

Potential and strategy for tourism development of Panjang and Lima islands in Banten bay

Rizky Darmawan, Sulistiono Sulistiono*, Gatot Yulianto, Dudi Muhammad Wildan, and Ayu Ervinia

Department of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, Bogor Agricultural University, Bogor, 16680, Indonesia

Abstract. Panjang and Lima Islands are island tourism areas with coastal and marine resources. Tourism resources should be well developed because they are a community income source. This study aims to analyze and map the island's resource potential and design alternative development strategies in Banten Bay. The research was conducted from October to December 2022. Data collection was carried out using field observations and interviews with questionnaires. Data analysis includes regional carrying capacity (CC), Willingness to pay (WTP), Travel Cost Method (TCM), and SWOT analysis. The results showed that CC of Panjang and Lima Islands obtained 283 people/day and 116 people/day, respectively. The average WTP of Panjang and Lima Island is Rp. 5,000, and Rp. 5,277.78, respectively. The average TCM tourist visitor to Panjang and Lima Islands earns IDR. 110,500, and IDR. 102,987, respectively. The alternative strategy for Panjang Island is to provide diving and snorkeling services for marine tourism and underwater archeology and use the beaches around the Panjang Island as a tourist attraction. The alternative strategy for Lima Island is to utilize the ecosystem around the Lima Island to become a tourist attraction, arrange facilities, and provide photo spots around that island

Keywords: carrying capacity, potential, island, strategy

1 Introduction

Indonesia is an archipelagic country with a potential of 20.87 million hectares of marine, coastal and small island conservation areas and abundant natural resources such as mangrove ecosystems, seagrass beds, coral reefs and aquatic biota. Abundant resources can be developed as marine tourism activities. Banten Bay is one of Indonesia's regions with natural potential that can be developed as a fishing and ecotourism area. This bay is located in Banten Province with natural beauty, including the sea and small islands. Panjang Island and Lima Island are small islands located around Banten Bay, which the local community uses as a tourist and fish cultivation area.

The development of the tourism sector in Banten Bay can positively impact the regional economy, such as local community income, job creation and investment in the tourism sector. Many tourist activities in Banten Bay are carried out on the Gope coast, the Karangantu mangrove area, Panjang Island and Lima Island.

*Corresponding author: onosulistiono@gmail.com

If community and tourism activities around Banten Bay are managed well, it could positively impact environmental resources. This is because coastal resources are vulnerable to community and tourist activities [1]. Coastal development that threatens the environment, such as reclamation and large-medium scale industry, can damage aquatic ecosystems [2]. Industrial development around Banten Bay is a factor that influences the condition of existing resources in Banten Bay. So, there is a need for government policies to regulate industrial development that is environmentally friendly and sustainable.

Efforts to optimally utilize the potential of Panjang Island and Lima Island are by developing tourism based on ecotourism concepts and principles. Ecotourism principles are based on the philosophy of preserving resources and utilizing them optimally in the interests of sustainable tourism activities [3]. Several research activities in Banten Bay have been widely studied, but more research is needed regarding the development of island tourism in Banten Bay. Research [4] on pollution of the coastal waters of Bojonegara Bay, Banten, [5] on the structure of plankton communities in the coastal waters of Bojonegara and around Banten Bay, and [6] on analysis of ecotourism potential and mangrove ecotourism management strategies on the Karangantu coast of Banten Bay.

This research aims to analyze resource potential and design alternative tourism development strategies for Panjang Island and Lima Island. The results of this research can provide information regarding reference strategies for developing potential aquatic resources on these islands. Environment to the community, both ecologically and economically, so that the community can preserve the islands in Banten Bay.

2 Materials and Methods

2.1 Time and Place

This research was conducted on Panjang Island and Lima Island, located around Banten Bay, Banten Province. The research was conducted for three months in October-December 2022. This research included collecting data in the field, assessing resource potential, and analyzing output through tourism development strategies.

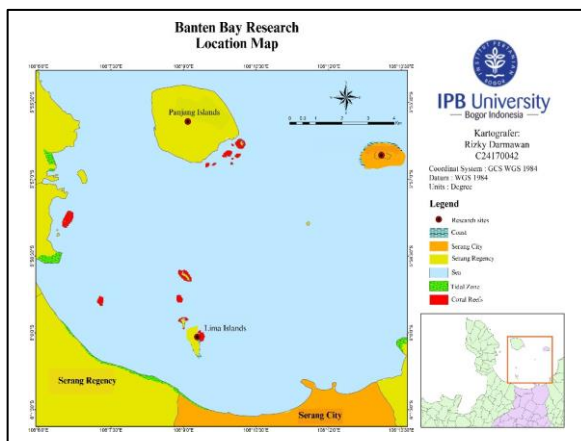


Fig 1. Map of research locations on Panjang and Lima Islands of Banten Bay

2.2 Data Collection

Primary data was collected through field observations and questionnaire interviews with several related parties (visitors, local communities, traders, and employees of the Karangantu Nusantara Fisheries Port/Karangantu National Fisheries Port) to achieve research objectives using questionnaires. Secondary data uses literature studies (related to water conditions, coral fish and coral reefs). Sampling of tourists used the Accidental Sampling and Purposive Sampling methods. The number of tourist respondents interviewed was 65 people.

2.3 Data Analysis

2.3.1 Carrying capacity of tourist areas

The development of coastal ecotourism requires calculating carrying capacity because what is utilized is the potential natural resources that exist in the coastal areas of small islands. [3], explains the concept of carrying capacity, estimating the maximum number of people or visitors accommodated for ecotourism activities.

The carrying capacity of the area can be calculated using the following formula [3]:

$$CC=K \times L_p / L_t \times W_t / W_p \quad (1)$$

Where:

CC = Area carrying capacity (people/day), K = Potential visitors per unit area (people), L_p = area/length of area that can be utilized (m^2 or m), L_t = Unit area for a particular category (m^2 or m), W_t = Time available for tourism activities/day (hours), W_p = Time spent by visitors for each specific activity (hours)

2.3.2 Willingness to pay

Willingness to Pay (WTP) is an analysis to determine the willingness of tourist visitors to pay for services and goods offered by tourist resources [7]. The following equation can estimate the average WTP value [8].

$$EWTP = \sum W_i \cdot P_{fi} \quad (2)$$

Where:

EWTP = Estimated average value (IDR), W_i = WTP Value i (IDR), P_{fi} = Relative frequency, n = Number of respondents (people), i = Respondent i who is willing to pay for environmental services (person).

2.3.3 Travel cost method

The economic value of tourism activities has added value for tourists, including travel costs and other costs in tourist areas (parking tickets, entrance tickets, meals, etc.). TCM is a method used to estimate the economic value of a commodity that does not yet have market standards, and this method is easy to apply in the tourism sector. Travel costs can be estimated using the following equation [9].

Total travel costs

$$TTC = CC + TC + EF + OC \quad (3)$$

Where:

TTC=Total Travel Cost (IDR /person), CC= Consumption Cost (IDR/person), TC= Transportation Cost (IDR /person), EF= Entry Fee (IDR/person), OC= Other Costs (IDR /person).

Average travel costs

Average travel costs are used to determine the average travel costs obtained from the accumulated travel costs of tourists during their tour. The average travel cost is obtained by dividing the total travel cost by the number of tourist respondents. The equation is as follows [10]:

$$ATC = \frac{\sum TTC}{n} \quad (4)$$

Where: ATC = Average Travel Cost (Rp/person), \sum TTC= Total Travel Costs (IDR), n= Number of respondents (people).

Factors influencing tourism demand

Non-experimental quantitative method analysis with multiple linear regression was conducted to analyze the factors influencing tourist demand. The amount of tourism demand on Banten Bay Island as the dependent variable (Y) is thought to be influenced by several independent factors (X1, X2, X3, X4, X5). The multiple linear regression model equation is as follows [11]:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \varepsilon \quad (5)$$

Where: Y= frequency of visits (times), X1= travel costs to the location (IDR), X2= visitor income (IDR), X3= education level (score), X4= age (years), X5= distance traveled from residence to tourist location (km), a= Constant, b1-b10= Regression Coefficient, ε = Error.

2.3.4 SWOT

SWOT analysis designs management that systematically and structurally identifies various factors to formulate strategies [11] by paying attention to internal factors such as strengths and weaknesses and external factors such as opportunities and threats. Analysis can be used to identify or visualise a tourist attraction's condition systematically. This analysis method is carried out with quantitative and qualitative data. Qualitative data analysis analyses internal and external factors, while quantitative data analysis is carried out through weighting and ranking.

SWOT analysis can produce a matrix that has value for recommending tourism development strategies. This matrix can produce four possible alternative strategies, namely: first, the SO (Strength-Opportunities) strategy, utilizing all strengths to seize and exploit maximum opportunities, second, ST (Strength-Threats) strategy, utilizing existing strengths to overcome threats, third, the WO (Weakness-Opportunities) is applied based on exploiting existing opportunities by minimizing existing weaknesses, and the four WT (Weakness-Threats) strategies are based on defensive activities and try to minimize existing weaknesses and avoid threats **Table 1**. Category, type, source, collection techniques, and data analysis methods.

3 Result and Discussion

3.1 General condition

Panjang and Lima Islands are within the administrative area of Banten Province. The area of Panjang Island is 798 hectares, and Lima Island is around 3.5 hectares. Panjang Island has residential areas, whereas Lima Island there are no residential areas. This is because clean water sources and the size of the island determine whether there are settlements or not. Island communities usually rely heavily on coastal ecosystems, capture fisheries, plantations, and aquaculture activities [3]. These two islands have potential coastal resources that can be developed as beach tourism and marine tourism.

Travel access to Panjang Island and Lima Island is not far from the Banten Bay area. The travel time from Karangantu Harbor to Lima Island is approximately 15 minutes, the travel time from Karangantu Harbor to Panjang Island is approximately 30 minutes, and the journey from Grenyang Harbor to Panjang Island is approximately 15 minutes.

Entering the Karangantu PPN Port Area, visitors are charged IDR. 2,000 per motorbike and IDR. 6,000 per car. The roundtrip island tour rental rate from Karangantu to Lima Island is Rp. Three hundred thousand per boat, and the general boat fare from Karangantu to Panjang Island is IDR. 25,000 per person. The fare for one public boat trip from Grenyang to Panjang Island is IDR. 10,000 per person and IDR. 15,000 if you ride a motorbike.

3.2 General condition of the coastal ecosystems of Panjang Island and Lima Island

The coral reef ecosystem is a marine resource that has an important role and function for the life of aquatic biota. The condition of coral reefs, from time to time, experiences dynamic threats, namely degradation, which results in changes in the quality and quantity of coral reef ecosystems. Direct and indirect factors cause coral ecosystem damage. Direct factors include ship waste and waste from tourist activities, which can disrupt coral ecosystems, as well as coral bleaching due to climate change.

Research on the health of coral reefs in Banten Bay was carried out by [13], which found dead coral with algae (28.4-58.0%), mud (5.3-28.9%), coral (9.1-25.9 %), soft corals (0.0-16.8%), macroalgae (0.0-10.2%), and sponges (0.0-2.2%). The health of coral reefs on Panjang Island, Lima Island, and Pamujan Besar Island is categorized as unhealthy or poor [13]. In line with research [14], environmental factors that influence the health of coral reefs include brightness and sedimentation, as well as anthropogenic pressure from human activities. Sedimentation poses a threat to zooxanthellae algae to carry out photosynthesis and eventually die, so the damage slowly spreads to the coral reef, and the coral dies or turns white [15].

3.3 Water Quality Conditions Around the Island

The water quality of Panjang Island and Lima Island has almost the same characteristics. Data collection on physical and chemical water parameters was carried out once a month at each island station. The data taken has the values presented in Table 1.

Table 1. Minimum, maximum, average, and standard deviation values for water quality at each research station

Station	Parameter					
	Temperature (° C)	Salinity (‰)	pH	Do (mg/L)	Transparency (m)	Depth (m)

Panjang Island	28.3-30	30-35	7-8	6-7.7	1-1.2	1-4.5
	29.31-0.78	31.67-2.06	7.5-0.54	6.85-1.20	1.1-0.14	2.7-1.30
Lima Island	30-30.1	30-34	7-7	7-7.2	0.5-0.5	0.5-4
	30.05-0.07	32-2.82	7	7.1-0.54	0.5	2.25-2.47

The results of collecting water quality data on Panjang Island and Lima Island were found to be in line with Republic of Indonesia Government Regulation Number 22 of 2021, namely standard seawater quality parameters for the marine tourism category. In line with [16], the water temperature range of 27-32oC is generally found in tropical waters, where this temperature range is a natural habitat for tropical marine biota.

3.4 Carrying Capacity of Coastal Tourism Areas

The carrying capacity of the area is one indicator in determining the number of tourists allowed. This is a parameter in measuring tourism carrying capacity in each area that has characteristics. The carrying capacity of an area is a benchmark for how big the tourism potential is in the area. The results of the analysis of the carrying capacity of Lima Island beach tourism were 116 people/day or 42,340 people/year, and Panjang Island was 283 people/day or 103,295 people/year. Utilization of an area of 25 m²/person and visit time of 6 hours/person/day.

Table 2. Carrying capacity of coastal tourist areas

Tourist activities	K (person)	Lp (m)	Lt (m)	Wp (hour)	Wt (hours)	CC (person/day)
Lima Island Beach Tourism	1	1,451	25	3	6	116
Panjang Island Beach Tourism	1	3,542	25	3	6	283

Data from Table 3 explains that the number of visitors visiting Panjang Island and Lima Island is below the carrying capacity value of the area. This is because island tourism activities are operating again after the Covid 19 pandemic. The carrying capacity of the area influences the satisfaction and comfort of visitors in enjoying the tourist activities of the islands they visit. If the carrying capacity of a tourist area is exceeded, it can affect the comfort and satisfaction of tourist visitors with tourism.

3.5 Motivation and interest of visitors

The motivational characteristics of tourism visitors on Panjang Island and Lima Island have the characteristics of a *one-day trip*. This was obtained from the results of interviews with visitors to Panjang Beach and Lima Island. Based on interviews with respondents, the reasons why respondents visited were beach recreation, enjoying the scenery, fishing, photography, and camping.

Table 3. Motivational characteristics and interests of Lima Island tourist visitors

No	Parameter	Criteria	Amount	Percentage
1	A long day of travel	1 - 2 days	35	100
		3 - 4 days	0	0
2	Travel companion	Alone	1	3
		Family/Friends/Community	34	97
3	Length of tourist activity	< 3 hours	18	51
		3 hours - 6 hours	19	54
		6 hours - 9 hours	2	6
4	Travel time	< 6 hours	34	97
		7 - 12 hours	1	3
5	Mileage	1-20	30	86
		-21-40	4	11
		> 40	1	3
6	Tourist destination	Beach Recreation	23	66
		Enjoy the view	12	34
		Looking for a calm and peaceful atmosphere	10	29
		Fishing	20	57
		Photography	2	6
		Camping	1	3
7	Transportation	Private vehicle	2	6
		Rental	32	91
		Public transport	1	3

Based on Table 4, it can be seen that the character of Lima Island tourist visitors is dominated by activities lasting 1-2 days with a percentage of 100%. Fellow travelers on Panjang Island found that arrivals alone were equal to arrivals with family or friends or the community with a percentage of 50%. The duration of tourist activity is dominated by 3 – 6 hours of tourist activity with a total percentage of 100%. Tourist travel time is dominated by the vulnerable under 6 hours with a percentage of 100%. Mileage is dominated by a range of 1-20 km with a percentage of 100%. Fishing activities dominate tourist destinations with a percentage of 100%. Tourist transportation found that the dominant number of visitors used public transportation with a percentage of 100%.

3.6 Williness to pay

Willingness to pay is an analysis to determine visitors' willingness to pay for the purpose of maintaining tourism resources. The tourist visitor profile can be used as a reference for determining the WTP value for Panjang Island and Lima Island. The WTP concept can be used as an effort to develop tourist attractions in the economic, environmental, and cultural aspects of ideal tourism [18].

Table 4. Willingness to pay visitors for Lima Island tourism

WTP Value (Rp)	The number of visitors who are willing to pay	Relative percentage	average WTP
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5,000	31	93.9394	4696.97
10,000	2	6.0606	606.0606
15,000	0	0	0
20,000	0	0	0
25,000	0	0	0
Total	33	100	5303.03

Table 5. Willingness to pay for visitors to visit Panjang Island

WTP Value (Rp)	The number of visitors who are willing to pay	Relative percentage	average WTP
5,000	21	100,0000	5000
10,000	0	0	0
15,000	0	0	0
20,000	0	0	0
25,000	0	0	0
Total	21	100	5000

Based on Table 6, the willingness to pay visitors to Lima Island who stated they were willing to pay was 3 3, and those who answered they were not willing to pay were 2. There were 3 5 respondents, with 3 3 respondents answering that they were willing to pay IDR. 5,000, and 2 respondents were willing to pay IDR. 10,000. Meanwhile, in Table 7, the willingness to pay visitors to Panjang Island out of 30 respondents, only 21 respondents were willing to pay IDR. 5,000, and the rest answered that they were not willing to pay. The amount of payment amount is a suggestion for the manager for entry ticket rates for the coastal tourist areas of Panjang Island and Lima Island. The levy system from tourists to area managers can be used as a form of concern from tourist visitors for tourist area managers. The levy system can also provide capital for managers to carry out maintenance, improve infrastructure, and increase potential income for the community [19].

Beach tourism activities on Panjang Island and Lima Island can contribute to local communities through community participation in tourism development and development. It is hoped that the coastal tourism potential of these islands can be managed well by the community by providing services and maintaining tourist attraction resources. Potential tourist attractions can become income opportunity assets for managers and the community. Apart from that, the efforts of the community and managers to participate in protecting environmental resources are a positive added value [20].

3.7 Travel cost method

The travel cost method assumes the value of a tour about the travel costs incurred by each visitor [21]. Based on the results of interviews with Panjang Island tourist visitors, it was found that the total travel cost was at most Rp. 155,000 and total travel costs of at least Rp. 65,000. Based on the results of interviews with Lima Island tourist visitors, it was found that the total travel cost was at most Rp. 196,000, and the total travel cost was at least Rp. 67,000.

Average travel costs are obtained by calculating the total travel costs divided by the number of visitor respondents. Based on the results of data analysis, it was found that the average travel cost for visitors to Panjang Island was IDR. 110,500, and the average travel cost for visitors to Lima Island is Rp. 104,443. This is because travel costs incurred by visitors

are the most significant contributor to travel expenses.

3.7.1 Factors influencing tourism demand

The tourism demand for the Banten Bay islands was analyzed by several variables such as travel costs, income level, education level, age, and distance traveled. These factors are used to find out the things that determine tourists coming to tourist locations.

Table 6. Results of multiple linear regression of demand factors for Panjang Island and Lima Island

Variable	Panjang Island Tourism		Lima Island Tourism	
	Coefficient	P-Value	Coefficient	P-Value
Constant	0.18767537	0.90273382	7.18644415	0.000942151
Travel expense	-0.00001319	0.02137764	0.00000590	0.379539135
Income	-0.00000053	0.00019983	0.00000007	0.099920726
Education	0.40012894	0.00089142	-0.15377368	0.044495055
Age	0.03853734	0.21162495	-0.10289223	0.004259011
Distance	0.07566296	0.03277451	-0.00704781	0.377815914
R ²	0.61494053		0.298966332	
Adjusted R ²	0.53471981		0.178098459	
Fit	7.66560698		2.47349708	
Ftab	0.00019953		0.05533001	

The results of the regression analysis obtained an R-square Panjang Island is 0, 61 or 61 %, while Lima Island is 0.29 or 29%. These results show that as much as 0.61 or 61%, it can be interpreted that the independent variables influence the dependent variable. In comparison, 39% is influenced by other variables not examined in this study. The Lima Island regression results show that 0.29 or 29% can be interpreted as independent variables not influencing the dependent variable, while 71% is influenced by other variables not examined in this research.

Variables that significantly influence the number of tourist visits to Panjang Island are travel costs, income, education, and distance. The travel cost variable has a significant influence at the 5% level and has a negative coefficient with a value of -0.00001319. This shows that if there is an increase in travel costs by one percent, assuming other variables remain constant, then the number of visits to Panjang Island tourism will decrease by 0.00001319 %. Variables that significantly influence the number of tourist visits to Lima Island are income, education, and age. The income variable has a significant influence at the 10% level and has a positive coefficient with a value of 0.00000007. This shows that if there is an increase in income of one percent, assuming other variables remain constant, then the number of visits to Panjang Island tourism will increase by 0.00000007 %.

3.8 Alternative strategy for developing island tourism in Banten Bay

SWOT analysis can be used as a development strategy for tourism management, especially for the islands in Banten Bay. Before implementing a SWOT analysis, it is important to know

that island tourism managers must know the strengths, weaknesses, opportunities, and threats that tourism has. The determination of these factors was obtained from the results of visitor interviews and adjusted to the factual conditions in the field.

3.8.1 Internal factors (IFAS) and external factors (EFAS)

Giving weight scores to internal factors and external factors must be carried out in accordance with the beach tourist attraction. The results of determining the weight scores of internal factors and external factors can be used to determine their relative weight values. The rating or level of importance of parameters is generated from an assessment of each internal factor and external factor. The score obtained for each factor determines whether the factor is strong or weak, so it is important to carry out calculations.

Table 7. Results of IFAS Lima Island strategic factors analysis

Symbol	Strategic Factors	Weight Score	Relative Weight	Ratings	Score
	<i>Strengths</i>				
S1	There is white sand mixed with coral fragments on Lima Island	4.2	0.10	3	0.31
S2	Fish biodiversity on Lima Island varies	4	0.10	4	0.40
S3	The water quality on Lima Island is in accordance with the quality standards for marine tourism activities	4.1	0.10	4	0.41
S4	Coral reef ecosystems are available on Lima Island	4	0.10	4	0.40
S5	The community around Banten Bay supports coastal and marine tourism activities on Lima Island	4	0.10	4	0.40
Sub-Total		20.3	0.51	19	1.92
	<i>Weaknesses</i>				
W1	Lima Island tourist facilities and facilities are inadequate	3.9	0.10	2	0.19
W2	There is no cooperation between tourism managers and government agencies	3.8	0.09	2	0.19
W3	Lima Island tourism services are not yet optimal	4.1	0.10	3	0.31
W4	The tourist layout of Lima Island is not yet good	4	0.10	2	0.20

Symbol	Strategic Factors	Weight Score	Relative Weight	Ratings	Score
	<i>Strengths</i>				
W5	Minimal marketing of Islands tourism in Banten Bay by the management	4	0.10	2	0.20

Table 8. Results of Analysis of Lima Island EFAS Strategic Factors

Symbol	Strategic Factors	Weight Score	Relative Weight	Ratings	Score
	<i>Opportunities</i>				
O1	The tourist location of Lima Island is very strategic, close to the ports of Karangantu and Grenyang	4.1	0.10	3	0.31
O2	Tourist interest in visiting again is very high	4	0.10	3	0.30
O3	Boat rental/travel services are available at Karangantu Harbor for Lima Island tourism activities	4.1	0.10	3	0.31
O4	The beautiful panorama is an attraction for visitors to Lima Island	4	0.10	3	0.30
O5	Sitting and relaxing activities are popular with tourists visiting Lima Island	4	0.10	3	0.30
Sub-Total		20.2	0.51	15	1.53
	<i>Threats</i>				
T1	The amount of rubbish from visitors and residents on Lima Island	3.9	0.10	2	0.20
T2	Put industrial waste in the waters of Banten Bay	4	0.10	3	0.30
T3	The influence of the west monsoon on waves and water currents in the waters of Banten Bay	3.8	0.10	3	0.29
T4	Lima Island coastal degradation due to erosion	3.9	0.10	3	0.30

Symbol	Strategic Factors	Weight Score	Relative Weight	Ratings	Score
	<i>Opportunities</i>				
T5	In certain weather, sea tides increase to the point that they inundate parts of the island	3.8	0.10	2	0.19
Sub-Total		19.4	0.49	13	1.28
Total		39.6	1.00	28	2.81

The results of the internal strategy factor analysis (IFAS) in Table 11 show an IFAS score of 3.01. This score indicates that internal factors are strong. This explains that the value of the strategy factor internal (IFAS) is included in the high category. The results of the external strategy factor analysis (EFAS) in Table 12 show a score of 2.81. This score indicates that external factors are strong. This explains that the value of external strategy factors (EFAS) is included in the medium category.

Table 9. Results of Analysis of IFAS Panjang Island Strategic Factors

Symbol	Strategic Factors	Weight Score	Relative Weight	Ratings	Score
	<i>Strengths</i>				
S1	There is white sand mixed with coral fragments on Panjang Island	4.2	0.09	3	0.26
S2	Fish potential on Panjang Island has a varied diversity	4	0.08	2	0.17
S3	The water quality on Panjang Island is in accordance with the quality standards for marine tourism activities	3.9	0.08	4	0.33
S4	Coral reef and mangrove ecosystems are still available on Panjang Island	4.2	0.09	4	0.35
S5	The Panjang Island community supports coastal, mangrove, and marine tourism activities	4	0.08	3	0.25
S6	Fresh water is available on Panjang Island	4	0.08	3	0.25
Sub-Total		24.3	0.51	19	1.61
	<i>Weaknesses</i>				

W1	Panjang Island tourist facilities and facilities are inadequate	3.9	0.08	3	0.25
W2	Panjang Island tourism services are not yet optimal	3.8	0.08	2	0.16
W3	Road access to beach tourism is inadequate	3.7	0.08	3	0.23
W4	Lack of use of ecosystems as tourist attractions	3.9	0.08	3	0.25
W5	Lack of tourism marketing on Panjang Island	4	0.08	3	0.25
W6	The Panjang Island beach tourism management does not involve the local community and village government in developing tourism	4.1	0.09	4	0.34
Sub- Total		23.4	0.49	18	1.48
Total		47.7	1.00	37	3.09

Table 10. Results of Analysis of Strategic Factors for EFAS Panjang Island

Symbol	Strategic Factors	Weight Score	Relative Weight	Ratings	Score
	<i>Opportunities</i>				
O1	Panjang Island's tourist location is very strategic, close to Grenyang Port	3.8	0.11	3	0.33
O2	The boat fare from Grenyang to Panjang Island is affordable	3.7	0.11	3	0.32
O3	There is potential for developing mangrove and marine tourism	4	0.11	3	0.34
O4	There is potential for underwater archaeological tourism on the ships HMAS Perth and	3.7	0.11	3	0.32

	USS Houston				
Sub- Total		15.2	0.43	12	1.30
Threats					
T1	Some residents are still taking beach sand on Panjang Island	4	0.11	2	0.23
T2	Many people still use coral stone as a building material for houses	4.3	0.12	3	0.37
T3	Put industrial waste in the waters of Banten Bay	3.8	0.11	3	0.33
T4	The influence of the west monsoon on waves and water currents in the waters of Banten Bay	3.9	0.11	3	0.33
T5	Degradation of the north coast of Panjang Island due to erosion	3.8	0.11	2	0.22
Sub- Total		19.8	0.57	13	1.47
Total		35	1.00	25	2.78

The results of the internal strategy factor analysis (IFAS) in Table 9 show an IFAS score of 3.09. This score indicates that internal factors are strong. This is due to the value of the strategy factor internal (IFAS) being included in the high category. The results of external strategy factor analysis (EFAS) in Table 10 show a score of 2, 7, and 8. This score indicates that the external factors are strong. This explains that the value of external strategy factors (EFAS) is included in the medium category.

3.8.2 Alternative Island Tourism Development Strategy

The IFAS and EFAS calculations that have been carried out are then continued with preparing the SWOT matrix. The matrix is arranged into four alternative strategies. These four alternative strategies are using strengths to take advantage of existing opportunities (SO), using strengths to overcome threats (ST), exploiting opportunities to overcome weaknesses (OW), and minimizing weaknesses by avoiding all threats (WT).

The SWOT matrix shows the strategic plans prepared by management. Strategies are prepared based on the results of interviews and field observations to increase existing strengths and opportunities and minimize weaknesses and threats to island tourism.

Alternative tourism development strategies for Panjang Island and Lima Island were obtained after calculating the sum of the SWOT element connectivity scores. The results of these calculations then produce a ranking of each strategy. The ranking is based on the largest number of scores to the number of scores with the smallest value. Alternative strategies are presented in the following table.

Table 11. Lima Island SWOT Matrix

No.	SWOT elements	Linkages	Total score	Ranking
S-O Strategy				
1	Utilizing the ecosystem around Lima Island to become a tourist attraction	S1, S2, S3, S4, O1, O2, O4	2.55	1
2	The management needs to collaborate with the local community in providing services such as boats, fishing equipment services, and other services	S1, O2, O3, O5	1.38	3
3	Providing opportunities for the community to take part in conserving coral reef ecosystem resources	S4, S5, O1	1.14	5
W-O Strategy				
1	Arranging facilities, providing photo spots and fishing facilities around Lima Island	W1, W3, W4, O1, O4, O5	1.71	2
2	Establish a joint agreement between the management and the government in the development and development of tourism	W2, W3, O1, O3	1.18	4
S-T Strategy				
1	Collaborating between managers and NGOs to monitor coral reef ecosystems	S4, T2, T4	1.09	6
W-T Strategy				
1	There is a need for a promotion team and a management team for managing Lima Island tourism waste	W2, W5, T1	0.61	8
2	The local government needs to provide firmness regarding the disposal of industrial waste around Banten Bay	W2, T2	0.55	9
3	It is necessary to provide safe equipment for tourist visitors and be aware of bad weather	W2, W3, T3, T5	1.02	7

Table 12. Panjang Island SWOT Matrix

No.	SWOT elements	Linkages	Total score	Ranking
S-O Strategy				
1	Utilizing the ecosystem around Panjang Island as a tourist attraction	S2, S3, S4, O3, O4, O5	1.51	2
2	Providing diving and snorkeling tourism services for marine tourism and underwater archaeological tourism	S1, S4, S6, O1, O2, O6, O4	1.51	1
3	Forming Pokdarwis for the management and development of beach tourism, mangrove tourism, and marine tourism	S4, S5, O1	0.93	7

No.	SWOT elements	Linkages	Total score	Ranking
4	roviding fishing tourism services around Panjang Island	S4, S5, O3, O4	0.95	6
W-O Strategy				
1	Providing facilities to support beach tourism activities, mangrove tourism, marine tourism, and underwater archaeological tourism	W1, W4, O2	0.72	9
2	The community establishes a joint agreement with the village government in the development and development of tourism	W2, W4, O3, O4	0.75	8
3	Carrying out road construction to the Panjang Island beach tourism area	W1, W4, O1	0.55	10
S-T Strategy				
1	Collaborating between managers and environmental groups to protect the coast of Panjang Island	S4, T1, T2, T5	1.17	3
2	The community has created a culture of reprimanding individual citizens who damage the Panjang Island environment	S5, T1, T2, T3	1.07	4
W-T Strategy				
1	The regional government confirms regulations on industrial wastewater quality standards around Banten Bay	W6,W7,T3,T4,T5	1.00	5

Based on the results of this analysis, the relationship between internal and external factors shows a sequence of alternative priority strategies that can be implemented for tourism on Panjang Island and Lima Island. The strategy recommendations are prioritized in the top three rankings as tourism management strategies.

Alternative tourism management strategies for Lima Island.

1. Utilizing the ecosystem around Lima Island to become a tourist attraction,
2. Arranging facilities, providing photo spots and fishing facilities around Lima Island,
3. The management needs to collaborate with the local community in providing services such as boats, fishing equipment services, and other services.

Alternative tourism management strategies for Panjang Island

1. Providing diving and snorkeling tourism services for marine tourism and underwater archaeological tourism.
2. Utilizing the ecosystem around Panjang Island as a tourist attraction,
3. Collaborating between managers and environmental groups to protect the coast of Panjang Island.

4 Conclusion

The potential resources on Panjang Island include coral reefs, mangroves, and stretches of beach. Meanwhile, Lima Island has beach potential that can be developed as a tourist attraction. The alternative strategy for Panjang Island is first to add diving and snorkeling services for marine tourism and underwater archaeological tourism; secondly, utilizing the ecosystem around Panjang Island as a tourist attraction; and thirdly, collaborating between managers and environmental observer groups to protect the coast of Panjang Island. The alternative strategy for Lima Island is first to utilize the ecosystem around Lima Island to become a tourist attraction; secondly, arranging facilities, providing photo spots and fishing facilities around Lima Island. The three management parties need to collaborate with local communities in providing services such as boats, fishing equipment services, and other services.

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