|---|---|
| **Investment Capital (Rp)** | |
| a. Boat | 40,350,000 |
| b. Fishing gear | 11,970,000 |
| c. Machine | 12,900,000 |
| **Total Capital** | 65,220,000 |
| **Fixed Cost (Rp/Year)** | |
| a. Maintenance | 4,565,500 |
| b. Depreciation | 8,997,000 |
| **Total Fixed Cost (Rp/Year)** | 13,562,500 |
| **Variable Costs (Rp/Year)** | |
| a. Operating costs | 48,120,750 |
| **Total Variable Costs (Rp/Year)** | 48,120,750 |
| **Total Cost (Rp/Year)** | 61,683,250 |
| **Income (Rp/Year)** | 123,565,000 |
| **Profit (Rp/Year)** | 61,881,750 |
| **R/C Ratio** | 1.82 |
| **NPV (Rp/10 Years)** | 382,895,901 |
| ***Payback Period* (Year)** | 1.33 |

Based on Table 3, it is known that the investment value of the crab catching business is IDR 65,220,000, which consists of vessels, fishing gear and machinery. The vessels used in the fishing business are wooden and fiberglass vessels with sizes > 5 GT. While the traps used ranged from 500 to 600 pieces. Operational costs incurred in this fishing business include diesel fuel, food and bait with a value of Rp 48,120,750/year or Rp 213,870/trip. The income earned amounted to IDR 123,565,000/year with three fishing seasons: lean, regular and peak. The lean season occurs from October to December, the regular season occurs from January, February, March, July and August and the peak season occurs from April to June. According to Supriadi et al. (2020), the amount of investment capital in crab catching business activities using folding traps is IDR 76,000,000, - with the largest cost component being the boat.

The R/C ratio value in crab catching business is 1.82 which indicates that the business is feasible or profitable. This is indicated by the R/C ratio value of more than one (>1). The R/C ratio itself is a ratio or comparison of the value of income and total costs obtained from the crab catching business. Based on the R/C ratio value of more than one, the crab catching business is feasible to continue. According to Afriani et al. (2023), if the R/C ratio > 1 then the revenue received is greater than the costs incurred so that it can be ascertained that the business is profitable and feasible to continue.

The NPV value of crab catching business in Suradadi Subdistrict is Rp 382,895,901/unit in 10 years, which means that the projection in 10 years of business conducted can produce a value of Rp 382,895,901/unit. This shows that the fishing business is feasible or profitable because the NPV value of the business is more than zero (>0). This is also reinforced by Zamdial et al. (2021), which states that the fishing business using traps is classified as profitable and feasible to run if the NPV value of the business is positive.

The payback period value in the crab catching business shows the time required to return the investment that has been spent. The payback period value obtained from crab catching business is 1.33, which is 1 year 3 months 29 days. The time required to return the investment from the business is relatively short because it is below the economic life of the investment item. This is reinforced by Annisa et al. (2023), which states that the success of a business is considered good if the payback period is smaller than the life of the business or project.

## 4. Conclusions

Crab catching business in Suradadi Subdistrict is feasible and profitable with R/C ratio criteria of 1.82, NPV of Rp 382,895,901/ business unit/10 years and payback periods of 1.33. The profitable crab catching business can affect the welfare level of the fishing community in Suradadi Subdistrict. However, there is a need for further research related to sustainable crab management so that existing crab resources are not over exploited due to profitable fishing businesses.

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