STRATEGY FOR STRENGTHENING GILI MATRA MARINE TOURISM PARK MANAGEMENT THROUGH AN INSTITUTIONAL ECONOMIC APPROACH

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Abstract

Background: Gili Matra Marine Tourism Park (GMMTP) has the potential for marine ecosystems and high economic value through tourism; however, it has not been managed sustainably. Coral reef damage and institutional irregularities are the primary challenges.
Purpose: This study aimed to formulate a strategy to strengthen GMMTP management by using a community-based institutional economic approach that considers ecological and socioeconomic aspects.
Design/methodology/approach: A quantitative approach combining the Contingent Valuation Method (CVM) for the value of existing benefits, Payment for Ecosystem Services (PES) for the basic value of service costs, and Interpretive Structural Modeling (ISM) for mapping problems and institutional strategies.
Finding/Results: The PES value was set at IDR 333,062/person/visit, and the total WTP reaches IDR 60.5 billion/year. The main problem is institutional disagreement between government parties. Main strategies: Additional budgets and supervisory personnel.
Conclusion: The application of an institutional economic approach has been proven to support the sustainable management of conservation areas with a scientific basis for financing policies through PES.
Originality/value (State of the art): This study fills this gap by integrating ecosystem service valuation and institutional strategies based on economic data, which have not been widely applied in marine conservation areas in Indonesia.

Keywords: conservation, strengthening strategy, PES, CVM, ISM

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INTRODUCTION

Marine Protected Areas (MPAs) are marine and coastal regions with clearly defined geographical boundaries that are formally or informally recognized, designated, and managed to ensure the long-term protection of natural resources, ecosystem services, and cultural values (Schultz et al. 2022). One such area is the Gili Matra Marine Tourism Park (GMMTP), located in North Lombok Regency, West Nusa Tenggara Province. This conservation area is managed by a Technical Implementation Unit under the Directorate of Marine, Coastal, and Small Islands (KP3K), Ministry of Marine Affairs and Fisheries (KKP), namely the National Marine Conservation Area Center (BKKPN), based in Kupang, East Nusa Tenggara.

The waters of Gili Matra host diverse coastal ecosystems, including mangroves, seagrasses, and coral reefs, which serve as habitats for species such as turtles and shellfish. These ecological assets not only support biodiversity but also enhance the appeal of the area as a popular marine tourism destination (Rosadi et al. 2022). In recognition of its ecological and economic potential, Gili Matra has been designated as part of a national strategic tourism area under Presidential Regulation No. 84 of 2021 in the Lombok-Gili Tramena National Tourism Destination Master Plan 2020–2044. Tourism in Gili Matra has positively contributed to local livelihoods through activities such as diving, snorkeling, and hospitality (Hilyana et al. 2022). The area also provides valuable ecosystem services, including provisioning, regulating, cultural, and supporting services, which play essential roles in sustaining both environmental integrity and economic productivity (Wahyudin, 2022).

However, increasing pressure from tourism and environmental degradation present a major challenge for sustainable management (Zhu et al. 2023). These conditions call for an integrated governance framework that not only protects natural assets but also ensures equitable economic benefits (Cisneros-Montemayor et al. 2021). In this context, institutional economic approaches offer a lens for evaluating and strengthening the management of marine conservation areas, including Gili Matra.

In recent years, research on Marine Protected Areas (MPAs) has advanced from purely ecological assessments to integrating socioeconomic and governance considerations (Schmidt et al. 2022). Several studies on the Gili Matra Marine Tourism Park and similar conservation areas have examined the biophysical characteristics of coastal ecosystems (e.g., coral reefs, seagrasses, and mangroves), the value of ecosystem services (Wahyudin, 2022), and the economic contribution of marine tourism (Hilyana et al. 2022). Hernández-Blanco et al. (2021) estimated that the potential economic value of Gili Matra's marine services could reach USD 1.3 billion per year, highlighting the site’s strategic importance.

However, most existing studies are either ecologically oriented or narrowly focus on economic valuation (Jalilov et al. 2025), without addressing how these valuations are translated into actionable institutional strategies. There is a lack of integrative frameworks that bridge ecological-economic values with institutional designs, governance models, and stakeholder coordination mechanisms (Shemshad et al. 2025). In particular, transaction costs and institutional barriers to sustainable conservation, which are key topics in institutional economics, have not been sufficiently explored in the context of Gili Matra and other similar MPAs in Indonesia. In particular, transaction costs and institutional barriers to sustainable conservation are key topics in institutional economics (Rachmadina et al. 2021). This has not been sufficiently explored in the context of Gili Matra or similar MPAs in Indonesia.
Currently, there is a growing scientific interest in applying institutional economics to environmental governance, especially in marine and coastal contexts. This approach considers how institutions, rules, and stakeholder interactions shape the environmental outcomes and transaction costs in resource management. Nevertheless, its quantitative integration with ecosystem service valuation and strategic planning remains underdeveloped in terms of practical conservation policies.

This study attempts to fill this gap by applying a novel framework that integrates institutional economic analysis with the valuation of ecosystem services and cost-benefit analysis to formulate practical strategies for strengthening marine conservation governance in Gili Matra.

To address the sustainability challenges of the Gili Matra Marine Tourism Park, this study adopts an institutional economic approach that emphasizes the integration of ecosystem service valuation and governance mechanisms. This approach is considered essential for bridging the gap between ecological benefits and the institutional arrangements necessary to sustain them.

Institutional economics provides a framework for analyzing transaction costs, incentive structures, and stakeholder coordination involved in managing marine protected areas (Fisher et al. 2022). This study aims to quantify the economic value of ecosystem services, evaluate socioeconomic trade-offs, and identify institutional strategies for sustainable community-based marine conservation by incorporating tools such as the Contingent Valuation Method (CVM), Payment for Ecosystem Services (PES), and Interpretive Structural Modeling (ISM).

This multi-method approach offers a comprehensive solution that captures the economic potential of conservation and aligns it with practical governance strategies to enhance the effectiveness of MPA management in Indonesia.

This study aimed to formulate a strategy to strengthen the management of the Gili Matra Marine Tourism Park (GMMTP) using a community-based institutional economic approach that considers both ecological and socioeconomic aspects. By integrating the Contingent Valuation Method (CVM), Payment for Ecosystem Services (PES), and Interpretive Structural Modeling (ISM), this study sought to quantify the value of ecosystem services, assess transaction costs, and develop inclusive institutional strategies for sustainable marine conservation.

METHODS

Both primary and secondary data were used in this study. Field observations, structured interviews, and questionnaires sent to stakeholders and tourists were used to gather primary data. To gauge willingness to pay, the survey asked 100 people, 62 of whom were domestic travelers and 38 of whom were foreign visitors. Local government representatives and conservation stakeholders were subjected to in-depth interviews and expert meetings. To support the analysis of ecosystem services and institutional structures, secondary data were gathered from Gili Matra Marine Tourism Park (TWP) management documents, institutional reports, zoning and planning documents, prior studies, and pertinent literature.

Tourist respondents were chosen for data collection using a non-probability sampling technique, namely accidental sampling. Site conditions and tourism activities were evaluated through field observations, and government, business, and community stakeholders participated in focus group discussions (FGDs) and interviews. Spending, perception, and readiness to pay were the main topics in the questionnaire. The input for ISM analysis was developed using expert judgment. Data were gathered in multiple stages between October and November 2023. The analytical methods used in this study are as follows:

Transaction Cost Analysis (TCA)

Refers to the total institutional economic transaction costs (TTC) of MPA management using the following formula:

$$TTC = \sum_{i=1}^{n} Ci \quad .....(1)$$

Ci represents the costs of establishing and operating MPA management such as zoning, monitoring, and institutional setup.

Total Economic Value of Marine Protected Area (TEVoMPA)

The entire economic value of ecosystem services within the MPA was captured using the following formula:

$$TEVoMPA = \sum_{i=1}^{n} \sum_{i=1}^{n} Eco_{ij} \quad .....(2)$$

Eco_{ij} represents the j-th service of the i-th ecosystem component.

Payment for Ecosystem Services (PES)

Calculate the basic fee based on cultural service values, formulated as:

$$BPES = CSV/CC \quad .....(3)$$

CSV refers to the cultural service value and CC represents the carrying capacity of the area.

Contingent Valuation Method (CVM)

Estimate the total willingness to pay (TWTP) of tourist respondents using the following formulas:

$$EWTP = \sum_{i=1}^{n} Wi.Pfi \quad .....(4)$$

$$Pfi = bi/N \quad .....(5)$$

$$TWTP = EWTP.\ Ni \quad .....(6)$$

Wi is the WTP value, bi is the number of respondents choosing WTP, and N is the total number of respondents (Rahayu et al. 2023).

Interpretative Structural Modeling (ISM)

ISM is a decision-making method used to determine the best alternative based on certain criteria for assessing effective and efficient conservation-based institutional scenarios, using an index system as a decision standard (Qarnain et al. 2021). The ISM methodology classifies sub-elements and constructs a hierarchy to identify the system structure, supporting more effective decision making (Munawir et al. 2022).

According to Qarnain et al. (2021), this research uses 2 (two) elements from the 9 (nine) existing elements according to Qarnain et al, (2021). This study used the elements of the problem and management strategy of TWP Gili Matra, with subelements identified by the structure using the VAXO symbol in the SSIM table. Data from the SSIM obtained through questionnaires and expert meetings were processed using the ISM software "Ever Vision Software, dDSS Ver. 1.0.01". The results included key subelements, model structures, and four subsectors (autonomous, dependent, linkage, and independent) validated by experts.

This study did not formulate a statistical hypothesis because it aimed to formulate a strategy to strengthen conservation areas based on the integration of ecosystem service valuation and institutional economic analysis in the Gili Matra Conservation Area. Although the elements are coded X1, X2, and Xn, these elements are sub-elements in the hierarchical structure model of the Interpretive Structural Modeling (ISM) method. Therefore, these elements are not quantitative variables used to test relationships statistically but rather systemic components used to map the relationship between strategies based on expert perceptions.

To integrate ecological and socioeconomic assessments into an institutional economic perspective, this study's framework first determines the economic value and transaction costs associated with the GMMTP. We then identify funding gaps and willingness to pay (WTP) and use ISM analysis to formulate a strategy based on input from stakeholders and institutions. The flow of this research framework is illustrated in Figure 1.

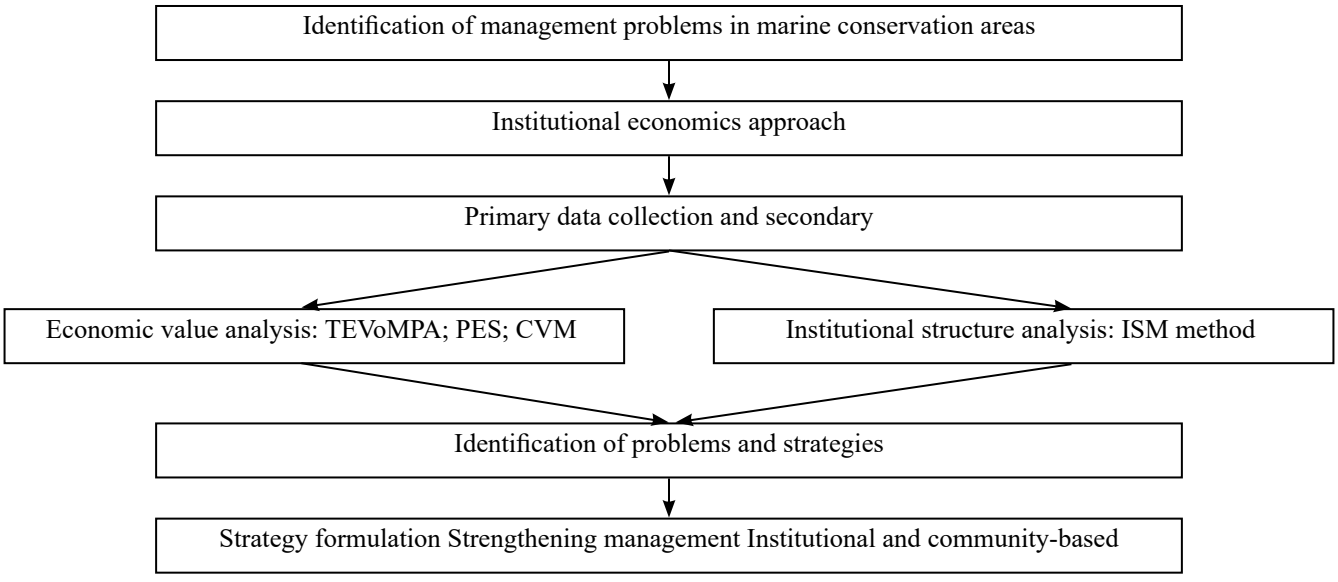

Figure 1. Framework thought of study

RESULTS

Gili Matra MPA Management Fee

The data used to analyze the management costs of the Gili Matra MPA were obtained through interviews with several stakeholders, including BKKPN Kupang of the Gili Matra MPA work area, NGO Gili Matra Bersama, Extension workers for the management of the Gili Matra MPA conservation area, and Pokmawas (Community Monitoring Group). The management costs of Gili Matra are listed in Table 1.

Based on the literature from the Conservation and Community Investment Forum (Tranter et al. 2022) regarding MPA financing, to manage one hectare of the conservation area, a management fee of 75-150 USD is required or an IDR exchange rate of IDR 15,241/USD (average exchange rate of US dollars (USD) to IDR). The transaction cost value of marine conservation area management reaches a minimum of IDR 1,143,075 million per hectare per year, whereas the maximum cost is IDR 2,286,150 million per hectare per year. Thus, for an area of 2,268.59 hectares, the total cost of managing the Gili Matra MPA conservation area can reach IDR 2,593,168,514 – 5,186,337,029 billion, annually. Thus, the costs incurred to manage the Gili Matra MPA conservation area can be said to have exceeded the budget needed to manage an area of 2,268.59 hectares when compared based on the literature from the Conservation and Community Investment Forum (Tranter et al. 2022).

The transaction costs of the Gili Matra Bersama NGO and POKMASWAS are dynamic, depending on the budget or donor received, while the costs of the Kupang BKKPN and Fisheries Extension Workers tend to be stable because they are supported by the government budget and long-term programs, unless there are changes in policy or external conditions.

The Benefit Value of Gili Matra MPA

Benefits of Ecosystem Services

In addition to providing services such as fish resources, shrimp, crabs, and various products produced directly by the ecosystem, marine conservation areas also provide benefits in the form of regulatory services, such as climate regulation, abrasion resistance, and flood control. The existence of marine conservation areas not only provides habitat services for marine biota but also cultural services such as recreation, education, and research (Buonocore et al. 2021). The estimated economic value of Matra is presented in Table 2.

Payments of the Ecosystem Services

Based on Table 2, it is known that the value of cultural/ information services from the Gili Matra MPA conservation area is IDR 51,179,993,423 /ha/year, so with a maximum capacity of 421 tourists who can visit per hectare per day (KKP 2023) or as much as 153,665 per year, then the basic PES fee value is IDR 333,062 per person per visit. Wahyudin et al. (2022) stated that payment of PES levies can be integrated with payment for supporting services in the area, such as accommodation, transportation, or equipment rental. Payments for ecosystem services are incentives to maintain ecosystems, so that they continue to provide goods and services that benefit humans. Jiangyi et al. (2020) stated that payments for ecosystem services are financial incentives to support the sustainability of biodiversity conservation, especially in marine conservation areas.

Table 1. Total management costs of Gili Matra MPA in 2023

Source of Cost	Cost (IDR)
Kupang BKKPN Gili Matra MPA Work Area	3,267,320,000
NGO Gili Matra Bersama	2,448,000,000
Fisheries Extension Officer	58,800,000
POKMAWAS	72,000,000
Total	5,846,120,000

Table 2. Estimated economic value of the Gili Matra MPA conservation area resources

Consequence Table		Total Value (IDR billion/year 2021)	Total Value (IDR billion/year 2023)
Coral reef ecosystem			
Arrangement Services		5,957,567,706	6,668,686,817
Culture		45,624,673,622	51,070,617,164
Provision		510,084,881	570.970.650
	Total	52,092,326,209	58,310,274,634
Seagrass ecosystem			
Supporter (nursery)		1,586,844,463	1,776,256,565
Supporters (nutrient cycle)		6,619,059,546	7,409,136,969
Arrangement		600,429,911	672,099,626
	Total	8,800,333,920	9,857,493,162
Mangrove ecosystem			
Regulation (coastal protection)		14,911,415	16,691,301
Culture		97,712,861	109,376,259
Supporters		3,138,961,645	3,513,640,663
Provision		22,031,545	24,661,318
	Total	3,273,617,466	3,664,369,541
Total Value		64,172,277,595	71,832,137,337

Value of Benefits of Existence

The value of the benefits of ecotourism in Gili Matra MPA was analyzed using the Contingent Valuation Method (CVM) by examining how much someone is willing to pay or willingness-to-pay (WTP) for the existence and services received from this tourism. The approach used is the technique of tourist entrance ticket costs using the bidding game method, in which the price is negotiated until an agreement is reached. The details of the benefits of this area are presented in Table 3.

The average WTP value from domestic tourists is IDR 45,161.29 and from foreign tourists is IDR 262,667 per entry, assuming that tourists visit once a year. Therefore, the total value of tourism benefits in Gili Matra MPA is IDR 60,515,542,494 per year. Individuals with high levels of education and income tend to have a higher value than those with low education or income (Nguyen and Jones, 2022).

Recommendation for Strengthening for Gili Matra MPA Management

The formulation of problems and recommendations for strategies to strengthen the management of the Gili Matra MPA in this study uses the Interpretative Structural Model (ISM), where the elements selected are considered to play a dominant role in determining problems and strategies in an effort to strengthen the management of the Gili Matra MPA. The following are the results of the data processing in the form of a structural model:

Elements of the Gili Matra Management Problem

The identified problem elements in the management of the Gili Matra MPA conservation area consisted of six sub-elements:
X1 = Guidance and control at sea have not been carried out continuously and do not yet have clear and substantial direction.
X2 = Understanding sustainable tourism from a bioecological perspective has not yet become an urgent criterion for the management of marine tourism parks.
X3 = Diving and snorkeling tourism operators, especially dive operators and centers, are not yet consistent with zoning regulations.
X4 = Diving and snorkeling activities are carried out en masse and not according to zoning without time limits or number of people.
X5 = There have been no efforts to divert fishermen's livelihoods to tourism or other businesses, so many become tourism workers, which is feared to result in changes in the socioeconomic structure of society.
X6 = There is no agreement at the government level, so there is an impression that each party has authority and is not well-coordinated.

Table 3. The benefits of the existence of ecotourism in Gili Matra MPA

Respondent	Total Tourist	Average of WTP (IDR)	Total of WTP (IDR)
Domestic	30,567	45,161.29	1,380,445,161
Overseas	225,132	262,666.67	59,135,197,333
	Total		60,515,542,494

The ISM results for the problem elements in the Gili Matra MPA are shown in Figure 2. Based on the hierarchical structure model of problem elements in strengthening the management of the Gili Matra Marine Conservation Area, there is no agreement on the sub-elements at the government level, so there is an impression that each has authority and is not well coordinated (X6problem) is a key element of the problem in Gili Matra MPA. This key element is the main driver and influences the subelements at a level below it.

Elements of the Gili Matra Strengthening Strategy

Meanwhile, the elements of the strengthening strategy to overcome this problem were identified as consisting of six sub-elements:
X1 = Policymaking involving consultation with the Gili Matra community
X2 = One-stop conservation area management
X3 = Ecotourism based tourism
X4 = Strict rules and sanctions for violators
X5 = Alert and integrated supervision
X6 = Addition of reception and supervision personnel

The ISM results for the strengthening strategy elements in the Gili Matra MPA are shown in Figure 3.

The hierarchical structural model of strategic elements in strengthening the management of the Gili Matra MPA can be observed above. The sub-element of the addition of budget and supervision personnel (X6strategy) is a key element of the strategy to strengthen the management of the Gili Matra MPA. The main strategy recommendation that can be made to strengthen the management of Gili Matra MPA is to add budget and personnel to the supervision of Gili Matra MPA management (X6strategy). This strategy is a solution related to the main problem in Gili Matra MPA, namely that there is no agreement at the government level, so there is an impression that each has authority and is not well coordinated (X6problem).

The next problem in Gili Matra MPA is related to guidance and order at sea, which has not been carried out continuously and does not have a clear and substantial direction (X1problem). For example, the dock between regions in Pemenang and Lembor has not functioned optimally as an entry point, and access in and out of the waters of the Gili Matra MPA does not go through the two ports. The strategy to solve this problem is to implement one-door conservation area management (X2strategy). One-door Gili Matra MPA management refers to a system that permits coordination and policies to be managed by an entity in order to ensure effective coordination, integrated management, and better supervision.

The third-level problem in the management of Gili Matra MPA is that the understanding of sustainable tourism from a bioecological aspect has not become an urgent criterion in the management of marine tourism parks (X2problem) and diving and snorkeling activities are carried out en masse and do not follow zoning without time limits and number of people (X4problem). One strategy that can be used to overcome these problems is to implement ecotourism-based tourism (X3strategy).

The analysis revealed that the management costs of the Gili Matra Marine Conservation Area exceeded the ideal budget benchmark for an area of 2,268.59 hectares, based on data from the Conservation and Community Investment Forum (Tranter et al. 2022). Despite this, the EVIKA 2023 score reached 88.71, indicating sustainable management status. However, significant governance challenges remain, particularly in the inter-agency coordination between the local government (for land areas) and BKKPN Kupang (for marine areas).

Field interviews highlighted weak oversight as a consequence of this fragmented authority. Tourists often go undetected when utilizing an area's resources because of a lack of coordinated personnel. The enforcement of regulations is hampered because monitoring officers are institutionally separated from the Gili Matra Marine Conservation Area unit and report to the remote PSDKP office in Benoa, East Lombok.

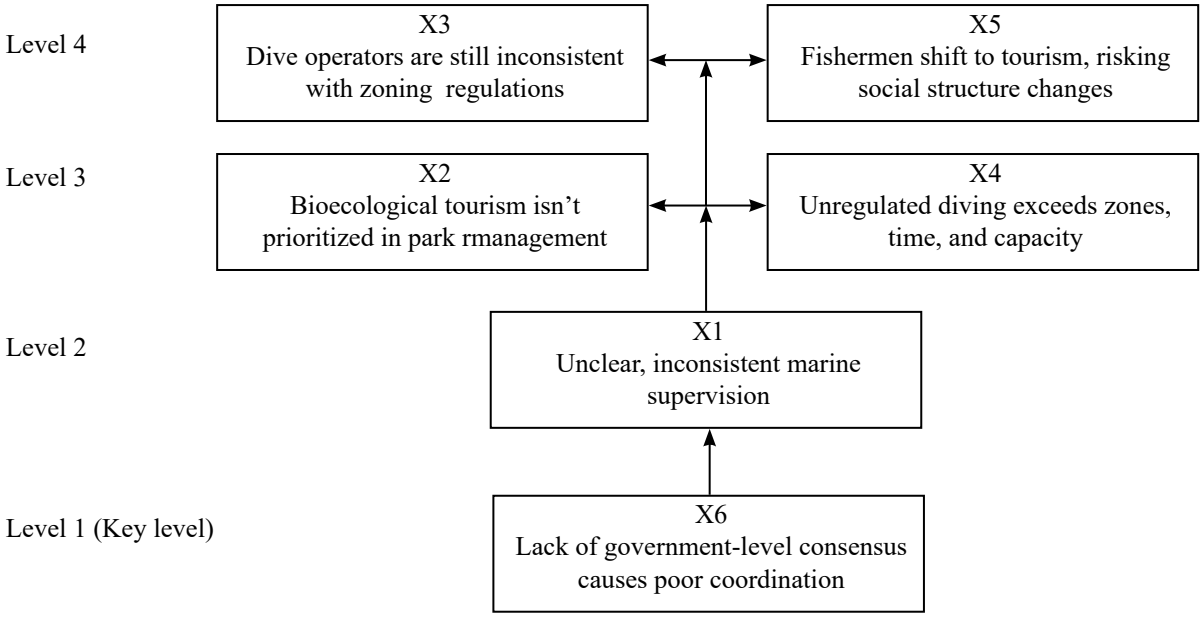

Figure 2. Diagram of the Hierarchical Structure Model of the Problem Elements of Strengthening the Management of the Gili Matra MPA

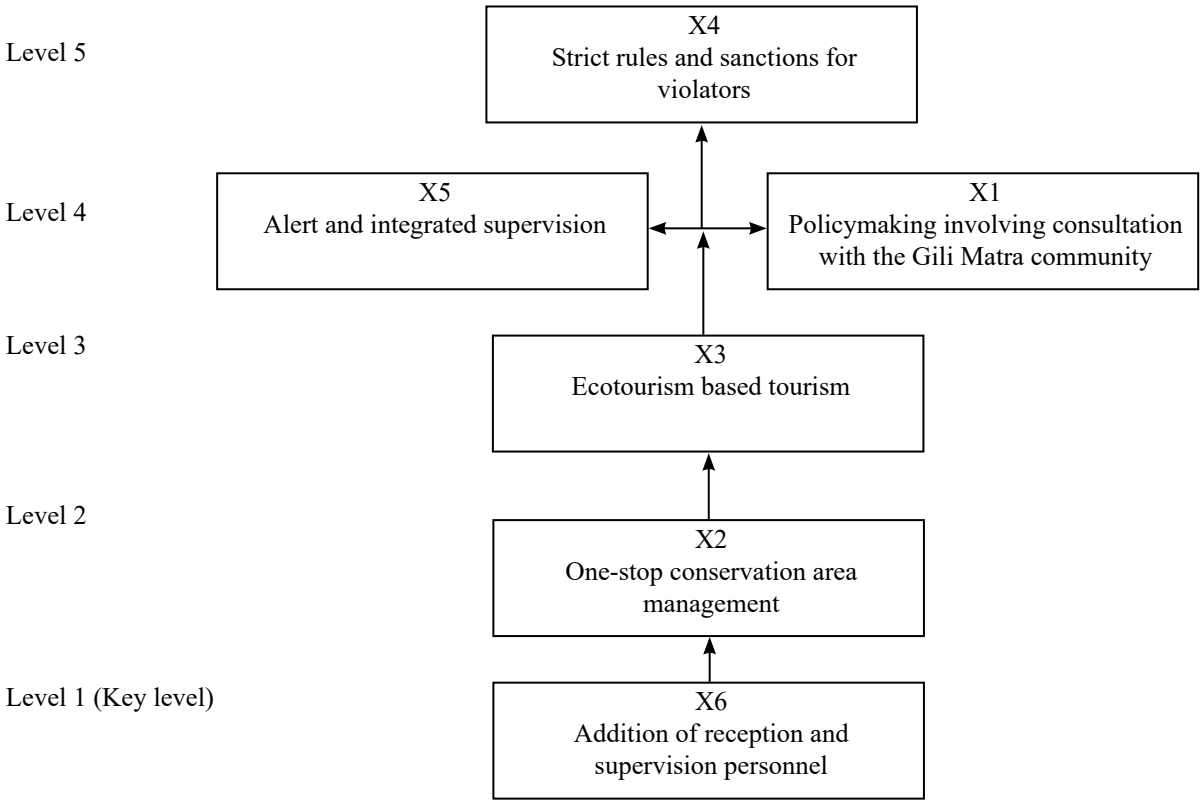

Figure 3. Hierarchical Structure Model Diagram of Gili Matra MPA Management Strengthening Strategy Elements

Strengthening supervision through increased personnel is essential to improve regulatory compliance and environmental protection (Wang et al. 2023). This can be supported by implementing Payment for Ecosystem Services (PES) schemes. PES provides a scientific and economic basis for tourism fees, which, in turn, offers sustainable financing for management needs (Thompson et al. 2023). According to Jones et al. (2020), PES schemes provide incentives for biodiversity protection and the sustainable use of ecosystem services.

The proposed PES-based entrance fee is IDR 333,062 per visitor, with a capacity of 421 people per day. Integration with existing tourism services such as accommodation and transportation can ensure effective fee collection. Wahyudin et al. (2022) emphasized PES as a strategic instrument for conservation financing, which has the potential to contribute to an endowment fund for future sustainability.

Although the North Lombok government introduced new area entrance fees (e.g., IDR 10,000 for domestic adults), these fees were still well below the calculated PES value. Furthermore, national regulations (Ministerial Regulation of Marine Affairs and Fisheries No. 31/2020) require permits for tourism in conservation areas, supporting the case of aligning fee structures with conservation financing requirements.

Revenue from PES can fund not only additional monitoring staff, but also ecosystem restoration and community-based programs (Kariuki and Birner, 2021). Inclusive decision making with local communities is essential to ensure ownership and successful implementation of policies. Therefore, strengthening the governance of the Gili Matra Marine Protected Area requires financial innovation and management participation.

Managerial Implications

The managerial implications of this study are in the context of multi-agency interests in the management of marine conservation areas in the Gili Matra Marine Tourism Park region. First, there is a need to establish a one-door management system that can integrate the land and sea authorities. Second, PES provides a scientific basis for determining conservation-based entrance fees, so that it can be a source of sustainable funding to increase monitoring capacity and fill conservation programs. Third, community involvement in the policy-formulation process emphasizes the importance of participatory governance in increasing compliance and social legitimacy. These implications indicate that the success of conservation area management depends not only on technical approaches, but also on adaptive leadership, funding innovation, and inclusive involvement between stakeholders at the local and national levels.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study aims to find a strengthening strategy for managing the Gili Matra MPA through an institutional economic approach. The value of payments for ecosystem services (PES) set as an entrance fee reaches IDR 333,062 per person per visit, and the overall willingness to pay (WTP) value is IDR 60,515,542,494 per year. Based on the results of the ISM analysis, the core problem of the Gili Matra MPA is that there is no agreement at the government level; therefore, there is an impression that each has authority and is not well coordinated. The core strategy to overcome this problem is to increase revenue and supervise personnel. The implementation of this strategy was also supported by the PES values collected for the management of the Gili Matra MPA conservation area.

Recommendations

The estimated values were based on an institutional economic perspective. Hence, they must be justified with local values to accurately reflect the actual monetary value of the marine conservation area in the Gili Matra MPA. To support the sustainability of the management of the Gili Matra MPA conservation area, it is necessary to make ecotourism a management objective, coordinate between all stakeholders for the formulation of appropriate policies, create integration between stakeholders to support the management and supervision of the Gili Matra MPA conservation area, and conduct an evaluation of budget allocation based on the characteristics of the area and EVIKA assessment indicators to support the improvement of the effectiveness of the management of the marine conservation area.

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