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DEVELOPMENT OF CAPTURE FISHERIES SYSTEM IN KEBUMEN REGENCY IN CENTRAL JAVA, INDONESIA

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Abstract: Logending Coastal Fishing Port (PPP) is one of the centres of fishing activities in Kebumen Regency, Central Java, Indonesia. The volume of fish catches at the fishing port increased from 2016 to 2019, but declined in 2020 due to bad weather, the COVID-19 pandemic, and limited port facilities. This decline has impacted the sustainability of the fisheries sector in the regency. The catch volume is also not proportional to the production value due to the diversity of fish species and market price fluctuations. Therefore, strategic efforts to develop commodity-based capture fisheries are important. This study aims to: (1) determine leading fish resources; (2) analyse the capture fisheries system; and (3) propose priority efforts for the development of capture fisheries in PPP Logending. A systematic approach was used to address these issues. Score analysis was used to determine leading commodities and an analytical hierarchy process was used to establish strategic policies. The results of the study show that hairtail, white pomfret and mackerel are priority commodities, with the peak fishing season occurring from August to November. The dominant fishing gear is gillnets and trammel nets, with vessels ranging in size from 1 to 3 GT. Strategic efforts to improve the quality of human resources are a priority for the development of capture fisheries in PPP Logending. The next priority is to improve the availability of facilities and infrastructure at fishing ports.

Keywords: Analytic hierarchy process, development strategy, Kebumen, PPP Logending, superior commodities.

Introduction

Capture fisheries in Kebumen Regency, Indonesia is still facing various problems despite its huge potential. Therefore, preparing a strategic plan for fisheries development in the area is vital as an alternative solution to the current problems. A systematic approach is needed to prepare the plan so that it can comprehensively address every issue that arises. The first step is to determine the superior fish commodity in the area and then analyse the various developmental needs, which include technology, human resource, infrastructure as well as socio-economic aspects. According to Irnawati *et al.* (2011), superior commodities are high-demand resources that can fetch a high selling price. Efforts to utilise superior commodities may encompass biological, technological, economic, and social aspects to increase people's income (Pregiwati *et al*., 2017).

The utilisation of superior commodities is the initial step in managing capture fisheries with the concept of efficiency in gaining advantages and better income, as well as increasing competitiveness (Hidayat *et al*., 2022). Kebumen Regency, located in the south coast of Central Java is rich in fish resources. Capture fisheries are quite developed in this region, with vast undisputed fishing grounds extending into the Indian Ocean. Fisheries in

the regency are supported by fish-landing bases (PPI) and coastal fishing ports (PPP) (Nurani *et al*., 2023; Nurani *et al*., 2024). The Logending Coastal Fishing Port (PPP Logending) is one of the main fishery centres in Kebumen Regency.

The volume of catches is not in line with the production value as a presentation of prices. The volume of fish landings showed an upward trend from 2016 to 2019 before declining in 2020. However, in terms of production value, there was an increase in the 2016 and 2018 periods, followed by a drastic decline in 2019 and 2020. As a striking example, the catch volume at PPP Logending in 2017 reached 907.52 tonnes and increased to 3,143.95 tonnes in the following year, which is an increase of 346.43%. However, the production value for both years was £13.8 billion and £19 billion, which only increased by 37.7% (Kebumen District Fisheries and Marine Affairs Office, 2020).

The stark difference between landing volume and production value may be attributed to the type of fish with very diverse prices. Fish with low market prices will not significantly increase production value despite being landed in large quantities. According to Kusumasuci *et al*. (2018), some of the catches landed at PPP Logending are hairtail fish (*Trichiurus* sp.), white pomfret (*Pampus argenteus*), Spanish mackerel (*Scomberomorus* sp.), tuna (*Euthynnus affinis*), ariid catfish (*Arius* sp.), white snapper (*Lates calcarifer*), and banana prawns (*Penaeus merguiensis*).

The decline in production in 2020 might have been caused by adverse sea conditions, including bad weather, strong winds, and high waves (Nurani *et al*., 2023; Nurani *et al*., 2024). Furthermore, the onset of COVID-19 pandemic had also aggravated the situation by preventing fishermen from going out to sea. The pandemic had caused a huge socio-economic disruption that made people limit their activities in the outside environment due to health concerns (Kholis *et al*., 2020). According to Mubarok and Fajar (2020), the pandemic had significantly decreased fishermen's income and caused fish prices to fall. As a result, the fishermen had to reduce their activities because of high operating cost.

The problem of decreased production is also influenced by location and infrastructure. PPP Logending is located near an estuary, making it prone to sedimentation that can interfere with the entry and exit of fishing boats. This was stated by Purnomo *et al*. (2015), who highlighted the difficulties in fish-landing and anchoring activities at PPP Logending due to port conditions that are prone to sedimentation. The port's main structure, namely the wavebreaker is also damaged and this made it difficult for fishermen to dock, especially during high waves. According to Nurani and Widyamayanti (2006), constraining factors in fisheries development included the use of old fishing gear, limited port infrastructure, small fishing ground coverage, low investment capital, and high operational costs.

The problems, if not addressed promptly, will have an impact on the sustainability of fisheries at PPP Logending, which in turn, will reduce employment opportunities, threaten food security, and disrupt economic development in Kebumen Regency. For this reason, it is important to study and formulate strategic measures for fisheries development in this region. Given the variety of fish in the sea, it is necessary to prioritise superior fish species with the aim of obtaining greater revenue with minimal development costs. Utilisation of superior commodities is the first step in managing capture fisheries with the concept of efficiency to gain advantages and increase competitiveness for greater income (Hidayat *et al*., 2021).

As the challenges faced by fishermen at PPP Logending are very complex, so, a systematic approach is needed in the problem-solving process. Assessment of the biological, technical, financial, and social aspects of these challenges may provide solutions in developing capture fisheries in the regency.

Materials and Methods

Location and Time of Research

This research was conducted at PPP Logending in Kebumen Regency, Central Java province, Indonesia. The research map is shown in Figure 1. PPI Logending is located on the south coast of Kebumen Regency. The data collection was carried out from March to May 2021.

Data Collection

The data collection was performed through interviews and questionnaire surveys. The research questionnaire for fishermen is presented in Appendix 1. Statistical data on PPP Logending between 2016 and 2020 were retrieved from the Kebumen Regency Department of Environment, Marine Affairs and Fisheries (DLHKP). The data comprised landing volumes and production values of each type of fish, the distribution of fish resources, the added value in fishery products, the amount of capture production, and the amount of effort put in. Technical aspects included facilities at the port, ship size, type of fishing gear, as well as fishing areas. Financial aspects included investment costs, operational costs, maintenance costs, total costs, total revenue, and profits.

Social aspects included the number of fishermen in the port, their age, employment status, and education level. The interview respondents comprised 24 ship crew members, 22 ship owners, five fishmongers, and two fish processors. They were selected using the non-probability sampling method with accidental sampling technique. The number of respondents was set at 10% of the total number of ship crewmen or owner in PPP Logending.

Data collection for determining development strategy was performed using the Analytic Hierarchy Process (AHP) in seven respondents. They included a staff member from the Logending Fish Auction Centre (TPI Logending), the head of TPI Logending, two PPP Logending staff members, the harbour master of

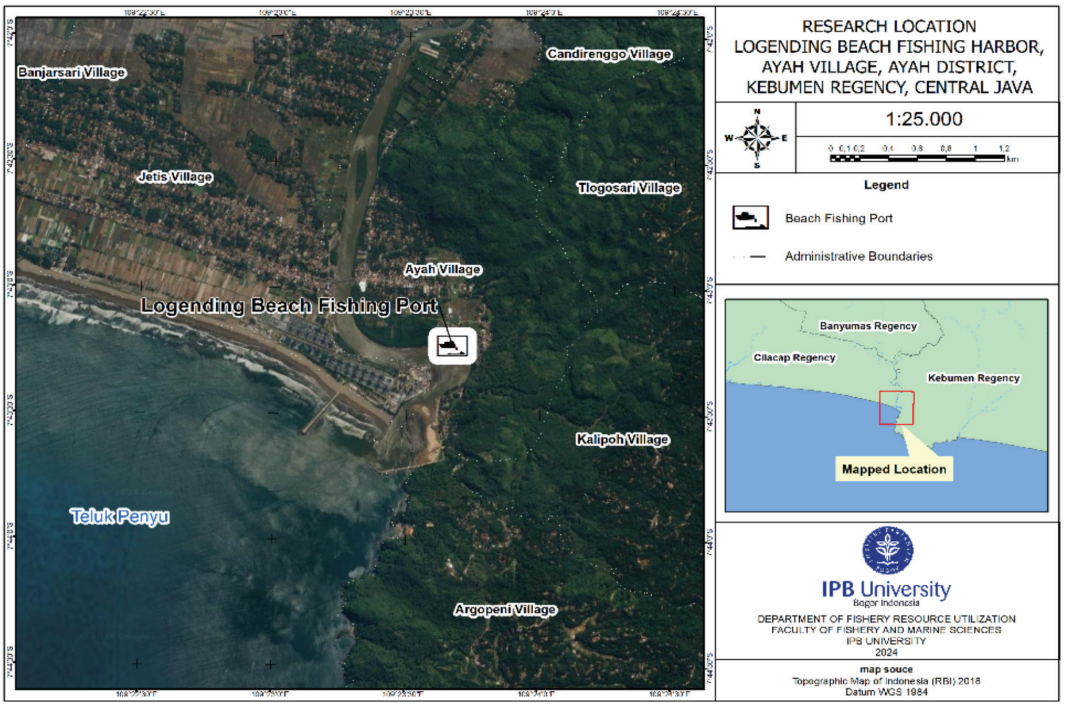

Figure 1: Map of research location at PPP Logending in Kebumin Regency, South Java, Indonesia

PPP Logending, and two representatives from Kebumen Regency's DLHKP. Respondents were chosen using the non-probability sampling method with purposive sampling technique. Respondents were also chosen based on other criteria such as their expertise and level of involvement in capture fisheries, besides familiarity with the working culture at PPP Logending.

Research Data Analysis

Analysis of Superior Fish Commodities

The scoring method was used to determine superior fish commodities according to Mangkusubroto and Trisnadi (1985) and Pregiwati *et al*. (2017). The method could assess the value of different units by assigning values ranging from low to high. The function to determine the values was performed using Equation 1.

$$V(X) = \frac{(X - X0)}{(x1 - x0)}$$

$$V(A) = \sum_{i=1}^{n} Vi\ (Xi),\ i = 1,2,3,..n \quad \text{(Equation 1)}$$

where

V (X) : value function of variable x
X : value of variable x
X_1 : the highest value in criteria x
X_0 : the lowest value in criteria x
V (A) : alternative value function A
V_i (X_i) : function of the alternative on the *i*-th criterion

There were four criteria to assess and select superior fish commodities, namely the volume of production, the production value, marketing (distribution area), and added value of product (product diversification). The criteria and values assigned are stated in Table 1.

Condition of Capture Fisheries

Biological Aspects

The biological aspects of capture fisheries activities was determined using the Catch Per Unit Effort (CPUE) analysis. The CPUE value was used to determine the fishing unit's productivity by processing the data of total amount of captured fish against the effort used. According to Sparre and Venema (1998), CPUE value may be calculated using Equation 2.

$$CPUE = \frac{Catch}{Effort} \quad \text{(Equation 2)}$$

where

Catch (C) : total amount of captured fish (tonnes)
Effort (E) : total catch effort (unit)

Table 1: Assessments categories for selecting superior fish commodities

No.	Criteria	Score	Descriptions
1	Volume of production	Using the statistical data of total volume of production of captured fish from 2016-2020	Sorting and selecting fish resources with the highest volume of production
2	Production value	Using the statistical data of total production value of captured fish from 2016-2020	Sorting and selecting fish resources with the highest production value
3	Marketing (distribution area)	1 2 3	Local Inter-city/inter-province International/export
4	Added value of the product (product diversification)	1 2 3	Low (< 3) Medium (3–5) High (> 5)

Source: Pregiwati *et al*. (2017)

According to Gulland (1982) in Nurani *et al.* (2021), standardisation of fishing gear was needed because they had different capabilities in catching fish. Indonesia is a country with a tropical climate and thus, had an abundance of fish resources. However, this also caused one species of fish to be easily caught with different types of fishing gear. A selected fishing gear was set as the standard based on the highest average CPUE value. Standardisation was performed by calculating the Fishing Power Index (FPI) in Equation 3.

$$FPI = \frac{CPUE\ dst}{CPUE\ st} \qquad \text{(Equation 3)}$$

where

FPI : fishing power index
$CPUE_{dst}$: CPUE of the fishing gear before standardisation (tonne/trip)
$CPUE_{st}$: CPUE of the standard fishing gear (tonne/trip)

The calculation of standard effort is performed using Equation 4.

$$F_s = FPI\ x\ F_{dst} \qquad \text{(Equation 4)}$$

where

F_s : standardised catch effort (*trip*)
F_{dst} : catch effort before standardisation (*trip*)

Analysis of CPUE is done by recalculating the CPUE value using the standardised catch effort while not changing the amount of captured fish as stated in Equation 5.

$$CPUE_s = \frac{Catch}{Effort} \qquad \text{(Equation 5)}$$

where

$CPUE_s$: amount of captured fish per standardised catch effort (tonne/*trip*)
Catch : amount of captured fish on the *i*-th month (tonne)
Effort : standardised catch effort on the *i*-th month (*trip*)

The estimation of seasonal fishing patterns were performed using the moving averages method. This was done by analysing the time series data on fish catches that landed in PPP Logending from 2016 to 2020. Fishing season could be classified into three categories based on the fishing season index (IMP). The categories were lean, medium, and peak seasons (Imron *et al*., 2020). The fishing season categories are stated in Table 2.

Table 2: Fishing season index (IMP) categories

IMP Value	Season Category
< 50%	Lean season
50% IMP < 100%	Medium season
≥ 100%	Peak season

Technical Analysis

Technical analysis was conducted to examine the factors related to the fishing units and port operational activities. The analysis surveyed the type and size of ships, the type, size and price of engines used, and the amount of fishing gear, including size and operating methods, fishing areas, and port facilities.

Financial Analysis

Financial analysis assessed the feasibility of a fishing business unit. The feasibility of a fishing business unit could be determined by calculating Total Cost (TC), Total Revenue (TR), the profit of the fishing business unit (π), Revenue-Cost ratio (R/C), and Payback Period (PP).

Social Analysis

Social analysis was conducted by describing the environmental and social characteristics of the fishing communities at PPP Logending. They included the fishermen's age, their level of education, employment status, and response towards modern technology.

Priorities in Developing Superior Fish Commodity Capture Fisheries System

One of the methods to analyse policy priorities in developing capture fisheries system is the Analytical Hierarchy Process (AHP). AHP is made through a series of procedures until a relative priority scale between various alternative policies is reached (Veisi *et al*.,

2022). The problem-solving procedures in AHP method are as follows:

(1) The initial step is to define the problem and ways to solve it carefully. This process includes recognising, understanding, and mastering a problem in depth.

(2) Arranging a hierarchy. The hierarchy arrangement process starts by defining the objective, system actors, criteria, as well as alternative actions based on the understanding of the problem reached in the first step. Understanding of the problem is useful in formulating alternative priorities for capture fisheries development policies.

(3) The next step is to make a pair-wise comparison matrix. This is done to depict the influence of each relevant element to each criteria above it.

(4) The paired comparison and assessment process is then carried out. This process is done by weighting each components.

(5) The Consistency index (Ci) value is calculated and the Consistency ratio (Cr) is examined.

Results and Discussion

Superior Fish Commodities

The selection and standardisation results of superior fish commodities are shown in Table 3. The main superior commodity at PPP Logending was the hairtail fish (*Trichiurus* sp.) with a function value of 3.76 (Table 3). The second and third superior commodities were the white pomfret (*Parpus argenteus*) and Spanish mackerel (*Scomberomorus* sp.), with a function value of 2.25 and 1.47, respectively. These superior commodities were chosen based on the volume of production, production value, marketing, and added value during the 2016 to 2020 period.

The most commonly used fishing gears were gillnets and trammel nets (Rizal & Apriliani, 2019). Those three commodities had wide marketing distribution and the potential to be an export commodity, with hairtail fish and white pomfret already being marketed in China, Japan, and Korea. These conditions were similar to other fishing ports such as Palabuhanratu and PPI Pasir that were also located in Fisheries Management Area 573 (WPP 573). Hairtail fish, ariid catfish, tuna mackerel, and Indian mackerel also had added value in the medium category because they could be processed into other products such as salted and spiced fish, which could increase the selling price of those commodities.

Condition of Capture Fisheries

Biological Aspects

The CPUE values at PPP Logending from 2016 to 2020 are shown in Table 4.

Table 3: Standardisation of superior fish commodities at PPP Logending

Commodity	FN1	FN2	FN3	FN4	Total FN	Priority
Hairtail fish (*Trichiurus* sp.)	1.00	0.76	1.00	1.00	3.76	1
White pomfret (*Pampus argenteus*)	0.25	1.00	1.00	0.00	2.25	2
Spanish mackerel (*Scomberomorus* sp.)	0.20	0.27	1.00	0.00	1.47	3
Ariid catfish (*Arius* sp.)	0.17	0.05	0.00	1.00	1.22	4
Tuna mackerel (*Euthynnus* sp.)	0.11	0.03	0.00	1.00	1.14	5
Indian mackerel (*Rastrelliger* sp.)	0.00	0.00	0.00	1.00	1.00	6
Banana prawn (*Penaeus merguiensis*)	0.09	0.41	0.00	0.00	0.50	7
Barramundi (*Lates calcarifer*)	0.19	0.03	0.00	0.00	0.21	8
Blue swimming crab (*Portunus* sp.)	0.03	0.04	0.00	0.00	0.06	9

Description: FN (Value function of each criteria): 1-4

Table 4: Total amount of captured fish, $Efforts_{std}$ and $CPUE_{std}$ at PPP Logending

Year	Total Amount of Captured Fish (tonne)	$Efforts_{std}$ (unit)	$CPUE_{std}$ (tonne/unit)
2016	312.49	6,114	0.05
2017	907.52	6,961	0.13
2018	3,143.95	11,953	0.26
2019	439.76	7,168	0.06
2020	326.36	7,611	0.04
Total	5,130.08	39,806.83	0.55
Average	1,026.02	7,961.37	0.11

Source: Processed data from Kebumen Regency's Department of Marine Affairs and Fisheries (2020)

Based on Table 4, the CPUE value tended to fluctuate during the past five years. The highest value was 0.26 tonne/unit recorded in 2018 and total amount of captured fish was 3,143.95 tonnes. Conversely, the lowest value was recorded in 2020 at 0.04 tonne/unit with 326.36 tonnes of fish captured. However, low amounts of captured fish did not always result in low CPUE values. Changes in fishing gear as well as increases or decreases in catch effort could also influence CPUE values (Mulyani *et al*., 2024). The increasing CPUE values at PPP Logending showed that fish resources in the area were still relatively good and fishing operations could be assumed to be profitable (Nurhayati *et al*., 2018). If there was a decrease in CPUE value, this indicated the possibility of overfishing. The biological aspects of capture fisheries is also analysed through IMP as shown in Figure 2.

The IMP value from 2016 to 2020 showed that the peak fishing season occurred from August to November. Medium season occurred from January to February, May to July, and December. This condition is based on the IMP values that were positioned between 50% and 100%. Lean season occurred in March and April with an IMP value below 50%. Determining the patterns of fish seasons could optimise and streamline fishing operations (Imron *et al*., 2020). Fluctuations in the amount of captured fish could also affected by internal and external factors. The internal factors included the number of fishermen, catching effort (trips), as well as the fishing gear used. The external factors were weather and water conditions of the fishing areas (Branenda *et al*., 2019).

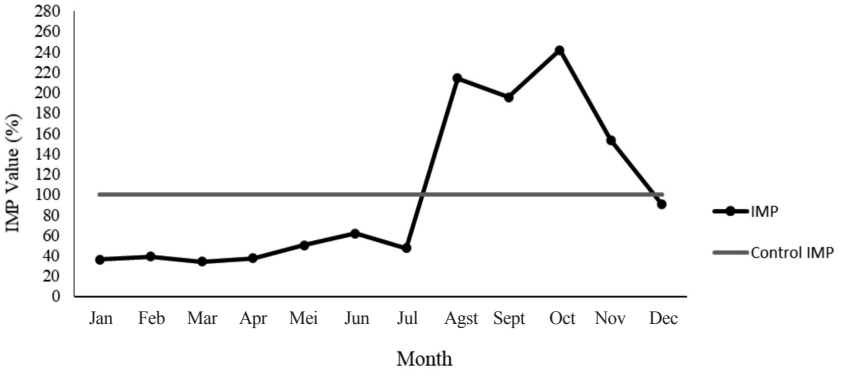

Figure 2: IMP value in PPP Logending

Technical Aspects

Capture fisheries in PPP Logending were classified as small-scale within the one to three Gross Tonnage (GT) capacities. The capacities of most ships at the port were the same as other ports in the regency such as PPI Karangduwur, PPI Pasir, and PPI Argopeni. According to Nurani *et al*. (2023), the use of small ships with the capacity of one to three GT were common. The number of fishing ships docking at PPP Logending was varied. The highest number was recorded in 2017 and 2018 at 74 ships in both years, whereas the lowest was in 2016 with 39 ships (Figure 3).

The gear used by fishermen in PPP Logending were gillnets, trammel nets, and fishing rods. According to Nurani *et al*. (2023), fisherman in Kebumen used different gears in different seasons. An interview with one fisherman found that he and his colleagues used drift and set gillnets while fishing rods were the reeling type. Gillnets were the most common tool used by fishermen at PPP Logending.

Financial Aspects

Financial aspects were reviewed based on three fishing units used by fishermen, in namely a ship with two gillnets, a ship with two gillnets, and one trammel net, as well as a ship with one trammel net. Business feasibility analysis was based on fishing gear as shown in Table 5.

The Revenue-Cost ratio (R/C) of fishing business at PPP Logending was between 1.55 and 1.69 for all types of equipment (An R/C above one means the business is profitable and feasible). The Payback Period (PP) was between 0.20 and 0.43. Fauzi *et al*. (2017) stated that the bigger the PP value, the longer it took for an investment to produce returns. A reasonable length of time needed to obtain a return on investment was an important factor to ensure business feasibility (Irnawati *et al*., 2021).

Social Aspects

The social aspects of the capture fisheries condition was determined by examining the number of fishermen operating from the port, their age group, education level, and employment status. The amount of active fisherman at PPP Logending from 2016 to 2020 was dynamic. The highest number was recorded in 2017 and 2018 at 464, whereas the lowest was in 2016 at 143. Majority of the fishermen had studied up to junior-high school level. Ship crew members tended to be dominated by people with elementary school education, whereas the owners were mostly junior-high graduates.

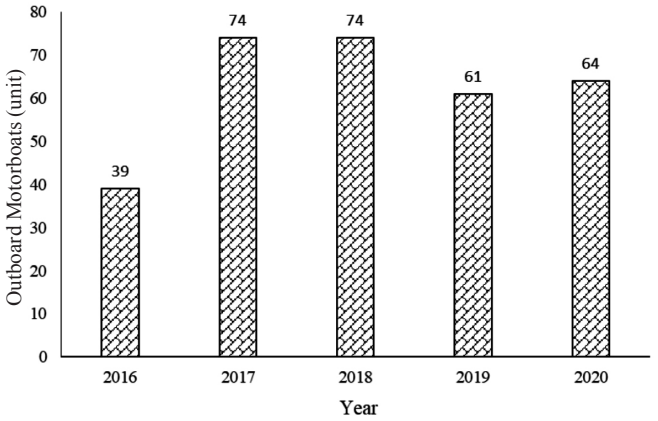

Figure 3: The number of fishing ships docking at PPP Logending from 2016 to 2020

Table 5: Feasibility analysis of fishing business in PPP Logending based on fishing gear

Fishing Unit	Description of Components	Results
2 gillnets	Average investment cost	Rp52,800,000.00
	Average fixed cost	Rp15,650,000.00
	Average variable cost	Rp342,981,771.00
	Average total cost	Rp358,631,771.00
	Average total revenue	Rp582,291,672.00
	Profit (π)	Rp223,659,901.00
	R/C	1.62
	PP	0.24
2 gillnets and 1 trammel net	Average investment cost	Rp77,030,769.00
	Average fixed cost	Rp19,791,539.00
	Average variable cost	Rp524,861,779.00
	Average total cost	Rp544,653,318.00
	Average total revenue	Rp920,673,077.00
	Profit (π)	Rp376,019,759.00
	R/C	1.69
	PP	0.20
1 trammel net	Average investment cost	Rp65,800,000.00
	Average fixed cost	Rp17,100,000.00
	Average variable cost	Rp264,036,458.00
	Average total cost	Rp281,136,458.00
	Average total revenue	Rp435,416,667.00
	Profit (π)	Rp154,280,209.00
	R/C	1.55
	PP	0.43

Strategy for Development of Capture Fisheries System

The AHP results are illustrated in Figure 4. The development strategy formulation using the analytic hierarchy process was split into four levels: (1) The first level comprised objective and strategic policy direction determinants; (2) the second level were on system actors who played a role in the implementation of development systems; (3) the third level included reviewed aspects; and (4) the fourth were alternatives for the development of capture fisheries systems.

Priority of Actors or Key Players in Capture Fisheries Development Strategies (Level 2)

The main stakeholder in the development of a capture fisheries system at PPP Logending was the Kebumen Regency DLHKP, which had a vector value of 0.388. Other influential parties included the port management, Department of Marine Affairs and Fisheries of Central Java and TPI Logending. DLHKP had the responsibility of carrying out socialisation, supervision, coaching, as well as policy-making efforts to maintain the sustainability of fish resources in

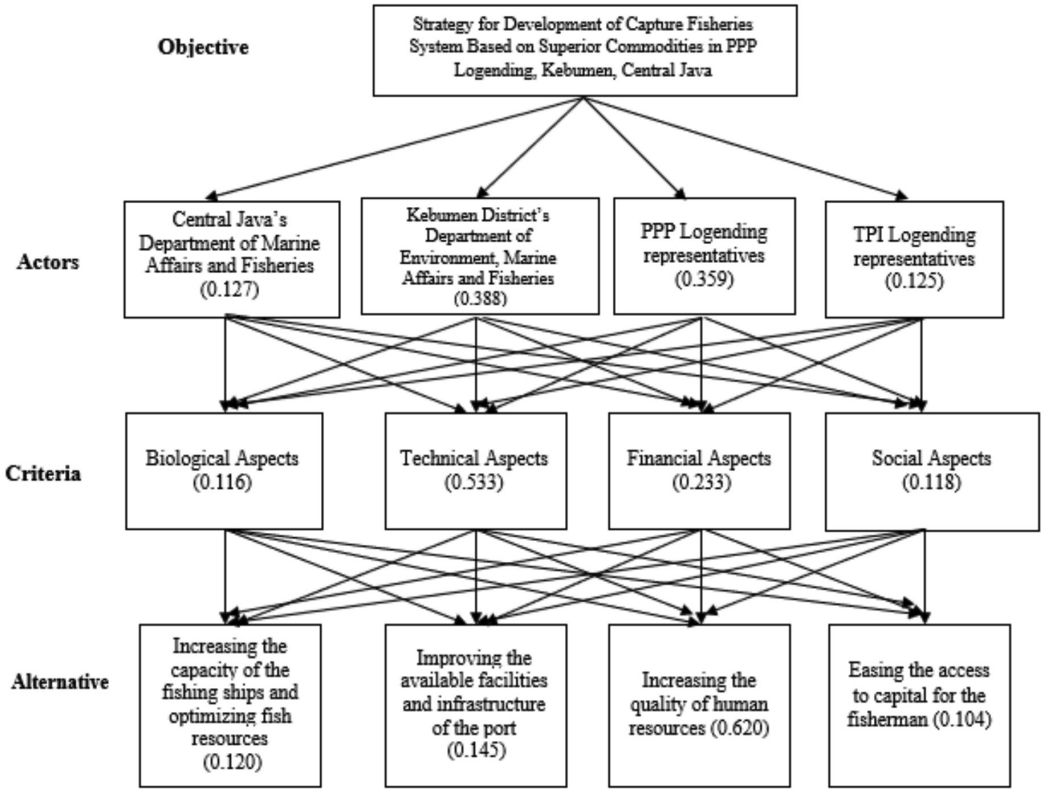

Figure 4: The analytic hierarchy process for the development of capture fisheries system based on superior commodities in PPP Logending

Kebumen waters. In the context of developing the fisheries sector, contributions were not limited only from the government, but it also required involvement from all relevant parties (Aguado *et al*., 2021). According to Retnoningtyas *et al*. (2021), stakeholders' involvement in the making of development plans could foster trust towards the planning process as well as facilitating initial communications between various stakeholders.

Criteria Priorities in Capture Fisheries Development Strategy (Level 3)

The technical aspect had been identified as a priority in the development of capture fisheries at PPP Logending with a value of 0.5333. The next is financial aspect with a value of 0.233, followed by social (0.118) and biological aspects (0.116). Technical aspects included factors that directly impacted the operation and efficiency of fishery activities. The readiness and availability of port infrastructure must be taken into consideration before implementing any development strategy. This was because infrastructure played an important role in integrating development and had potential to be the driving force for fishery production (Ririhena, 2022).

Alternative Strategies for Capture Fisheries Development Strategy (Level 4)

Increasing the quality of human resources as an alternative had the highest value in formulating strategies for capture fisheries development (0.620). Other alternatives included improving port facilities and infrastructure, increasing the capacity of fishing ships, and optimising fish resources, as well as easing the access to

capital for fishermen. Human resource strategies were considered to be in accordance with the characteristics of economic development in developing countries. Improving the quality of human resource could also reduce the development gap between regions. This could be done through activities that improve the fishermen's skills such as training and certification programmes (Saleh *et al*., 2020).

Conclusions

The first three superior commodities ranked in value: Hairtail fish with a score of 3.76, white pomfret with the score of 2.25, and Spanish mackerel with a score of 1.47.

CPUE results showed a need to optimise fishing efforts. The IMP for fish resources was in the eastern and second transition seasons. In technical aspects, capture fisheries at PPP Logending were dominated by small-scale fishermen using one to three GT ships, with gillnets as their main fishing gear. The financial aspects showed that business at PPP Logending was still profitable with a payback period of less than three years. Social aspects indicated that most fishermen were between 24 and 65 years old with elementary to junior-high school level education.

The alternative strategy in developing capture fishery systems was to increase the quality of human resources with the importance ratio (RK) value of 0.620.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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Appendices

Appendix 1: Socio-Economic conditions of fishermen

I. Aspects of Socio-economic conditions

1.	Status of fishermen	:	Owner [ ]; Ship's crew [ ]
2.	Employment status	:	Full [ ]; Side hustle [ ]
3.	Length of employment	:	……...year
4.	Revenue	:	Rp……../month
5.	Month's expenditure	:	
	a. Food	:	Rp……..
	b. Non-food	:	Rp……..
	c. Savings	:	Rp……..
	d. Others	:	Rp……..
6.	Number of dependents	:	……..people
7.	Number of children	:	……..people
8.	Education level of family members	:	Kindergarten [ ] people Elementary [ ] people Junior High School [ ] people Senior High School [ ] people

II. Aspects of Socio-economic conditions

1.	Name of ship	:	……..
2.	Material	:	……..
3.	Ship size	:	……..
4.	Ship price	:	Rp……..
5.	Ownership status	:	Private [ ]; Rent [ ]
6.	Year of manufacture	:	……..
7.	Technical life	:	……..
8.	Maintenance cost	:	……month/year

9. Variable cost : ……..
10. Machine type : ……..
11. Machine : ……..
    a. Size : ……..
    b. Price of machine : ……..
    c. Fuel : ……..
12. Year registered at the fishing port : ……..
13. Type of fishing gear : ……..
14. Technical life : ……..
15. Catch result : ……..
16. Fishing season : ……..

Season	Month	Catch Result	Kg
Harvest			
Medium			
Famine			

17. Number of trips : …….……month
    : …….……..year
18. Catch location : ……..
    a. …… distance from fishing port……
    b. …… distance from fishing port……
    c. …… distance from fishing port……
    d. …… distance from fishing port……
    e. …… distance from fishing port……
19. Marketing : ……..
    a. Place of sale : ……..
    b. Payment systems : Cash [ ]; Tempo [ ]
    c. Fish price : ……..

Species	Price (Rp)