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Ecotourism Development Strategy in the Karimunjawa National Park

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Abstract
Karimunjawa National Park has seen a surge in tourism over the past decade. However, many tourists lack awareness of ecotourism principles, leading to ecological damage, particularly to coral reefs. A recent study by the park manager found 7.48 hectares of damage, mostly due to tourism. To address these issues, a comprehensive ecotourism strategy is needed. This study aims to develop such a strategy using the AHP and SWOT methods. The results, which combine AHP and SWOT, show an IFAS value of 0.59 and an EFAS value of 1.06. This suggests that a robust strategy, choosing the six SO (Strengths-Opportunities) and ST (Strengths-Threats) strategies with the highest values, is key to preserving the environment through ecotourism and conservation.

Keywords: Ecoturism, Development Strategy, Karimunjawa National Park

1. Introduction

The development of Indonesian tourism continues to increase because it is one of the important factors in supporting the country's economy. Tourism is one of the development sectors currently being developed by the government, because tourism has a very important role in the development of Indonesia, especially as one of the regional and state revenue sectors. Aliansyah and Hermawan (2021) said that tourism in Indonesia is one of the important economic sectors. In addition to being an economic driver, tourism is considered capable of reducing unemployment and is expected to increase income through foreign exchange earnings. The tourism sector plays a very important role in national development, as an additional source of foreign exchange earnings, equalizing and increasing employment opportunities and community income (Setiawan, 2019).

Tourism or recreation has become a necessity of life for today's society (Pakpahan & Sentosa, 2020). Hikmah *et al*., (2022) stated that healing through tourism is included in the context of emotion-focused coping, which is oriented toward conscious activities to make defensive efforts through emotional control. Activities performed by seeking calmness and relaxation through tourism are an indicator of quality of well-being and quality/satisfaction of life. The perceived tranquility can improve psychological well-being. Furthermore, healing can be achieved through nature tourism, cultural tourism and special interest tourism. Nature tourism is a travel activity or part of the activity that is

voluntarily and temporarily undertaken to enjoy the symptoms of uniqueness and beauty of nature in wildlife reserves, national parks, botanical forest parks and nature tourism parks.

The high growth of demand for ecotourism in protected areas leads to the disruption of the potential of natural tourist attractions, causing environmental degradation. Brown *et al*. (1995) said that are several problems that arise from the development of a tourist area. One of them is the environmental degradation associated with the increase in the number of tourists. Sudini and Arthanaya (2022) stated that tourism development generally aims to introduce, utilize, preserve and improve the quality of objects and tourist attractions, in the development of tourist objects and natural attractions carried out with due regard to cultural sustainability and environmental quality as well as the continuity of the tourism business itself. Thus, tourism and environmental issues are inextricably linked.

Karimunjawa National Park is a protected area with the function of a nature reserve, which has an original ecosystem, is managed on the basis of a zoning system, and is used for the purposes of research, science, education, supporting cultivation, and utilization of environmental conditions. One of the utilization of environmental conditions of Karimunjawa National Park is the utilization of nature tourism environmental services. The utilization of nature tourism environmental services is carried out in the utilization zone because of the location, conditions and natural potential of the national park for the benefit of nature tourism and other environmental conditions.

Figure 1. Number of tourist visits in Karimunjawa National Park

The number of tourist visits to Menjangan Kecil and Menjangan Besar Islands has increased significantly each year, resulting in high ecological pressure in this area. Coral reefs in the Karimunjawa Islands experience an average of 10% damage per year due to marine tourism diving and snorkeling (Kartawijaya *et al*., 2011). The utilization zone of Menjangan Kecil and Menjangan Besar Island in Karimunjawa National Park is included in the intensive nature tourism area, where this area is the main tourism zone that has the potential for good natural tourism objects and attractions and mass tourism activities can be carried out (Sekartjakrarini & Nababan, 2010). High ecological pressure due to intensive tourism has led to a decrease in coral reef degradation/damage. The greatest damage to coral reefs in Karimunjawa National Park is caused by tourism activities. One of the largest sites with degraded areas (open area) is in the exploitation zone of Menjangan Kecil and Menjangan Besar island

waters. The degraded area of Karimunjawa National Park waters is 7.48 hectares and almost 97% is located in the waters of Menjangan Kecil and Menjangan Besar Islands. The degraded area of the waters of Menjangan Island is 6.2519 hectares, consisting of 6.2500 hectares due to tourism and 0.0019 hectares due to vessel grounding (Balai Taman Nasional Karimunjawa, 2019).

Table 1: The table of open areas of Karimunjawa National Park

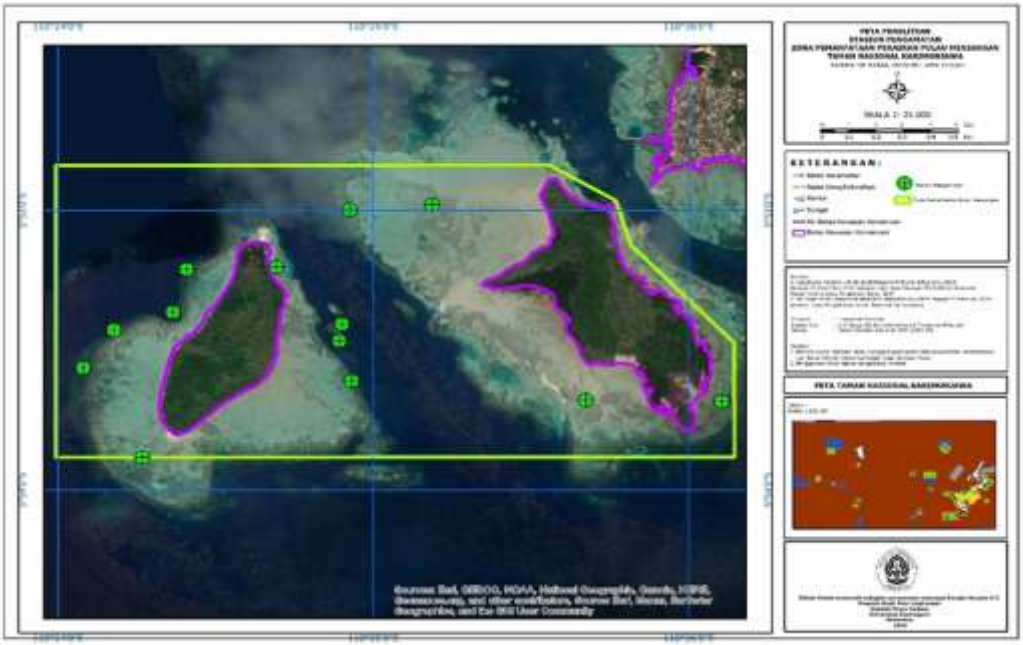
Number	Location	Wide (hectar)	Information
1	West of the Tengah Island Waters	0.1420	Vessel grounding
2	East of the Tengah Island Waters	0.5334	Tourism activity
3	The Water of Sintok Islands	0.0780	Tourism activity
4	West of the Cilik Island Waters	0.0270	Vessel grounding
5	East of the Cilik Island Waters	0.2356	Tourism activity
6	The Water of Telaga	0.0053	Vessel grounding
7	The Water of Mrican 1	0.1233	Vessel grounding
8	The Water of Gosong Seloka 1	0.0184	Vessel grounding
9	The Water of Gosong Seloka 2	0.0650	Vessel grounding
10	The Water of Tanjung Gelam	0.0007	Vessel grounding
11	The Water of Menjangan Besar Islands	0.0019	Vessel grounding
12	The Water of Menjangan Kecil Islands	6.2500	Tourism activity
Total		7.48	

Source: Karimunjawa National Park, 2021

The data above indicates that the open area due to tourism activities is 7,097 hectares, or 95%. This includes the waters of Menjangan Kecil and Menjagan Besar Islands, which are part of the Karimunjawa National Park nature tourism master plan. This has led to high pressure in the waters of Menjangan Kecil and Menjagan Besar Islands. The waters are popular with tourists due to their proximity and easy access in bad weather, coupled with the relatively good condition of the coral reefs and variety of reef fish. Snorkeling is generally done on shallow coral reef flats at a depth of 2–3 meters or on the tubir, a meeting point between the end of the contour on the reef plain and the reef slope. Shallow reef areas have flat contours dominated by branching corals, while the tubir area has more massive corals interspersed with branching corals (Cahyani & Wijaya, 2021). The waters around Menjangan Kecil Island are the site of the most significant damage, and the island is the region's primary tourist attraction. Therefore, an analysis of the suitability of natural tourism is necessary to ensure that the development of tourism in Karimunjawa does not lead to ecological damage and typological incompatibility in the region. This analysis will help to maintain the sustainability of natural tourism in the area.

The coral cover of Menjangan Kecil and Menjangan Besar Island consists of 60% dead coral, 3.81% broken coral, and 22.86% live coral cover (Muhidin *et al*., 2019). The utilization zone of Menjangan Kecil and Menjangan Besar Island requires an appropriate nature tourism development strategy to have a positive and sustainable impact on the community in Karimunjawa. This research proposed a strategic framework for natural tourism with the stakeholder perceptions to developing strategies the importance of tourism.

Figure 2. Research location the Aquatic Utilization Zone of Menjangan Kecil and Menjangan Besar Karimunjawa National Park



2. Methods

The analysis method in this study using SWOT Analysis. SWOT analysis is a systematic identification of various factors to formulate a strategy that is expected to solve a problem. This analysis is based on logic that can maximize strengths and opportunities, but together can minimize weaknesses and threats (Rangkuti, 2015). The stages carried out in the SWOT analysis are drawing the EFE (External Factor Evaluation) matrix and the IFE (Internal Factor Evaluation) matrix. Then, the SWOT matrix is formed through the adjustment of internal and external strategic factors, which are used as the basis for formulating a strategy.

The data collection stages in this study will be carried out using two methods, namely direct and indirect. Data collection begins with preparation activities through literature studies and identification of data needs. Primary data is collected through exploration methods by ground checks. Socio-economic and cultural data are collected through document and literature studies from related agencies and various relevant sources (BPS, BIG, Karimunjawa National Park Office, Disbudpar, PUPR Office, and Bappedalitbangda Jepara Regency). In addition, interviews were also conducted to determine internal and external factor data used as material for hybrid AHP and SWOT analysis. Respondents of AHP for A'WOT are based on the criteria of position/job title, traditional figures, tourism practitioners and experts/academics. The number of respondents in this study was 5 people consisting of representatives of 1 respondent from the Jepara Regency Tourism and Culture Office, 1 respondent from Tourism Actors (Forum Wisata Berkelanjutan Karimunjawa), 1 person from the holder of a permit for the natural tourism business of Karimunjawa National Park, 1 person from the manager of the Karimunjawa National Park Office area and 1 person from a tourism NGO in Karimunjawa. The primary and secondary data obtained are then processed to complete the analysis process of ecotourism development strategies in the Menjangan Kecil and Menjangan Besar Island Water Utilization Zones of Karimunjawa National Park.

The strategy in this study was determined using the hybrid method of AHP and SWOT (A'WOT), which combines SWOT analysis with AHP. The SWOT and AHP methods are combined to obtain the best priority strategy. Therefore, the implementation of the strategy in the study area will help achieve regional sustainable development goals (Sahani, 2021). TOWS matrix was prepared based on SWOT analysis and several strength-opportunity (SO), weakness-opportunity (WO), strength-threat (ST) and weakness-threat (WT) strategies were developed for ecotourism development in the study area. The weight and consistency of strategy groups (SO, WO, ST and WT) were estimated based on AHP method.

Quantitative SWOT analysis provides an effective decision-making tool not only for the purpose of evaluating and selecting reintroduction sites, but also for identifying site-specific management strategies to enhance and maintain site and site suitability. Even if only one area/site is available for a particular reintroduction, SWOT analysis can be invaluable in maximizing efficiency and effectiveness (Feili, H. *et al*., 2017). Analytical Hierarchy Process (AHP) is a multicriteria decision-making method (Saaty, 1987). AHP determines pairwise comparison values between factors to prioritize them using eigenvalues. The purpose of incorporating AHP into the SWOT framework is to systematically evaluate SWOT factors and equate their intensity values. The advantages of implementing SWOT-AHP are analyzing current conditions, anticipating threats and planning alternative strategies in the future (Kurttila *et al*., 2000). The objective of this research endeavor is to formulate a comprehensive strategy for the development of ecotourism in the utilization zone Menjangan Kecil and Menjangan Besar Karimunjawa National Park.

3. Result and Discussion

The ecotourism development strategy of this study is based on the strengths, weaknesses, opportunities and threats associated with the development of ecotourism activities in the aquatic utilization zone Menjangan Kecil and Menjangan Besar Island of Karimunjawa National Park. The development of ecotourism in Karimunjawa National Park is included in the document Karimunjawa National Park Nature Tourism Master Plan 2010. Internal factors consist of two parts, namely strength factors (strength) and weakness factors (weakness). The strength of ecotourism in Menjangan Kecil and Menjangan Besar Island Waters Utilization Zone is the potential of natural tourism attraction data objects in the form of clean waters, white sand beaches and unique underwater beauty. The potential for biodiversity is quite high, namely the existing hard coral genera are 69 genus, which are included in the order Scleractinia 14 families and 3 non-Scleractinia orders.

A total of 353 reef fish species belonging to 117 genera and 43 families have been recorded. The location of Menjangan Kecil and Menjangan Besar Islands is close to the center of Karimunjawa District Government and can be reached with a relatively short travel time. The leadership and support of the central and local governments are very important in the development of ecotourism in Menjangan Kecil and Menjangan Besar Islands. The next internal factor is weakness, namely the lack of existing tourism facilities and infrastructure, tourism management human resources are still very low, cooperation among tourism stakeholders (government agencies, private sector and community) is still very limited and the mainland area of Menjangan Kecil and Menjangan Besar Islands is not a protected area so there are management constraints.

External factors consist of two parts, namely opportunities and threats. Opportunities that exist for the development of ecotourism in the Menjangan Kecil and Menjangan Besar Island Aquatic Utilization

Zone, namely the existence of a strategic tourism policy to support natural tourism management, at the regional level, a Natural Tourism Management Site Design has been prepared in the Menjangan Kecil and Menjangan Besar Island Aquatic Utilization Zone, at the national level, the Karimunjawa National Park area is one of the strategic parts in the development of the National Tourism Strategic Area in Indonesia. The opportunity to build a business in the tourism service sector is very large with the support of the existing regional potential. Optimally in realizing sustainable tourism in Karimunjawa National Park, a Sustainable Tourism Forum and a Tourism Forum were formed as a driving force in supporting the creation of a conducive climate for the growth and development of tourism and the realization of Sapta Pesona in increasing regional development through tourism and its benefits for the welfare of the Karimunjawa people.

The easy and cheap accessibility of Karimunjawa National Park is one of the opportunities for the domestic tourism market, especially tourists from Java and surrounding islands, and the promotion through social media is also an opportunity to promote the potential of ecotourism in the waters of Menjangan Kecil and Menjangan Besar Islands. The next external factor in the form of threats is the use of the area for non-procedural tourism that has not been licensed, tourist activities that have the potential to cause environmental damage, coordination between sectors and policy makers is still weak, and economic conditions, natural and geopolitical phenomena greatly affect the ebb and flow of tourist visits. Each SWOT component is compared and factors for each component are compared by stakeholders. The following hierarchical structure of the ecotourism development strategy direction is presented in full in Figure 1. SWOT weighting is carried out using AHP analysis techniques or commonly known as A'WOT to determine the weight of each SWOT component The results of the A'WOT analysis are presented below

Tabel 2. The weigh of each SWOT factor

Internal strategic factors		**AHP Weight**	**Rating**	**Skor**
	Strength			
1	Potential objects of tourist attraction	0,23	0,18	0,043
2	High potential for biodiversity		0,26	0,060
3	Strategic location		0,13	0,031
4	High level of governace and government support		0,43	0,100
	Weaknesses			
1	Lack of supporting tourism infrastructure	0,08	0,43	0,034
2	The competence of human resources in tourism management is still insufficient		0,26	0,020
3	The cooperation between tourism stakeholder is still very limited		0,22	0,017
4	The land area of Menjangan Kecil and Menjangan Besar Islands is not a protected area		0,10	0,008
Eksternal strategic factors		**Bobot AHP**	**Rating**	**Skor**
	Opportunities			
1	Supporting strategic policy for Nature Tourism Management		0,22	0,088

2	Inventory of Tourism Development		0,18	0,074
3	Establishment of Sustainable Tourism Forum in Karimunjawa National Park	0,40	0,17	0,068
4	Domestic Tourism Market potential		0,21	0,082
5	Social Media Promotion potential		0,22	0,088
	Threats			
1	The use of the area for non procedural/ tourism without license		0,12	0,034
2	The Tourist activities with potential for environmental damage		0,57	0,164
3	Sectoral and policy based coordination is still weak	0,29	0,19	0,056
4	The ebb and flow of tourist visit is heavily influenced by economic conditions, natural and geopolitical phenomena		0,13	0,036

Source: Data Analysis 2025

The results of calculating the weight of each SWOT factor in the effort to develop ecotourism strategies in the waters of Menjangan Kecil Island and Menjangan Besar Karimunjawa National Park resulted in a ranking of each SWOT group priority: Strengths (group weight 23%), Opportunities (8%), Weaknesses (40%), and Threats (29%). According to the results of the analysis, the most important factor in the SWOT is the tourist activity with potential form environmental damage from the threat group. This is the most important factor to consider with an overall priority value of 0.164. Other important factors are ranked in order of priority as follows: high level of governance and government support (10%), Supporting strategic policy for Nature Tourism Management (8,8 %), Social Media Promotion potential (8,8 %), and Lack of supporting tourism infrastructure (3,4 %).

Figure 3. Supporting facilities for tourism in the water utilization zone of Menjangan Kecil and Menjangan Besar islands, Karimunjawa National Park

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The criteria with the highest score for strength factors with a score of 0.100 is high level of governance and government support in this case in line with the vision of Karimunjawa National Park based on the Karimunjawa National Park Long Term Management Plan document, namely to realize the biodiversity of ecosystems for sustainable tourism utilization with the concept of ecotourism through the mission of minimizing damage to coral reefs due to tourism, ensuring the absence of destruction of tourist attraction objects, and reducing waste in tourist objects with the management objective of improving the quality of natural tourism objects and attractions. In addition, there is also a form of support in the form of Karimunjawa National Park Tourism Management Master Plan, which makes the waters of Menjangan Kecil Island and Menjangan Besar one of the intensive tourism sites.

The highest score for weaknesses is the criteria for Lack of supporting tourism infrastructure with a score of 0.034. This is in accordance with the function of protected areas in the utilization zone, the development of ecotourism supporting facilities and infrastructure must be in accordance with the business space / public space. For the development of tourism facilities and infrastructure by external parties outside the management, it can only be carried out in the business space with an approval mechanism in the form of a Business License for Natural Tourism Facilities Services, which is regulated in accordance with applicable regulations.

Supporting strategic policy for Nature Tourism Management and Social Media Promotion potential with a score of 0.088 are the greatest opportunity factors. The strategic policies that support natural tourism management in the Menjangan Kecil Island and Menjangan Besar Aquatic Utilization Zone of Karimunjawa National Park are quite stable because the natural tourism management site design has been compiled and ratified in the Menjangan Island Waters Utilization Zone based on the decree of the Director of Utilization of Conservation Forest Environmental Services No: SK.28 / PJLHK / PJLWA /KSA.3 / 5/2018 which refers to the regulation of the Director General of PHKA number: P.5 /IV-SET / 2015 concerning amendments to the Regulation of the Director General of the PHKA Number: P.3 /IV-SET / 2011 concerning the guidelines for the preparation of the design of natural tourism sites Number. /IV-SET/2015 concerning amendments to the Regulation of the Director General of PHKA Number: P.3/IV-SET/2011 concerning Guidelines for the Preparation of Site Design for Nature Tourism

Management in Wildlife Reserves, National Parks, Botanical Forest Parks and Nature Tourism Parks where in conservation zone management in this area has been divided into public space and business space for the development of ecotourism both internally and externally. Nationally, the Karimunjawa National Park area is part of the National Tourism Strategic Area according to the RIPPARNAS 2010-2025 document.

Meanwhile, the threat factor with the highest score of 0.164 is in the form The Tourist activities with potential for environmental damage. The overall highest scoring value of the SWOT analysis results in the opportunity factor. This shows that the Menjangan Kecil and Menjangan Besar Island Water Utilization Zones of Karimunjawa National Park have great potential to be developed for ecotourism development by considering the criteria for strategic policies for supporting natural tourism management, tourism development investment, the existence of sustainable tourism forums, market opportunities and promotions. The results of the SWOT analysis obtained three SO strategies (strengths and opportunities), three ST strategies (strengths and threats), four WO strategies (weaknesses and opportunities), and three WT strategies (weaknesses and threats).

Table 3. SWOT Matriks Analysis

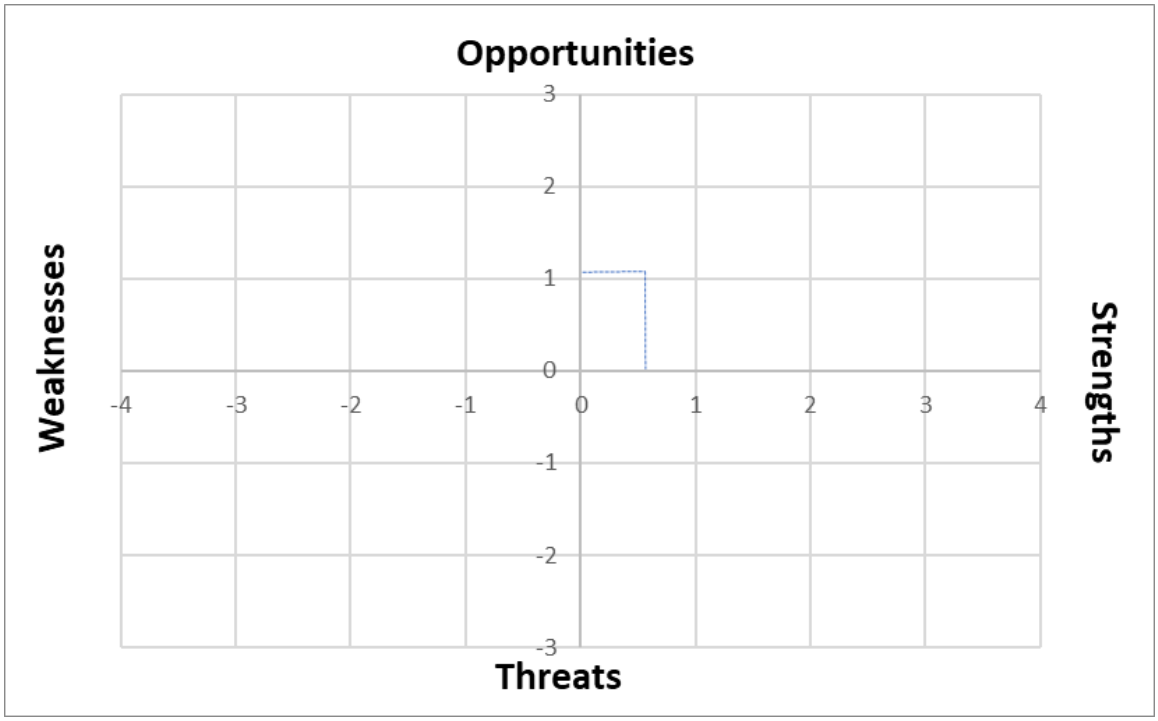
Factor	**Opportunities**	**Threats**
Strength	1. Collaborate in the development of ecotourism with Forum Wisata Berkelanjutan Karimunjawa National Park (S1, S2, S4, O1, O2, O 3, O4, O5) 2. Improve the tourism infrastructure in the waters of Menjangan Kecil Island and Menjangan Besar Island to facilitate ecotourism investment. (S3, O1, O2, O4, O5) 3. The promotion of sustainable ecotourism in Karimunjawa National Park is achieved by leveraging the potential of social media to reach both domestic and international tourist markets. (S1, S2, O4, O5)	1. In order to minimize the negative impacts of tourism on the area, it is crucial to establish cooperative relations with relevant stakeholders and tourism actors in Karimunjawa National Park (S4,T2,T3) 2. Conduct an ecotourism awareness campaign for the Karimunjawa community and Karimunjawa National Park tourism businesses (S2,S3,T1,T2,T3) 3. Improve security at tourist attractions on Menjangan Kecil and Menjangan Besar Islands (S1, S2,T1, T2, T4)
Weaknesses	1. Increasing the development of supporting infrastructure for ecotourism through PBSWA in the waters of Menjangan Kecil and Menjangan Besar Islands (W1, O1, O2) 2. Improving the capacity of tourism management human resources in collaboration with the Karimunjawa National Park sustainable tourism forum through tourism training (W2, O3, O4) 3. Increasing synergy between tourism	1.Optimizing the use of tourism infrastructure and human resources for tourism management to increase tourist awareness of the existence of marine ecotourism on Menjangan Kecil and Menjangan Besar Islands (W1,W2,T2) 2.Strengthening coordination between tourism stakeholders around the Karimunjawa National Park area to minimize security disturbances by paying attention to cultural characteristics and social norms

	stakeholders for the management of eco-tourism in the waters of Menjangan Kecil and Menjangan Besar Islands (W3, O2, O3) 4. Optimizing the land ecotourism of Menjangan Kecil and Menjangan Besar Islands through social media promotion (W4, O2, O4, O5)	(W3, T3, T4) 3. Prioritize the development of tourism support facilities in the land areas of Menjangan Kecil and Menjangan Besar Islands (W1, W4, T1)

Source: Data Analysis 2025

Based on the image of the SWOT quadrant matrix, it can be seen that the ecotourism development strategy in the waters of Menjangan Kecil and Menjangan Besar Island Utilization Zone is in a position between the opportunity and strength axes, namely quadrant I. This means that the ecotourism development is recommended to take advantage of the existing internal strengths to achieve development success from the external opportunities. This means that ecotourism development is recommended by utilizing existing internal strengths to gain development success from external opportunities to achieve a good ecotourism development strategy.

Figure 4. SWOT Kuadran Matrik



SWOT's Quadrant I is an aggressive strategic approach. It analyzes matters of priority for the long, short, and urgent term. This analysis guides the steps, actions, or strategies that need to be taken in accordance with an integrated plan. The aim is to ensure the achievement of targets or outputs set based on predetermined policies. The strategy implemented is a growth-oriented strategy. It combines strengths and opportunities (S-O).

Table 4. The sequence of strategies for determining ecotourism development

Strategy	Related	Total Weight	Rank
S-O	S1, S2, S4, O1, O2, O 3, O4, O5	0.603	1
	S3, O1, O2, O4, O5	0.363	2
	S1, S2, O4, O5	0.273	6
S-T	S4, T2, T3	0.32	5
	S2, S3, T1, T2, T3	0.345	3
	S1, S2, T1, T2, T4	0.337	4
W-O	W1, O1, O2	0.196	9
	W2, O3, O4	0.17	10
	W3, O2, O3	0.159	11
	W4, O2, O4, O5	0.252	7
W-T	W1, W2, T2	0.218	8
	W3, T3, T4	0.109	12
	W1, W4, T1	0.076	13

Source: Data Analysis 2025

The top six strategies were selected based on organization and refinement. The prioritization of these strategies was intended to ensure focused implementation. Results from a Space Matrix analysis showed that the top position of the ecotourism strategy on Menjangan Kecil and Menjangan Besar islands was based on the SO and ST factors. Therefore, the strategic plan is implemented in a way that is aligned with the strengths of the utilization zone, while considering potential opportunities and challenges. After a sorting process, the top six strategies were identified. The prioritization of these strategies is outlined to ensure focused implementation.

The development strategy is structured around these six plans: 1) collaborative ecotourism development with the Karimunjawa National Park sustainable tourism forum, 2) improving tourist accessibility infrastructure to facilitate ecotourism investment, 3) conducting ecotourism awareness campaigns, 4) increasing the security of attractions, 5) establishing cooperation with related stakeholders to minimize the impact of tourism, and 6) promoting the park on domestic and foreign social media markets.

4. CONCLUSION

The development strategy follows a six-step plan: 1) Promote sustainable ecotourism, 2) Make it accessible, 3) Boost sustainable ecotourism to boost the local economy, 4) Involve local communities to lessen ecotourism's impact, 5) Educate on environmental conservation and ecotourism for visitors and locals and 6) Collaborate with stakeholders. The strategy aims to reduce environmental damage, especially biodiversity loss, by improving tourism governance, especially regarding protected areas, while maintaining community well-being.

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