Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Fostering Sustainability through Sport Tourism: Management Strategies in Mandeh Coastal Area, Indonesia

Eri Barlian

e.barlian@fik.unp.ac.id

State University of Padang

Dewi Rahmadani Siregar

State University of Padang

Iswandi Umar

State University of Padang

Pudia M Indika

State University of Padang

Haris Satria

State University of Padang

Tandiyo Rahayu

State University of Semarang

Tommy Soenyoto

State University of Semarang

Adi S

State University of Semarang

Billy Castyana

Sungkyunkwan University

Research Article

Keywords: Coastal tourism, Management strategy, Mandeh, Sport tourism, Sustainable development

Posted Date: August 25th, 2025

DOI: https://doi.org/10.21203/rs.3.rs-7342564/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Sport tourism is a global industry sector with significant potential to drive sustainable development, but its management in Indonesia still faces complex challenges. This study aims to formulate a comprehensive and sustainable sport tourism management strategy using a case study of the coastal area of Mandeh Island, West Sumatra. The method used is a descriptive quantitative approach supported by land suitability evaluation analysis, multidimensional sustainability analysis using Rapid Appraisal for Fisheries (RAPFISH), Analytical Hierarchy Process (AHP) for determining strategy priorities, and Interpretative Structural Modelling (ISM) for analyzing stakeholder relationships. Data collection was conducted through Focus Group Discussions (FGD), interviews with 25 experts, and field surveys. The evaluation results show that the Mandeh Island coastal area meets the “Suitable” (S2) criteria with a score of 167. Multidimensional sustainability analysis shows that the economic and socio-cultural dimensions are in the ‘Sufficient’ to “Highly Sustainable” status, but the environmental dimension is negatively impacted. The main challenges identified include suboptimal human resources, weak coordination among stakeholders, a lack of planned events, and limited supporting infrastructure. Based on the AHP analysis, the priority strategy for the coastal area is to seek investors and sponsors. The ISM analysis positions the central government as an independent stakeholder with the highest driving power, playing a crucial role in driving other elements. This study produces a strategic management model emphasizing the importance of stakeholder synergy and targeted investment as the foundation for achieving sport tourism that is not only economically beneficial but also socially fair and environmentally sustainable.

Introduction

One of the most dynamic and rapidly growing sectors within the global tourism industry is sport tourism. The United Nations World Tourism Organization (UNWTO) defines it as travel undertaken to participate in or spectate at sporting activities, with a broad spectrum ranging from major international events like the Olympics to individual recreational activities such as hiking, skiing, and diving (United Nation World Tourism Organization, 2019). More than just a niche market, sport tourism has now become a significant driver of economic growth (Özgider & Koçak, 2025; Ramos-Ruiz et al., 2025). The global sport tourism market, valued at hundreds of billions of dollars and driven by trends in health, wellness, and experiential travel, underscores a critical opportunity for destinations to diversify their tourism products. Tourism has long been recognized as a powerful and influential economic sector within a country. Indonesia’s maritime wealth contributes to its extensive maritime tourism potential, each region boasting its distinct beauty and uniqueness (Barlian et al., 2024). As the world”s largest archipelagic nation, comprising over 17.000 islands and possessing sport tourism. The country’s location in the heart of the Coral Triangle provides a world-class natural arena with unparelleled marine biodiversity, ideal for activities such as diving, snorkeling, surfing, and other water sports. Recognizing this extraordinary potential, the Indonesian government is actively promoting the development of marine tourism destinations, including the Mandeh Bay area in West Sumatra, as part of a strategic plan to accelerate economic development(Kemenparekraf, 2020). The development of tourism in Indonesia continues to increase

from time to time, as can be seen from the increasing number of tourists visiting tourist destinations in Indonesia which are famous for their natural beauty, community friendliness, and cultural diversity. At the regional level, this sector is expected to be a support for regional revenues whose future contributions have good prospects (Husna et al., 2022).

However, the rapid development of sports tourism, particularly in ecologically sensitive coastal areas, presents a significant paradox. On one hand, it promises substantial economic benefits, including foreign exchange revenue, job creation, and infrastructure development. On the other hand, uncontrolled and poorly managed tourism growth poses a serious thereat to the very resources upon which it depends (Coghlan, 2025). Environmental degration is a primary concern, with threatening impacts such as direct physical damage to coral reef ecosystems, an increase in single-use plastic waste, and pollution from inadequate waste management systems (Dogru et al., 2020). Therefore, promoting the transformation of the tourism industry from scale expansion to quality-oriented development has become an urgent task for many tourist destinations worldwide (Salem et al., 2025).

Socially. The influx of tourists can present significant challenges, such as the marginalization of local communities, economic leakage where profits revert to external investors, and increased pressure on local resources and culture (Vahdat et al., 2025). This dichotomy between economic opportunities and socio-environmental risks creates an urgent need for sustainable management models that can balance development with conservation and community well-being (Jain et al., 2025). This paradox underscores the urgency of developoing marine sport tourism though a sustainability-oriented approach that integrates the principles of economic viability, environmental protection, and social equity. However, the implementation of such an approach is inherently complex; the multidimensional and dynamic nature of sustainability has rendered traditional, reductionist methods inadequate, thus necessitating new, holictic approaches to address this multidisciplinary complexity. Within the Indonesian context, developing sustainable marine sport tourism managemnt strategies has become a strategic a strategic imprerative to maximize economic potential while mitigating the risks of environmental degradation and social inequality. The Mandeh Bay area in West Sumatra, with geographical and socio-economic characteristics representative of many marine sport tourism destinations in Indonesia, offers a valuable case study for developing a replicable sustainable managemnt model for other locations.

There is a significant gap in empirical studies on management models that can effectively address this dualism. Existing studies tend to be partial and have shown taht traditional approaches are no longer adequate to address the complexity of multidimensional sustainability issues. To date, there is no proven, holistic, and replicable fremework specifically designed for the socio-ecological context of an archipelagic contry such as Indonesia-a model capable of translating sustainability principles (economic viability, environmental protection, and social justice) into operational and measureable strategies. The absence of an applied model is a critical gap, leaving valuable destinations such as the Mandeh Region vulnerable to unguided development, which risks damaging its natural assets for short-term gain or failing to optimize the sustainable well-being of its communities.

Literatur review

The tourism sector and the concept of sustainable development have been extensively explored in the literature, covering both theoritical and practical aspects (González-Morcillo et al., 2023; Wang & Wu, 2022). In this context, the Mandeh region presents significant potential for development as a marine tourism destination, owing to its scenic coastline and archipelago (Umar, 2022). The region boasts a diverse rane of attractions, including vantage point from several peaks that provide panoramic soactal viewa, family-oriented tourism zones, exclusive areas designated for investment, cable car facilities, special interest and conservation tours, and opportunities for sailing. Given its tremendous potential, the planning and development of this area must be meticulously executed in a sustainable manner to secure long-term benefits for the region (Alhadi et al., 2023; Zefnihan, 2018). The development of the Mandeh region as a marine tourism destination must be strategically implemented by optimizing its diverse natural resource potential, including capture fisheries, aquaculture, agriculture, and local craft industries. Crucially, economic expansion in this sector must be integrated with conservation effort aimed at preserving vital coastal ecosystems, particularly its coral reefs and fisheries. Ultimately, the sustainable enhancement of these economic activities will contribute to improving the livehoods of local communities (Febriandi et al., 2025). The Mandeh Integrated Tourism Area (KWT), located in the Pesisir Selatan Regency of West Sumatra, has transformed into a significantly developing destination. Its primary charm lies in a unique blend of historical artifacts, stunning natural panoramas, and a rich cultural heritage proudly preserved by its local community. Geographically, Mandeh is a bay encircled by green hills and adorned with a cluster of small islands at its center. The view from Puncak Mandeh, its main vantage point, presents a serene panorama of the calm bay with its scattered islands. It is this combination of turquoise seas, tropical islands, and lush hills that forms the basis for the prestigious analogy often used to describe it. This potential positions Mandeh as a world-class destination awaiting optimization, particularly within the sport tourism sector (Fatimah et al., 2025).

The gophysical attributes of Mandeh render it an ideal location for diverse aquatic sport activities. This suitability is based on two primary factors: first, the bay’s semi-enclosed topography, which is naturally sheltered by a chain of lush hills and small islands, functions as a powerful breakwater against open-sea swells. This results in remarkably placid and predictable water conditions, establishing an exceptionally safe and comfortable arena for novices and family-oriented recreation, second, beyond the tranquil surface, Mandeh’s appeal is magnified by its rich and vibrant natural environment. The bay hosts a dynamic marine ecosystem, featuring healthy coral gardens and a high diversity of reef fish and other marine life. This underwater sanctuary offers a captivating and memorable experience, making it a prime destination for more experienced participants. Activities like snorkeling and scuba diving become immersive explorations of a thriving underwater world, providing a profound connection to nature of Mandeh.

Rich marine biodiversity for snorkeling and diving

Snorkeling is the activity of swimming on or through a body of water while breathing through a tube called a snorkel. This practice allows you to observe the underwater world for extented periods without needing to constantly lift your head for air. The fundamental purpose of snorkeling is one of peaceful observation and discovery. It allows individuals to explore sunlit, shallow-water environments like the vibrant coral reefs and coastal. The Mandeh region is a haven for divers and snorkelers, featuring several dive sites that offer rich and diverse underwater ecosystems. The area is defined by two primary types of underwater attractions. Firts, healthy coral feef formations are found around Cubadak and Sironjong Islands. These sites are home to a wide variety of colorful tropical fish species, and excellent water visibility during certain seasons makes for a highly rewarding snorkeling. The second major attraction, an iconic site for divers, is the wreck of the Dutch merchant vessel, MV Boelongan, which sank during World War II. Resting at a depth of approximately 22 meters, the shipwreck has transformed into m a thriving artificial reef, inhabited by diverse marine biota. The site offers a unique diving experience that blends historical allure with exotic underwater beauty.

Beyond its funtion as a tourist attraction, the MV Boelongan wreck site possesses significant historical, scientific, and economic value. As a cultural heritage artifact, it serves as a valuable subject for maritime research that can reinforce regional and national identity. As a unique tourism asset, it provides a world-class wreck diving experience. This approach requires the careful integration of environmental conservation, cultural heritage preservation, and strategic sourism development. The ultimate goal is to enhance community welfare through local economic growth, an improved quality of life, and the safeguarding of local culture (Putra et al., 2024).

An archipelago ideal for island hopping

Island hopping is the recreational activity of traveling from one island to another, typically visiting multiple islands as part of a single journey. In practice, it involves talking a boat to explore a gruop of islands that are relatively close to each other. Instead of staying on one island for a long time, the goal is to experience the unique character of several different islands in a short period, often within a single day. Island hopping, or exploring the archipelago, is an esential activity when vising the Mandeh region. Tourists can charter a boat from the Carocok Pier or the Mandeh Fish Auction Port (TPI) to embark on a day trip to several iconic islands, each possessing a unique character. A typical itinerary includes Sironjong Gadang and Sironjong Ketek islands, renowned for their rock cliff formations which serve as a favorite location for cliff jumping activities of varying heights. The journey often continues to Sultan island, which functions as a hub for water sports and relaxation, where visitors can enjoy fresh seafood on white sandy beaches. For those seeking tranquility and privacy, Cubadak island offers the allure of an exclusive, international-standard resort. Uniquely, the tour is often interspersed with an experience of navigating a small river flanked by a lush mangrove forest, which leads to the refreshing Gemuruh Waterfall. This diversity of experiences within a single travel package constitutes a highly promising attraction. This aligns with tourism research by (Liu et al., 2025), which posits that the aesthetic experience is an integral component of tourism consumption. According to the study, the dimensions of

entertainment, authenticity, and the visual beauty of a destination are curicial factors that shape visitor satisfaction. Thus, the Mandeh island hopping itinerary-which presents a combination of challenging cliffs, serene beaches, and an authentic mangrove forest and waterfall-effectivwly fulfills these various aesthetic dimensions, rendering it a holistic and highly engaging tourism experience .

Water sport

The placid waters of Mandeh bay render it an ideal arena for a variety of adrenaline-pumping water sports (Silisna & Susanti, 2020). These activities are primarily concentrated around Sultand island, where visitors can rent Jet Skis to experience the thrill of exploring the bay at high speeds. Additionally, popular group attractions such as the Banana Boat are widely available. Towed by a high-speed motorboat, these rides are highly favored by families and groups as they offer a shared experience of excitement and amusement (Then et al., 2020).

Among the diverse forms of cultural ecosystem services, recreation and tourism are the most frequently explored. A primary reason for this is that these two sectors possess an economically quantifiable market value. Furthermore, they are also considered to have a clear and direct linkage to the enhancement of human well-being (Mariyam et al., 2025). The Mandeh tourism area possesses the legitimate potential to be on par with world-class destinations, particularly in the development of sport tourism. However, this potential brings with it a significant responsibility. Without an integrated, participatory, and sustainable management strategy, this invaluable potential sould conversely become a source of ecological and social disaster. The primary challenge, therefore, lies in aligning the rate of tourism-driven economic growth with the environmental carrying capacity and the well-being of the local community.

Methods

This study employs a mixed-methods research design, combining both qualitative and quantitatives approaches. Strategies were formulated through Focus Group Discussions (FGD) with relevant stakeholder institutions and agencies, following the collection of data from respondents (community members participating in the activities and those present at the location). The research variables include sport tourism management, sustainable development indicators based on the Sustainable Development Goals (SDGs).

Study site and period

The study site is geographically located in Nagari Mandeh, which falls within the administrative jurisdiction of Pesisir Selatan Regency, West Sumatra Province. The focal area of the research, indicated by the green shaded region on the map, is defined by its administrative boundaries with the surrounding *nagaris* (autonomous village-level governance unit in West Sumatra). The boundaries are as follows: to

the north, it is bordered by Nagari Sungai Pinang and Nagari Duku, to the east, it is bordered by Nagari Nanggalo, to the south and west, it is bordered by Nagari Ampang Pulai and the waters of the bay. Fiield research for this study was conducted in May 2025

Statistical analysis

Data solleection for this study was conducted through a two-stage process to acquire both primary and secondary data. The collection of primary data was performed using several methods, including questionnaire surveys, in-depth interviews, focus group discussion (FGD), and participatory observation. Secondary data previous data were gathered through document analysis, a review of existing statistical data and previous studies, as well as maps and other spatial data. following the data collection phase, this research adopts a multifaceted approach to data analysis, integrating multiple techniques to yield comprehensive findigs.

Analysis and evaluatioon of sport tourism management

The evaluation of sport tourism managemnt was conducted using six key indicators, namely: (1) Tourist Attraction and Appeal, (2) Accessibility, (3) Safety and Security, (4) Management and Human Resources, (5) Facillities and Infrastructure, and (6) Tourism Event. Subsequuently, each indicator was developed into specific sub-indicators, which were then assigned a corresponding weight and score. For clarity and further detail, this evaluation framework is presented in Table 1.

Table 1
Sport tourism managemnt indicators

Indicator/Weight	Sub Indicator	Rating	Score
Tourist Attraction and Appeal/ 10	High	3	30
	Moderate	2	20
	Low	1	10
Accessibility/ 10	Very Easy	5	50
	Easy	4	40
	Moderate	3	30
	Difficult	2	20
	Very Difficult	1	10
Safety and Security/ 5	Safe	3	15
	Moderate	2	10
	Unsafe	1	5
Management and Human Resources/ 7	High	3	21
	Moderate	2	14
	Low	1	7
Facillities and Infrastructure/ 15	High	3	45
	Moderate	2	30
	Low	1	15
Tourism Events/ 15	Very Often	5	75
	Often	4	60
	Sometimes	3	45
	Rarely	2	30
	Never	1	15
Source: Yulianda (2007)			

The class interval was subsequently determined using Eq. 1, as defined in the equation, the class interval (i) is calculated by subtracting the lowest total score among the indicators (b) from the highest total score, then diving the result by the desired number of classes (k). The resulting class interval value is presented in Table 2.

i = $\frac{c-b}{k}$ (1)

Table 2
Sport tourism management class intervals

Criteria	Class Interval	Index
Very Good	183–221	S1. Highly Suitable
Good	143–182	S2. Suitable
Average	103–142	S3. Marginally Suitable
Poor	62–102	N. Not Suitable

Analysis of the sustainability sport tourism management

To determine the current condition and sustainability level of sport tourism management and to develop future scenarios, a sustainability analysis was conducted using the rapid appraisal method through Rap-Mad analysis. The sustainability anaysis ultilizes multidimensional scaling (MDS), leverage analysis. Monthe Carlo analysis, and the determination of the stress value and the coefficient of determination (R^2). The data for this sustainability analysis were sourced from ecological, social, economic and institutional dimensions, which were obtained from relevant government agencies, direct interviews with respondents, and the processing of questionaire data.

Multidimensional scaling (MDS) analysis

Multidimensional scaling (MDS) is employed in this Rapish analysis because its output has proven to be more stable compared to other multivariate analysis methods, such as factor analysis and multi-attribute utility theory (MAUT). The ordinal technique (distance determination) in MDS is based on the Educlidean Distance, which, in a dimensional space, can be written as an equation (Dauzi & Anna, 2002).

$$d = \sqrt{\left(\left[x_1 - x_2 \right]^2 + \left[y_{1_} y_2 \right]^2 \left[z_1 - z_2 \right] + \ldots \right)}$$

2

These points are then plotted by regressing the Eclidean distance from point i to point j (dij) against the original distance values, according to the following equation:

$$d_{ij} = a + \ \beta \ \delta_{\ ij} + \epsilon$$

3

This regression equation utilizes the alternating least squares (ALS) technique, also known as the ALSCAL algorithm. This algorithm, based pn squared euclidean distances, operates by iterating the

regression process to achieve the minimum error value. According to Kavanagh & Pitcher (2004), the ALSCAL algorithm optimizes the squared distance (squared distance = dijk) against the squared dissimilarities (original dissimilarities = 0ijk), in three dimensions (ijk), this relationship is expressed by a formula known as S-Sttress, as shown in the following equation:

$$S = \sqrt{\frac{1}{m}} \sum_{k=1}^{m} \left[\frac{\sum_i \sum_j \left(d_{ijk}^2 - o_{2ijk}^2 \right)^2}{\sum_i \sum_j o_{ijk}^4} \right]$$

4

The squared distance is a weighted Euclidean distance, which can be expressed as the following equation:

$$d_{ijk}^2 = \sum_{a=1}^{i} W_{ka} \left(X_{ia} - X_{ja} \right)^2$$

5

The position of the sustainability points can be visualized on the horizontal and vertical axes. Following a rotation process, the possition of these points is projected onto the horizontal axis, where the sustainability index is scored on a scale from 0% (poor) to 100% (good). Subsequntly, the sustainability index for each dimension is visualized in the from of a kite diagram. The scores, which represent the sustainability index for each dimension, are presented in Table 3.

Table 3
Sustainability status index

Sustainability index	Categori		Status
0–25	Poor	:	Unsustainable
25–50	Fair	:	Less sustainable
51–75	Sufficient	:	Sufficiently sustainable
76–100	Good	:	Highly sustainable
Source: (Yusuf, 2016)			

Leverage analysis

Leverage analysis is conducted to identify sensitive attributes and the necessary interventions. The result are expressed as the percentage (%) change in the Root Mean Square (RMS) for each attribute upon its removal from the ordination. The analysis is performed by examining the influence of each attribute through the resulting change in the RMS value. Attributes with the highest persentage change

are the most sensitive influencing sustainability. A greater change in the RMS indicates a more sensitive role of that attribute in improving the sustainability status.

Monte Carlo analysis

This analysis is employed to test the reability of the index values for each dimension at a 95% confidence level. Monte Carlo analysis facilitates the sustainability assesment by examining the influence of scoring errors on each attribute. These errors can be caused by procedural flaws, misinterpreationm of aattributes, and scoring variations arising from differences in researcher opinion or judgment. Furthermore, the analysis accounts for the stability of the Multidimensional scaling (MDS) analysis process, data entry errors or missing data, and the occurence of excessively high stress values.

Stress value and coefficient of determination (R^2)

The validation of the attributes studied studied in the MDS analysis, confirming their accuracy and scientific defensibility, is determined by examing the Stress value and the coefficient of determination (R^2). The analysis results are considered accurate and reable if the Stress value is less than 0,25 (25%) and the coefficent of determination (R^2) approaches 1,0 (100%).

Analysis of sport tourism management strategy

Subsequently, Interpretive Structural Modelling (ISM) is employed to determine the policy directives for sustainable sport tourism management. The fundamental principle of the ISM mwthod is the identification of a structure within a system, which offers significant utility for formulating the system effectively and for enhanced decision-making. The ISM methodology comprises the development of a hirarchy and the classification of its sub-elements.

The experts enaged to determine the strategic policy direction for sustainable sport tourism management were drawn from relevant stakeholders. This panel included representatives from the department of sport and tourism, academics, community leaders, non-governmental organizations (NGO), traditional leaders (*pemangku adat*), sports observers, and the Mandeh Area Water Police. A total of 25 expert s were involved in this research.

Result

The holistic synthesis of research findings reveals a significant gap between macro-level strategic policy formulation and its micro-level implementation in coastal sport tourism management. This discrepancy leads to numerous operational and coordination challenges.

Evaluation analysis of sport tourism managemnt in Mandeh

Table 4
Evaluation results of sport tourism management in Mandeh

Indicator/Weight	Actual value	Area description
Tourist Attraction and Appeal/ 10	30	The region features an ideal combination of spectacular natural scenery and a diverse potentital for water sport. Cluters of small islands, characterized by white sandy beaches and crystalline waters, provide a perfect setting for activities such as snorkeling, diving, and other water sports. Its well-preserved coral reef ecosystem is a primary asset for diving and snorkeling. The high marine biodiversity, coupled with the geographicaal features of its surrounding bays, offers a unique experience for visitor.
Accessibility/ 10	40	Accessibility to the region is relatively good, with a travel time of approximately 1.5 hours from the city of Padang, which facilitates concenient access for both domestic and international tourists. The availability of homestays and local lodges offers accomodation choices that support the development of sustainable sport tourism. The location is readily accessible by privat vehicles, including cars anad motorcycles, with parking facilities available in the vicinity.
Safety and Security/ 5	15	The socio-cultural environment of the Mandeh region contributes significantly to visitor safety. The local community is recognized for its hospitality and strong adherence to the tradition of mutual cooperation (*gotong royong*). a low crime rate, with infrequent security incidents involving tourists, is characteristic of the area. This safe atmosphere is further cultivated by the Minangkabau culture, which wmphasizes values of courtesy and honor. Additionally, the local fishing community enhances safety by frequently assisting in maritime emergencies, a crucial factor for those engaged in water sports. The physical and operational conditions for sport tourism are also highly favorable. Key safety attributes include waters that are generally calm and protected from large waves, good underwater visibility suitable for diving and snorkeling, and a lack of dangerous currents in the main activity areas. This is complemented by the presence of experienced local guides with intimate knowledge of the marine environment.
Management and Human Resources/ 7	7	The current management of the Mandeh region predominantly relies on a traditional approach, featuring an organizational structure that is not standardized for the demands of the modern tourism industry. This limitation is evident in the scarcity of personnel with formal educational backgrounds in tourism, destination management, or sport tourism. The majority of the area's managers are local community members who operate based on empirical experience, often lacking adequatee theoritical knowledge of sustainable tourism management. Consequently, the mnagement structure remains informal and lacks a clear delineation of roles and responsibilities. Coordination among key stakeholders-such as local goverment bodies, local tour operators, and fishing communities-is weak. There is no specialized unit professionally dedicated to sport tourism development, causing management to be reactive rather than proactive in capitalizing on the region's potential.
Facillities and Infrastructure/ 15	30	The road infrastructure proving access to the Mandeh region is generally adequate, with paved roads accessible to various types of vehicles. Nevertheless, certain segments require routine maintenance, particularly during the rainy season, and nighttime

Indicator/Weight	Actual value	Area description
		illumination along the coastal roads remains innsufficient. Parking facilities are available at several strategic locations; however, their capacity is often insufficient during peak seasons. While jetties and small harbors exist to provide access to the surrounding islands, several of these structures are of rudimentary construction and require significant upgrades to ensure tourist safety and comfort.
Tourism Events/ 15	45	The organization of tourism events in the Mandeh region is currently sporadic and does not adhere to a well-structured event calendar. Existing events are typically confined to specific occasions, such as national holidays or local festivities, and lack the programmatic continuity required to attract a consistent flow of tourists throughout the year. Consequently, the absence of a signature annual event has prevented Mandeh from estabishing a strong brand identity as a premier sport tourism destination.

The class intervals for sport tourism management are as follows:

Table 5
Class intervals for sport tourism management

Criteria	Class interval	Index
Very good	194–237	S1. Highly suitable
Good	150–193	S2. Suitable
Moderate	106–149	S3. Marginally suitable
Poor	62–105	N. Unsuitable

Based on the weighted analysis of all indicators, this research yielded a total score of 167. This score classifies the sport tourism suitability of the Mandeh region within the S2 index, corresponding to a “Good” criterion and a “Suitable” designation. This result indicates that while the region possesses substantial potential and strong foundational assets for sport tourism development, there are still identifiable weaknesses that prevent it from achieving an optimal, “Highly Suitable” status.

Sustainability analysis of sport tourism managemnt in Mandeh

The socio-cultural dimension

Based on the analysis of the socio-cultural dimension, an assessment was conducted on ten key attributes using a rating scale from 0 (very low) to 3 (high). The findings indicate that several aspects received a very positive response from the community. The attributes that received a high score (3) include community perception of the activity, community awareness or concern, acceptance of socio-cultural pluralism, and the positive impact of the activity on new job creation. Meanwhile, several other

attributes were rated at a moderate level (2). These aspects include community participation in the activity, the use of regional attributes or culture, the involvement of traditional leaders, and the sale of local culinary specialties during the event. On the other hand, the incidence of social conflict resulting from the activity was rated as low (1), indicating minimal negative social impact. However, one attribute requiring special attention was the performance of cultural and dance attractions, which received a very low score (0).

The economic dimension

Based on the analysis of the economic dimension, ten key attributes were assessed using a rating scale from 0 (very low) to 3 (high). The results indicate a very positive economic impact overall. A majority of the attributes, seven in total, received a high score (3). These attributes include MSME (Micro, Small, and Medium Enterprises) involvement, community economic improvement, high monetary circulation, the growth of the creative economy, an increase in Regional Original Revenue (PAD), increased hotel/lodging occupancy, and the sale of local specialty snacks. Meanwhile, the remaining three attributes were rated at a moderate level (2). These aspects are the growth of new industries as an impact of the activity, an increase in tax revenue, and the sale of regional souvenirs. Overall, no attributes were rated as low, indicating that this sport tourism event provides a strong and widespread economic contribution.

The environmental dimension

Based on the analysis of the environmental dimension, an assessment was conducted on seven key attributes using a scale from 0 (very low) to 3 (high). The results show that the negative environmental impacts of the sport tourism activity are generally at low to moderate levels. The majority of environmental impact attributes were rated as low (1). This includes ecosystem disruption, land cover change, air pollution, surface water pollution, and soil degradation. This assessment indicates that the activity did not cause significant environmental damage in these aspects. Meanwhile, two other attributes showed a moderate (2) level of impact: an increase in waste generation and a rise in water demand due to the activity. No single attribute was rated as high; however, the aspects of waste management and water usage are noted as requiring further attention.

Table 6
Summary of Rapfish analysis result

Dimension	Stress	R^2	Value MDS	Sustainability Status	Monte Carlo test	Difference (MDS-Monte Carlo)
Socio-cultural	0,134	0,951	63,17	Moderately sustainable	61,91	1,26
Economic	0,134	0,954	85,53	Highly sustainable	82,74	2,79
Environmental	0,159	0,940	55,24	Moderately sustainable	55,06	0,18
Average			67,98	Moderately sustainable		

Analysis of sport tourism management strategies

Based on research data analysis challenges in managing sport tourism:

- Insufficient human resources, not all tourist attractions are well managed (T)
- Informal management structure without clear division of tasks (S)
- Weak coordination between stakeholders (government, tour operators, community) (T)
- Limited infrastructure and facilities, with current road access still suboptimal (e.g., no streetlights) (T)
- Events are still on a local scale with limited promotional reach (R)
- Not all community members are involved in sport tourism events (R)
- Limited road access for large buses (R)
- Security posts are not yet available (R)
- The track or road is too extreme and winding, located in the middle of a hill (S)
- Emergency health facilities are limited for emergency situations (S)
- Event organization is sporadic without a planned calendar (T)
- Weak coordination in event planning and implementation (S)
- Private sponsorship and partnership support is still minimal (T)
- No master plan for sustainable event development (T)
- No standardized operating procedures (SOP) (S)
- No attractive investment schemes for private investors (T)

Based on the analysis presented in the figure above, the strategy for developing sport tourism in the Mandeh area requires seeking investors and sponsors for sport tourism activities and collaboration

between relevant stakeholders. The stakeholders involved in sport tourism management are:

- Ministry of Tourism and Creative Economy: formulation of national sport tourism policies, allocation of development budgets, and international promotion
- Provincial Tourism Office: coordination of provincial-level tourism development, regional promotion, and capacity buildingpariwisata provinsi: koordinasi pengembangan pariwisata tingkat provinsi, promosi regional dan capacity bulding
- District Tourism Office: implementation of local tourism programs, tourism business licensing, and tourism operator training
- Fishing communities: providers of maritime transportation services, local guides, and maritime knowledge
- Coastal youth: potential workforce for the sport tourism industry
- UMKM communities: providers of food services and souvenirs unique to coastal areas
- Traditional leaders: guardians of local cultural values and wisdom in managing the area

Results of ISM analysis of stakeholder roles in sport tourism activities at the Mandeh area tourist attraction:

Discussion

Coastal zone management is a multidimensional approach that integrates the management of terrestrial and marine ecosystems, resource utilization, and environmental protection. Therefore, the universal challenge faced globally is to implement effective coastal governance to achieve an optimal balance between economic development agendas, resource exploitation, and ecosystem conservation imperatives (Chen et al., 2024; Skilton et al., 2024). This study aims to formulate a sport tourism management strategy to achieve sustainable development in coastal areas, using the Mandeh region as a case study. This discussion section will delve deeply into key findings, interpret relationships between variables, and compare them with relevant theoretical frameworks.

Superior Potential Versus Lagging Managerial Capacity

The most significant finding of this study is the discrepancy between the physical and economic potential of the region and its existing managerial capacity. The evaluation results show that the Mandeh Region achieved a suitability score of 167, categorizing it as “Suitable” (S2) for the development of sports tourism. This high score is primarily contributed by the Attractiveness indicator (score 30), Accessibility (score 40), and Safety (score 15). Natural attractions, such as well-preserved coral reef ecosystems, island groups with white sandy beaches, and relatively calm waters, constitute a very strong foundation. However, this outstanding potential is inversely proportional to the internal management capacity.

The Human Resource Management indicator received the lowest score (7 out of 7), indicating fundamental weaknesses. This finding is reinforced by the identification of constraints in the field, such as an organizational structure that is still informal, weak coordination among stakeholders, and the absence of a standardized master plan for development. This suggests that management of the area tends to operate in an organic and reactive manner, relying on the empirical experience of the local community without being supported by standardized modern tourism management knowledge. The weakness of human resource capacity is the main bottleneck or obstacle preventing the area's natural potential from being capitalized on optimally and sustainably. Through community organizing, lobbying, strong leadership, and existing connections to developed strategies that helped them adapt and reorganize (Ackerman et al., 2025).

Critical analysis of Multidimensional Sustainability Status

Sustainability analysis using the Rapfish method provides a more nuanced picture. Aggregately, this region has a status of “Moderately Sustainable” with an index of 67.98. However, a breakdown by dimension reveals interesting dynamics. The economic dimension achieves a “Highly Sustainable” status with an index of 85.53, supported by high SME involvement, increased community economic activity, and significant cash flow from tourism activities. This confirms that sports tourism has successfully become a driving force for the local economy (Stoll et al., 2020). On the other hand, the socio-cultural dimension with an index of 63.17 and the environmental dimension with an index are at the “Moderately Sustainable” level. Although this score is not bad, it indicates vulnerability. In the social dimension, several attributes such as community participation in activities with a score of 2, involvement of traditional leaders with a score of 2, and especially cultural attraction performance with a score of 0 indicate room for improvement. This suggests that the integration between tourism and local cultural capital has not been maximized. Meanwhile, the “Moderate” status in the environmental dimension, with attributes such as waste growth at a value of 2 and increased water demand at a value of 2, serves as an early warning signal that without proactive management interventions, pressure on the ecosystem will continue to increase as the number of tourists grows, risking a decline in sustainability status in the future.

Priority Issues and Their Implications for Strategy Formulation

The issue screening process, conducted through a Focus Group Discussion (FGD), successfully identified seven priority issues that require immediate attention. Issues such as insufficient human resources (HR), weak coordination, the absence of a master plan, sporadic events, and minimal sponsorship collectively point to a single root cause: weak governance. These issues cannot be resolved in a piecemeal fashion; instead, they require an integrated strategic approach. The finding from the Analytic Hierarchy Process (AHP) analysis, which ranked "the need to seek investors and sponsors" as the primary strategy, must be interpreted with caution. Efforts to attract investors are unlikely to be successful if fundamental governance issues, such as the absence of a master plan and a clear

investment scheme, are not addressed first. Investors require robust regulatory and planning capabilities, which currently remain a significant constraint in the Mandeh Area.

The Key Roles of Stakeholders in a Collaborative Strategy

Interdisciplinary studies confirm the growing global awareness that stakeholder engagement is a crucial element in natural resource management (Başkent & Başkent, 2025; Bendtsen et al., 2021; Borah et al., 2025; Paarlberg et al., 2025; Panzarella et al., 2025), this involvement influences various decisions related to land use (Sarmiento Barletti et al., 2020), additionally, it also promotes compliance with environmental regulations by encouraging collective behavioral change(Eaton et al., 2021), this process also plays a role in determining how ecosystem services are valued and prioritized (Asah & Blahna, 2020). Stakeholder analysis using ISM provides a clear roadmap for strategy implementation. The analysis results place the Ministry of Tourism (E1) and the Provincial Tourism Office (E2) in the Independent quadrant with the highest driver power and at the lowest hierarchical level, namely levels 4 and 3. This confirms their role as key drivers with the power to push for systemic change, but with low dependence on other actors. Therefore, initiatives for governance reform, master plan development, and human resource capacity building must be spearheaded by these two government institutions. On the other hand, local actors such as the Fishing Community (E4) and Coastal Youth (E5) are in the Dependence quadrant, indicating high dependence but low driving power. They are the recipients and implementers of policies in the field. Effective strategies must ensure that the policies designed by key drivers are participatory and empower these dependent groups, not the other way around. Actors such as the District Tourism Office (E3), UMKM Community (E6), and Traditional Leaders (E7), who are in the Linkage quadrant, act as crucial connectors that can bridge macro policies with implementation at the micro level.

Overall, this discussion shows that the strategy for managing sport tourism in the Mandeh Region must shift from a partial and organic approach to an adaptive and collaborative governance system led by the government but implemented synergistically with all stakeholders to ensure long-term sustainability. Previous research (Mollah et al., 2021) generally explains that the development of sports tourism requires collaborative involvement between the sports sector, tourism sector, and other sectors, as well as diverse stakeholders. Insights into stakeholder engagement and leadership highlight the need for a robust policy framework that encourages collaboration between local communities, tourism companies, and government agencies. Policies must be developed to support grassroots participation, promote environmentally friendly practices, and ensure fair benefit sharing to avoid marginalization. Additionally, regional differences in cultural and ecological contexts must be considered to tailor policies to local priorities and conditions (Gerber et al., 2025; Kumar et al., 2025). This heterogeneity increases tourism's dependence on strategic planning and local government resource allocation, reinforcing close ties with regional authorities (Yang et al., 2025).

Conclusions

This study analyzes sport tourism management strategies in the Mandeh Coastal Area as a case study for achieving sustainable development. Based on the comprehensive evaluation and multidimensional analysis conducted, a series of fundamental conclusions and relevant policy implications can be drawn. The findings above highlight a central paradox: the Mandeh region possesses superior hardware (natural assets and economic potential), yet is hindered by suboptimal software (managerial and institutional capacity). The “Highly Sustainable” status in the economic dimension reflects the organic dynamics emerging from the grassroots (community participation and SMEs) rather than the outcome of a planned management strategy. Institutional aspects in the socio-cultural dimension, such as the suboptimal participation of the community and the involvement of traditional leaders in several activities, as well as the “Moderately Sustainable” status in the environmental dimension, which is vulnerable to pressure, confirm that the current sustainability is fragile. The absence of formal organizational structures, clear division of tasks, and weak coordination are the main obstacles preventing the transformation of natural and economic potential into structured and highly resilient sustainable development. In other words, management that tends to be reactive and traditional is a bottleneck preventing the Mandeh Region from achieving professional and proactive management.

Based on the conclusions of the stakeholder analysis (Interpretive Structural Modeling - ISM), which identified the government (Ministries and Agencies) as a key driver with high driver power, future management strategies must focus on top-down intervention to strengthen the managerial foundation. The primary proposed strategic recommendation is the strengthening of a professional management institution. Specifically, it is urgent to establish a formal and professional Destination Management Organization (DMO). This organization must possess a clear mandate, be supported by regulations, and be responsible for formulation and implementation. Secondly, improving human resource capacity, namely addressing low scores on human resource indicators, must be a priority. Provincial and district governments need to initiate regular training and certification programs for local tourism operators, dive guides, homestay managers, and coastal youth groups. Training materials should cover sustainable tourism management, international service standards, and safety in sports tourism activities. Third, creating an investment and partnership climate: in line with the AHP findings highlighting the importance of seeking investors and sponsors, the government needs to design attractive and transparent investment schemes for private investors. This includes streamlining permits and providing accurate data on potential opportunities. Additionally, a strategic partnership model (public-private partnership) should be established to improve the quality of infrastructure and support the organization of national and international events.

Limitations and future research

Based on the research findings, the main limitations in the development of sport tourism in the Mandeh coastal area lie in several interrelated critical aspects, requiring a comprehensive and detailed future research agenda. Currently, destination management remains informal with an unstandardized organizational structure, exacerbated by weak coordination among policy makers and a lack of human resources with formal education in tourism. Supporting infrastructure is also inadequate, such as roads

requiring regular maintenance, the absence of street lighting, limited parking capacity, and simple piers. Additionally, sports events are held sporadically without a planned calendar, there is a lack of sponsor support, and no attractive investment schemes for the private sector, all of which hinder growth potential. In response to this challenge, future researchers must focus on designing and testing collaborative governance models such as Public-Private-Community Partnerships (PPCPs), as well as conducting in-depth studies on the ecological carrying capacity of the region to mitigate environmental impacts that show the lowest scores in sustainability analyses. Further research should also formulate effective capacity-building programs for local communities, identify signature events that align with the region's character to build a strong destination brand, and analyze policy frameworks and successful investment models in similar destinations to sustainably engage the private sector.

Declarations

Author contribution E.B; Conceptualization; Formal analysis; Validation; Supervision, D.R.S; Data Curation; Writing- Original Draft; Writing-Review & Editing, I.U; Methodology; Software; Visualization, P.M.I & H.S; Resources, T.R, T.S, A.S & B.C; Project Administration.

FundingThe authors would like to thank the Research and Community Service Institute of Padang State University for funding this research under contract number: 1531/UN35.15/2025.

Data availability statement The data that support the findings of this study are available from the corresponding author on reasonable request.

The author affirms the absence of any financial, non-financial, or other interests that mnay be construed as having influenced the findings or interpretations presented in this article.

Ethical approval All authors confirmed their agreement to be included in the study after being fully informed of its details.

Conflict of interest No conflict of interest.

References

1. Ackerman, R., Neuenfeldt, R., Eggermont, T., Burbidge, M., Lehrman, J., Wells, N., Wondolleck, J., & Fischer, A. P. (2025). Coastal Community Resilience: A Comparative Case Study in Oregon, USA. *Coastal Management*, *53*(3), 220–238. https://doi.org/10.1080/08920753.2025.2477853
2. Alhadi, Z., Zefnihan, Muchtar, B., & Evanita, S. (2023). Developing a Community-Based Tourism Model for Sustainable Tourism in the Mandeh Area, West Sumatra Province, Indonesia. *International Journal of Sustainable Development and Planning*, *18*(11), 3491–3503. https://doi.org/10.18280/ijsdp.181114
3. Asah, S. T., & Blahna, D. J. (2020). Involving Stakeholders' Knowledge in Co-designing Social Valuations of Biodiversity and Ecosystem Services: Implications for Decision-Making. *Ecosystems*,

23(2), 324–337. https://doi.org/10.1007/s10021-019-00405-6

4. Barlian, E., Umar, I., Dewata, I., Sari, S. M., Suciandica, M., Alifa Putri4, D. A. L., & Yuzandi, I. (2024). Priority Model Of Tourism Development In Pariaman City. *Journal of Sustainability Science and Management*, *19*(3), 110–122. https://doi.org/10.46754/jssm.2024.03.008
5. Başkent, E. Z., & Başkent, H. (2025). Integrating Technical, Socio-Economic, and Sustainability Dimensions for Spatial Stratification of Ecosystem Services Using the AHP Method. *Environmental Management*. https://doi.org/10.1007/s00267-025-02224-z
6. Bendtsen, E. B., Clausen, L. P. W., & Hansen, S. F. (2021). A review of the state-of-the-art for stakeholder analysis with regard to environmental management and regulation. In *Journal of Environmental Management* (Vol. 279). Academic Press. https://doi.org/10.1016/j.jenvman.2020.111773
7. Borah, A., Alex, R. K., Duarah, H., Kannankai, M. P., & Devipriya, S. P. (2025). Assessment of Awareness, Attitude, and Opinion of Indian Farmers on Microplastic Pollution in Agroecosystems. *Environmental Management*. https://doi.org/10.1007/s00267-025-02213-2
8. Chen, X., Yang, W., & Liu, Y. (2024). Recent Developments in China's Coastal Zone Management Legislation: An Appraisal. *Coastal Management*, *52*(6), 315–339. https://doi.org/10.1080/08920753.2024.2425473
9. Coghlan, A. (2025). Tourism growth versus fixing problems: in praise of understanding and valuing systems archetypes as a research tool. In *Journal of Sustainable Tourism*. Routledge. https://doi.org/10.1080/09669582.2025.2529336
10. Crabolu, G., Font, X., & Miller, G. (2024). The Hidden Power of Sustainable Tourism Indicator Schemes: Have We Been Measuring Their Effectiveness All Wrong? *Journal of Travel Research*, *63*(7), 1741–1760. https://doi.org/10.1177/00472875231195736
11. Dogru, T., Bulut, U., Kocak, E., Isik, C., Suess, C., & Sirakaya-Turk, E. (2020). The nexus between tourism, economic growth, renewable energy consumption, and carbon dioxide emissions: contemporary evidence from OECD countries. *Environmental Science and Pollution Research*, *27*(32), 40930–40948. https://doi.org/10.1007/s11356-020-10110-w
12. Eaton, W. M., Brasier, K. J., Burbach, M. E., Whitmer, W., Engle, E. W., Burnham, M., Quimby, B., Kumar Chaudhary, A., Whitley, H., Delozier, J., Fowler, L. B., Wutich, A., Bausch, J. C., Beresford, M., Hinrichs, C. C., Burkhart-Kriesel, C., Preisendanz, H. E., Williams, C., Watson, J., & Weigle, J. (2021). A Conceptual Framework for Social, Behavioral, and Environmental Change through Stakeholder Engagement in Water Resource Management. In *Society and Natural Resources* (Vol. 34, Issue 8, pp. 1111–1132). Routledge. https://doi.org/10.1080/08941920.2021.1936717
13. Fatimah, S., Ramadhan, D., & Susanti, R. (2020). *Local Wisdom in Supporting Sustainable Tourism in the Mandeh Region, Pesisir Selatan, West Sumatra*. 341–346. https://doi.org/10.5220/0010021203410346
14. Fatimah, S., Syafrini, D., Yuliana, Y., Antomi, Y., Patra, H., & Mohamad Sharif, S. (2025). The Hidden Paradise; gap and culture shock in the transformation of a fishing villages into a tourism hotspots in

Mandeh region, Indonesia. *Cogent Arts and Humanities*, *12*(1). https://doi.org/10.1080/23311983.2025.2533596

15. Febriandi, Fatimah, S., Triyatno, Hermon, D., Putra, A., Mutmainah, H., Arifin, T., & Akhwady, R. (2025). Predicting Of Land Cover Changes Until 2030 And Assessing Sustainability Status In The Mandeh Region, Indonesia. *Geographia Technica*, *20*(1), 263–280. https://doi.org/10.21163/GT_2025.201.18
16. Gerber, E., Fournier, J., Salim, E., Fragnière, E., & Kebir, L. (2025). Systems thinking to adapt tourism to climate change: Application to summer glacier skiing in Switzerland. *Annals of Tourism Research Empirical Insights*, *6*(1). https://doi.org/10.1016/j.annale.2025.100172
17. González-Morcillo, S., Horrach-Rosselló, P., Valero-Sierra, O., & Mulet-Forteza, C. (2023). Forgotten effects of active tourism activities in Spain on sustainable development dimensions. *Environment, Development and Sustainability*, *25*(10), 10743–10763. https://doi.org/10.1007/s10668-022-02503-3
18. Husna, R., Permata Sari, M., & Dwi Septivani, M. (2022). Tourism Hospitality in Mandeh Tourism Development in Pesisir Selatan Regency, WestSumatra. *Proceeding Applied Business and Engineering Conference*.
19. Jain, P., Jain, N., Bhati, N. S., & Totuka, A. (2025). Psychological Determinants of Environmental Conservation Behavior: Unveiling Key Influencing Factors. *Environmental Management*. https://doi.org/10.1007/s00267-025-02212-3
20. Kemenparekraf. (2020). *Rencana Strategis Kementerian Pariwisata dan Ekonomi Kreatif/Badan Pariwisata dan Ekonomi Kreatif Tahun 2020-2024*.
21. Kumar, V., Agarwala, T., & Kumar, S. (2025). Rural tourism as a driver of sustainable development: a systematic review and future research agenda. In *Tourism Review*. Emerald Publishing. https://doi.org/10.1108/TR-03-2024-0172
22. Liu, C., Li, J., Mi, S., & Zhang, Z. (2025). Rethinking perceived destination aesthetic quality: Formative measurement development and validation in the rural tourism context. *Journal of Destination Marketing and Management*, *38*. https://doi.org/10.1016/j.jdmm.2025.101035
23. Mariyam, D., Gulati, S., & Karanth, K. K. (2025). Contradictions in Conservation: Education, Income, and the Desire to Live Near Forest Ecosystems. *Environmental Management*. https://doi.org/10.1007/s00267-025-02233-y
24. Mollah, M. R. A., Cuskelly, G., & Hill, B. (2021). Sport tourism collaboration: a systematic quantitative literature review. *Journal of Sport and Tourism*, *25*(1), 3–25. https://doi.org/10.1080/14775085.2021.1877563
25. Özgider, C., & Koçak, M. S. (2025). What motivates fans from different nationalities to travel internationally to attend major sports events? An analysis based on the UEFA Euro 2016 Football Championship. *Journal of Sport and Tourism*. https://doi.org/10.1080/14775085.2025.2534936
26. Paarlberg, A., Sena, G., Loc, H. H., & Schultner, J. (2025). Understanding Stakeholder Perspectives on the Implementation and Management of Riparian Buffer Zones in the Santa Lucía River Basin, Uruguay. *Environmental Management*. https://doi.org/10.1007/s00267-025-02230-1

27. Panzarella, F., Cappuyns, V., Abelshausen, B., & Turcanu, C. (2025). Integrating the community capitals framework for sustainable remediation of NORM- and TENORM-contaminated sites: The Case of Crotone, Italy. *Environmental Management*. https://doi.org/10.1007/s00267-025-02223-0
28. Putra, A., Hermon, D., Yulius, Prarikeslan, W., Syarief, A., Ridwan, N. N. H., Arifin, T., Febriandi, Damanhuri, H., Widodo, T., & Dermawan, A. (2024). Assessment Of Seawater Quality And Environmental Sustainability For Shipwreck Diving Tourism: A Case Study Of Mv Boelongan Nederland In Mandeh Bay, Indonesia. *Geography, Environment, Sustainability*, *17*(4), 171–182. Https://Doi.Org/10.24057/2071-9388-2024-3469
29. Ramos-Ruiz, J. E., Muñoz-Fernández, G. A., García García, L., & Arteaga Sánchez, R. (2025). Pedalling towards satisfaction: the power of motivation and emotions in shaping tourism perception in cycle tourism events. *Journal of Sport and Tourism*. https://doi.org/10.1080/14775085.2025.2503349
30. Salem, I. E., Elbaz, A. M., Omeish, F., Essam, E., & Magdy, A. (2025). Eco-wise travels: cultivating regenerative tourism through eco-literacy, net-zero commitment and pro-environment attitudes. *Tourism Review*. https://doi.org/10.1108/TR-10-2024-0957
31. Sarmiento Barletti, J. P., Larson, A. M., Hewlett, C., & Delgado, D. (2020). Designing for engagement: A Realist Synthesis Review of how context affects the outcomes of multi-stakeholder forums on land use and/or land-use change. In *World Development* (Vol. 127). Elsevier Ltd. https://doi.org/10.1016/j.worlddev.2019.104753
32. Silisna, B. El, & Susanti, R. (2020). Sport Tourism Event of Tour De Singkarak to Support Destination Management in West Sumatera, Indonesia. *Journal of Tourism*, *7*(1), 55–72. http://ojs.unud.ac.id/index.php/eot55http://ojs.unud.ac.id/index.php/eot56
33. Skilton, A. L., Osland, A. C., Willis, E., Shao, C., Reed, K., Vidrine, B., & Vo, T. (2024). Watching it Wash Away, Watching it Grow: Evaluating Community Perspectives on Long-Term Coastal Restoration Projects in Louisiana. *Coastal Management*, *52*(6), 395–414. https://doi.org/10.1080/08920753.2024.2440947
34. Stoll, J. A., Dixon, A. W., Goldsmith, A. L., Andrew, D. P. S., & Chelladurai, P. (2020). Sport tourism entity desired outcomes. *Journal of Sport and Tourism*, *24*(3), 195–213. https://doi.org/10.1080/14775085.2020.1822201
35. Then, J., Felisa, H., & Irene, N. (2020). *Sustainable Tourism Development in the Mandeh Tourism Area, Padang, West Sumatra*.
36. Umar, I. (2022). Evaluation of the suitability of marine tourism in the Mandeh Archipelago, West Sumatra. *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan*, *12*(2), 259–267. https://doi.org/10.29244/jpsl.12.2.259-267
37. United Nation World Tourism Organization. (2019). Sport Tourism and the Sustainable Development Goals (SDGs). In *Sport Tourism and the Sustainable Development Goals (SDGs)*. World Tourism Organization (UNWTO). https://doi.org/10.18111/9789284419661
38. Vahdat, R., Farsani, N. T., Naeini, M. A. S., & Bahadori, S. R. (2025). Sustainable Sport Tourism on the Erg Landforms of the Iran Desert Ecosystem. *Geoheritage*, *17*(2). https://doi.org/10.1007/s12371-

025-01097-2

39. Wang, C. M., & Wu, T. P. (2022). Does tourism promote or reduce environmental pollution? Evidence from major tourist arrival countries. *Environment, Development and Sustainability*, *24*(3), 3334–3355. https://doi.org/10.1007/s10668-021-01568-w
40. Xu, N., & Li, H. (2025). Towards management of sustainable tourism development in coastal destinations of the Bohai Rim: insights from a tourism carrying capacity analysis. *Discover Sustainability*, *6*(1). https://doi.org/10.1007/s43621-025-00951-1
41. Yang, L., Yang, Y., Huang, X., & Yan, K. (2025). From words to growth: Unveiling government attention to tourism from natural language processing. *Tourism Management*, *112*. https://doi.org/10.1016/j.tourman.2025.105264
42. Zefnihan, Z. A. (2018). Community-based tourism development voewed from economic, sosial culture and environment aspects in mandeh's integrated marine tourism area. *MATEC Web of Conferences*, *229, 01006*. https://doi.org/10.1051/6
43. Zhang, Y., Xiong, Y., Lee, T. J., Ye, M., & Nunkoo, R. (2021). Sociocultural Sustainability and the Formation of Social Capital from Community-based Tourism. *Journal of Travel Research*, *60*(3), 656–669. https://doi.org/10.1177/0047287520933673
44. Zhong, J., Xie, H., & Lin, Z. (2025). Pathways to High-Quality Tourism Development: An Integrated Analysis of Factor Endowment, Digital Transformation, and Institutional Quality. *Journal of Travel Research*. https://doi.org/10.1177/00472875251349238

Figures

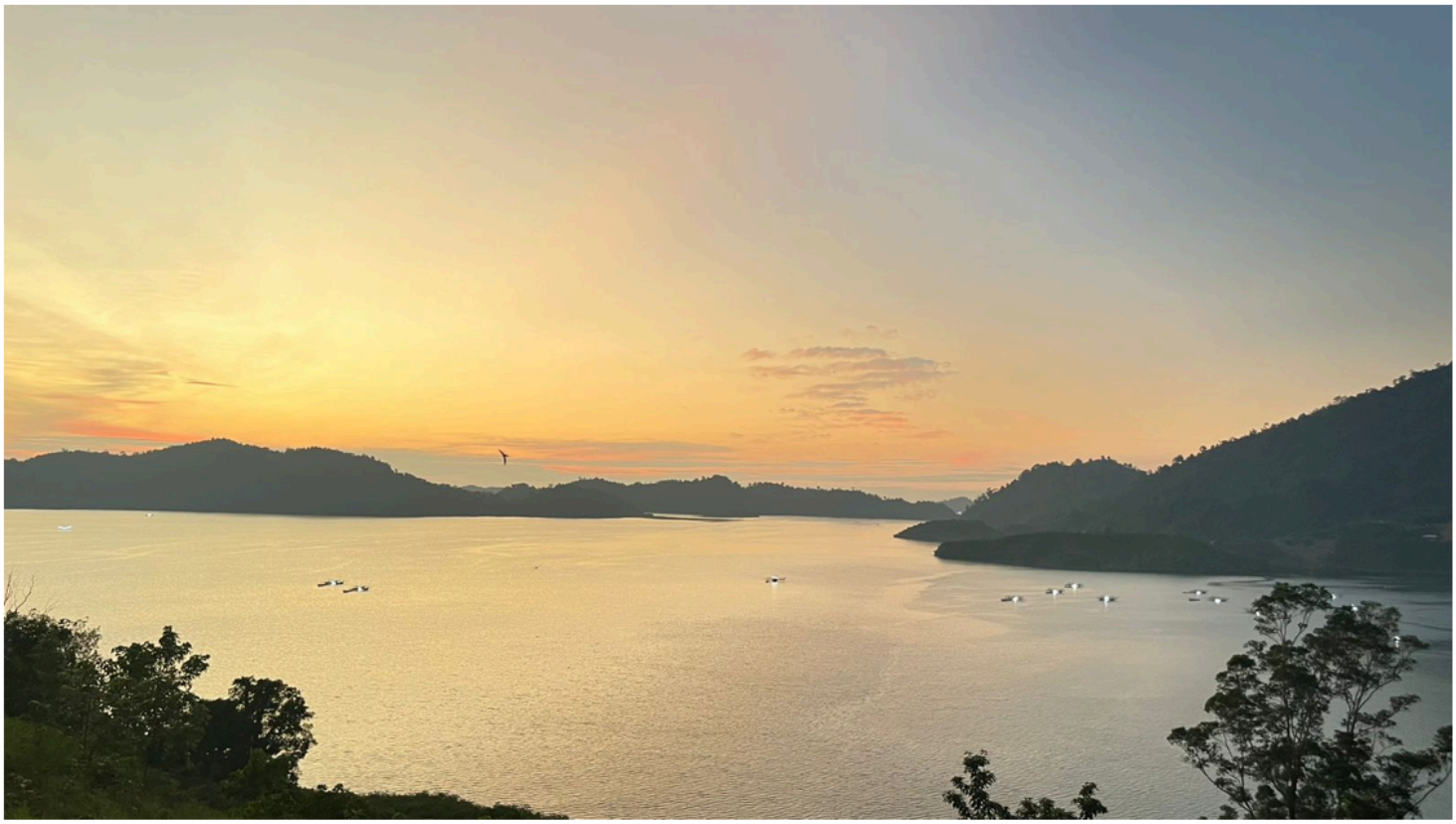

Figure 1

The maritime landscape of Mandeh, presenting a panoramic spectacle of the sea

Source: Author, taken in 2025





Figure 2

(a) Underwater Scenic Beauty, (b) The wreck of the Dutch merchant vessel, MV Boelongan

Source: http://infosumbar.net/



Figure 3

(a, b) Location for exploring the islands in Mandeh

Source: Author, taken in 2025



Figure 4

(a,b) Water sports activities in Mandeh are jet skiing and banana boating

Source: https://berita.pesisirselatankab.go.id

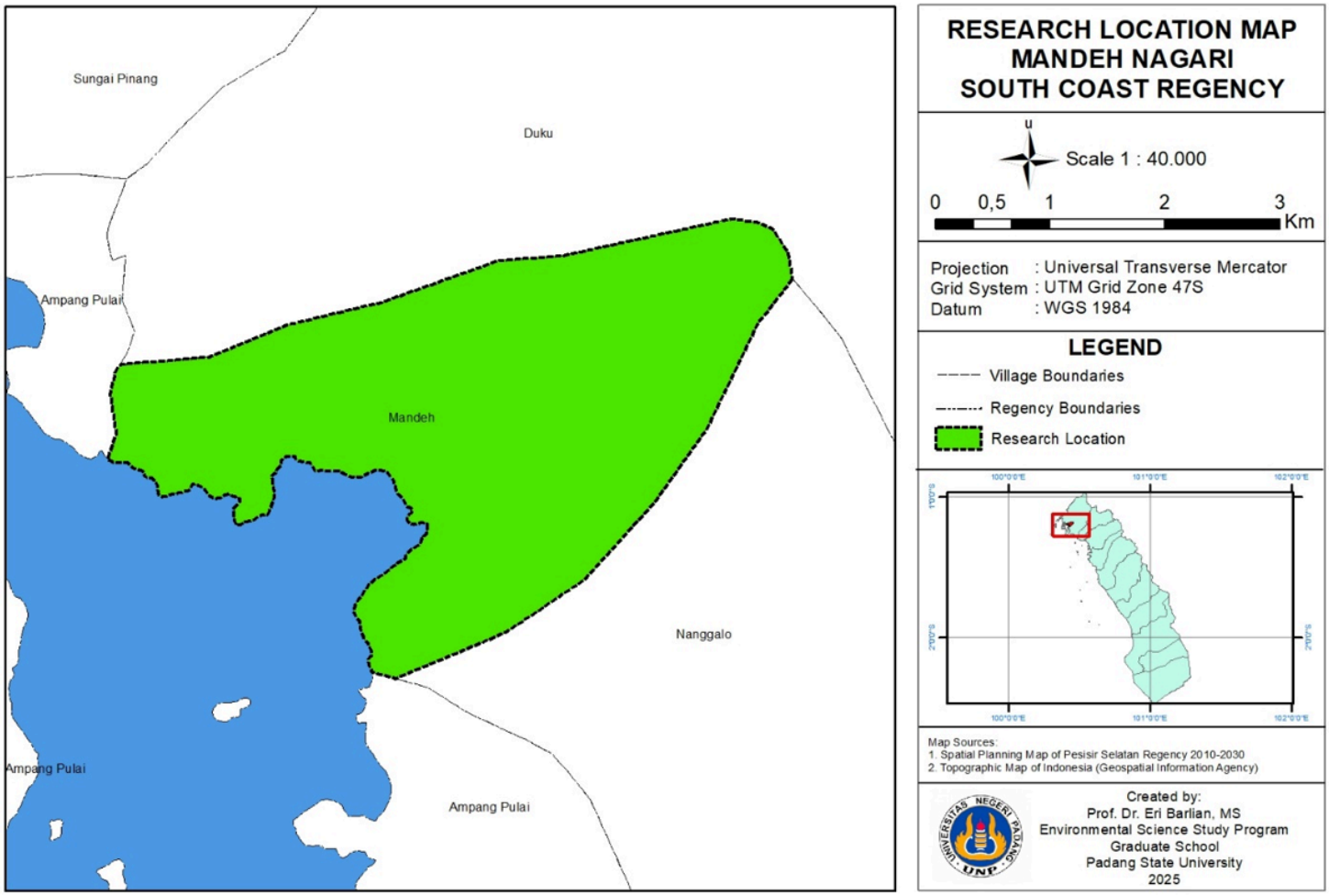

Figure 5

Map of the study area

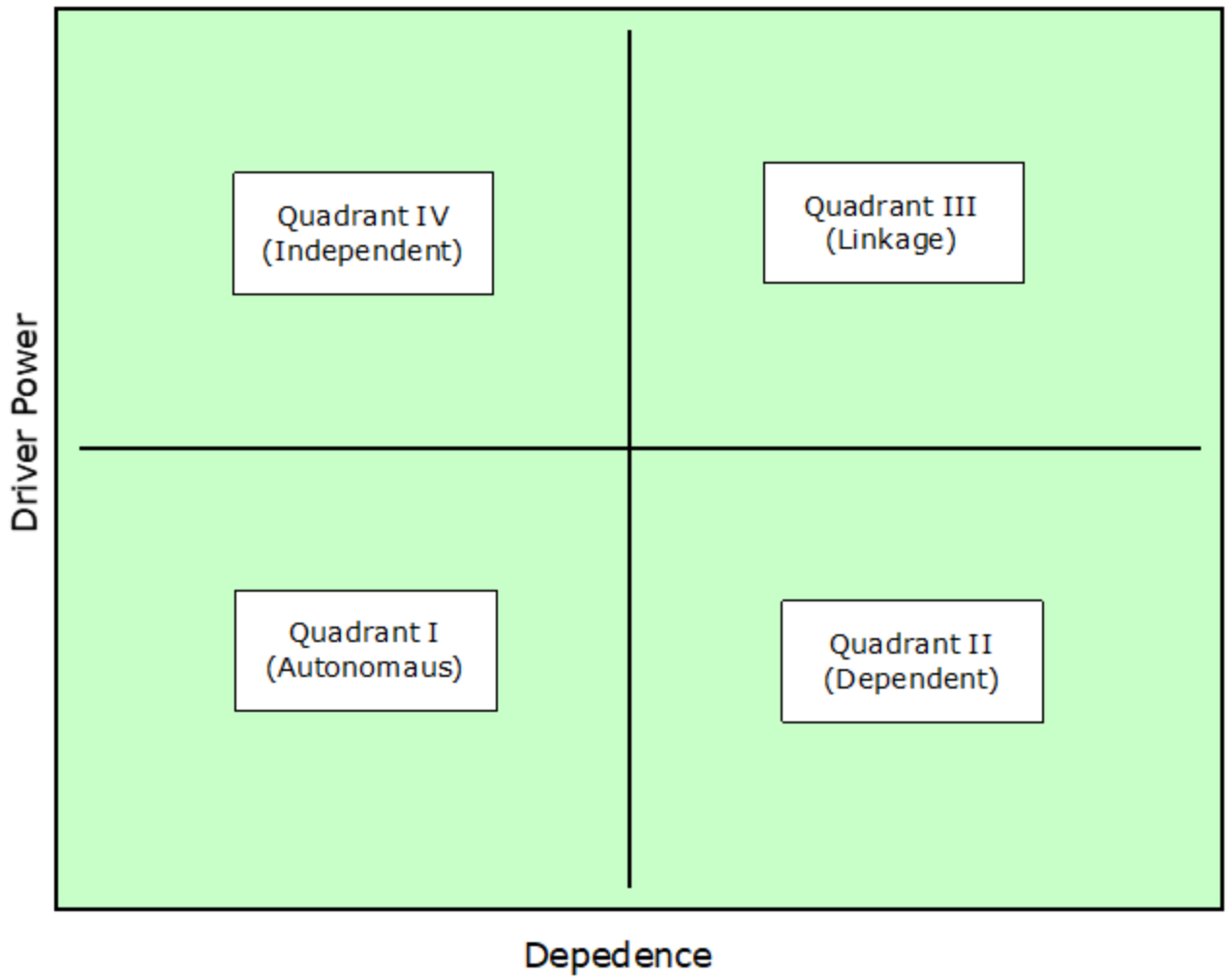

Figure 6

Quadrant of the driver power-dependence matrix

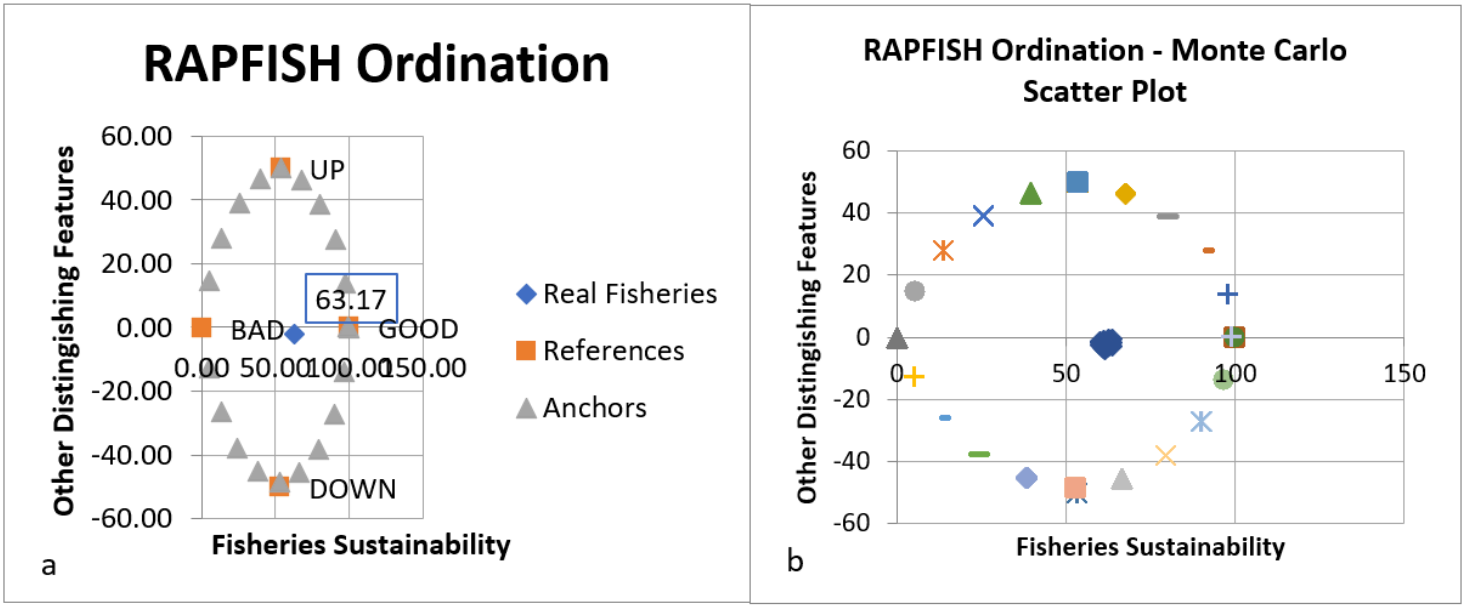

Figure 7

(a) Rapish analysis of the socio-cultural dimension, **(b)** Monte carlo analysis pf the socio-cultural dimension

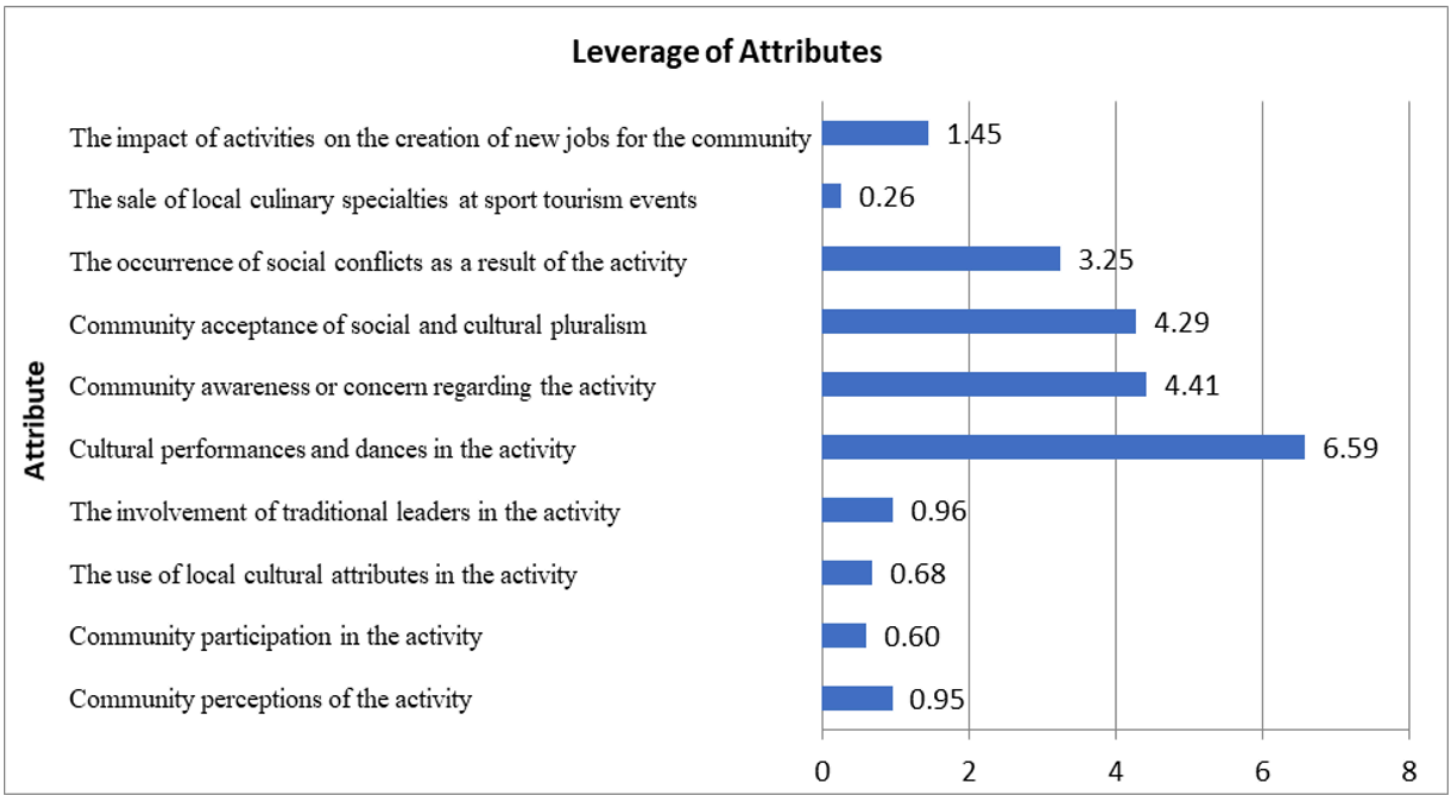

Figure 8

Results of the Leverage analysis on the socio-cultural dimension

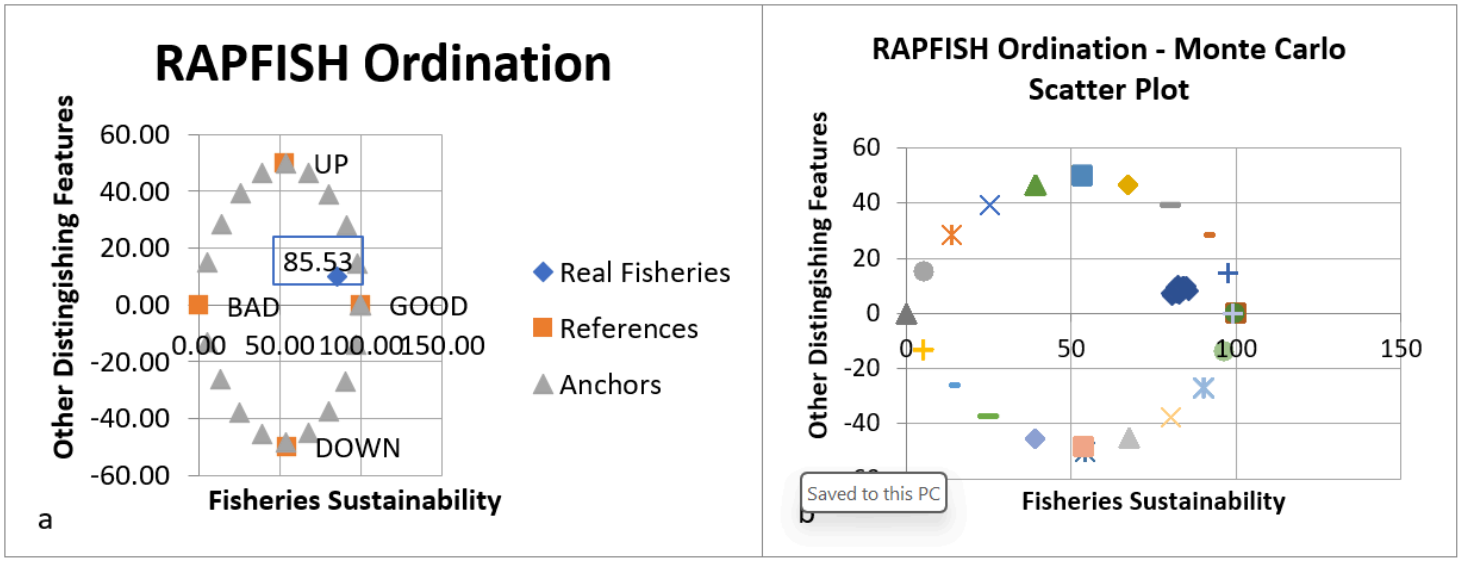

Figure 9

(a) Rapfish analysis of the economic dimension, **(b)** Monte Carlo analysis of the economic dimension

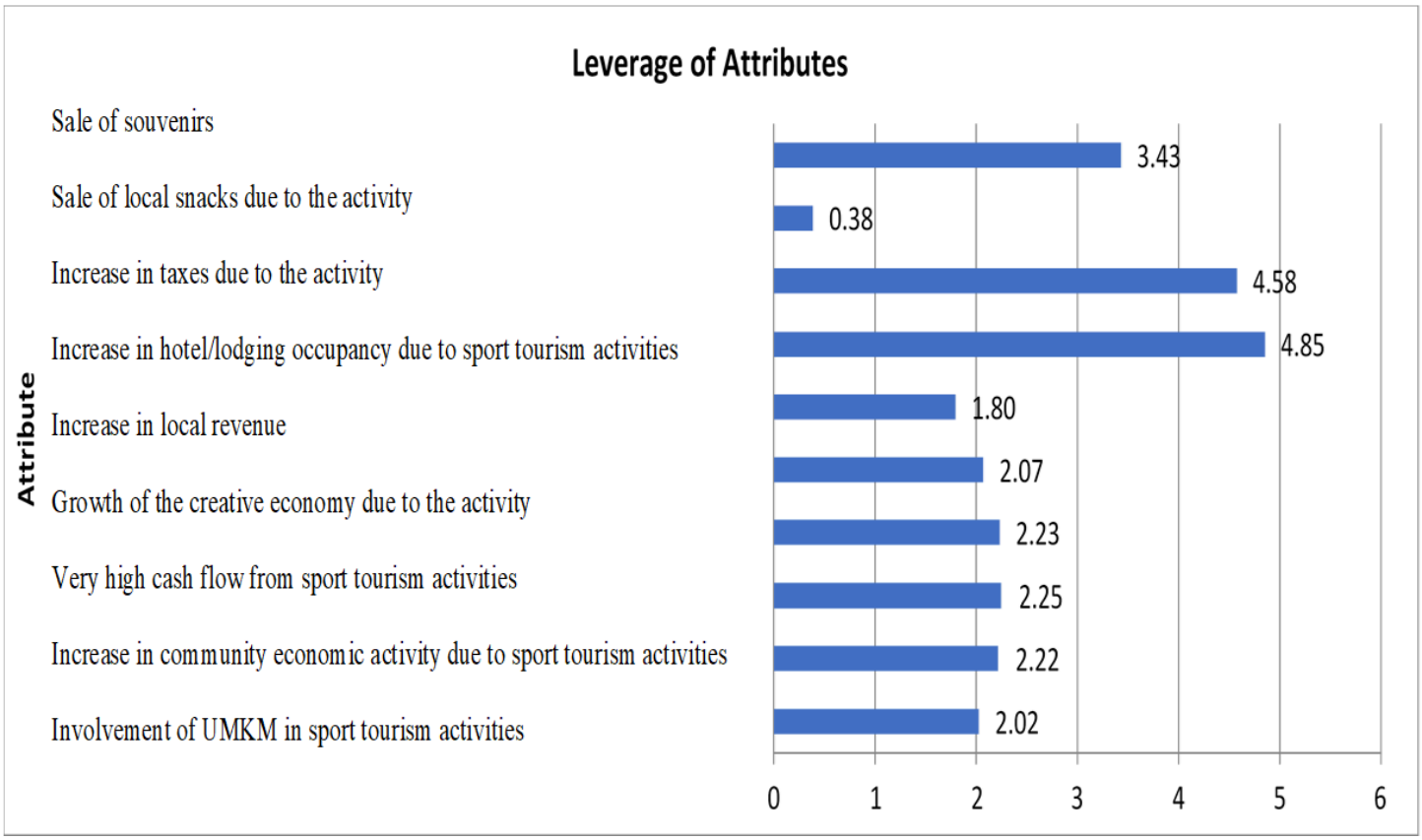

Figure 10

Results of the Leverage analysis on the economic dimension

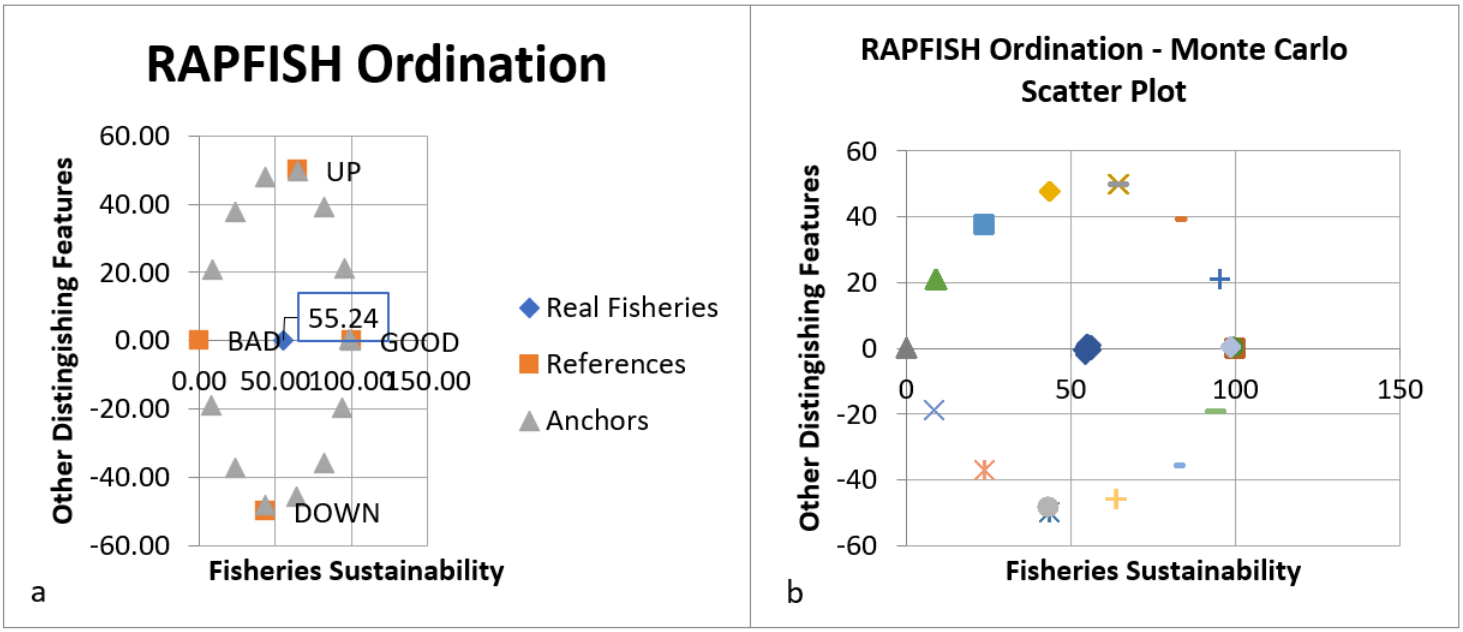

Figure 11

(a)) Rapfish analysis of the environmental dimension, **(b)** Monte Carlo analysis of environmental dimension

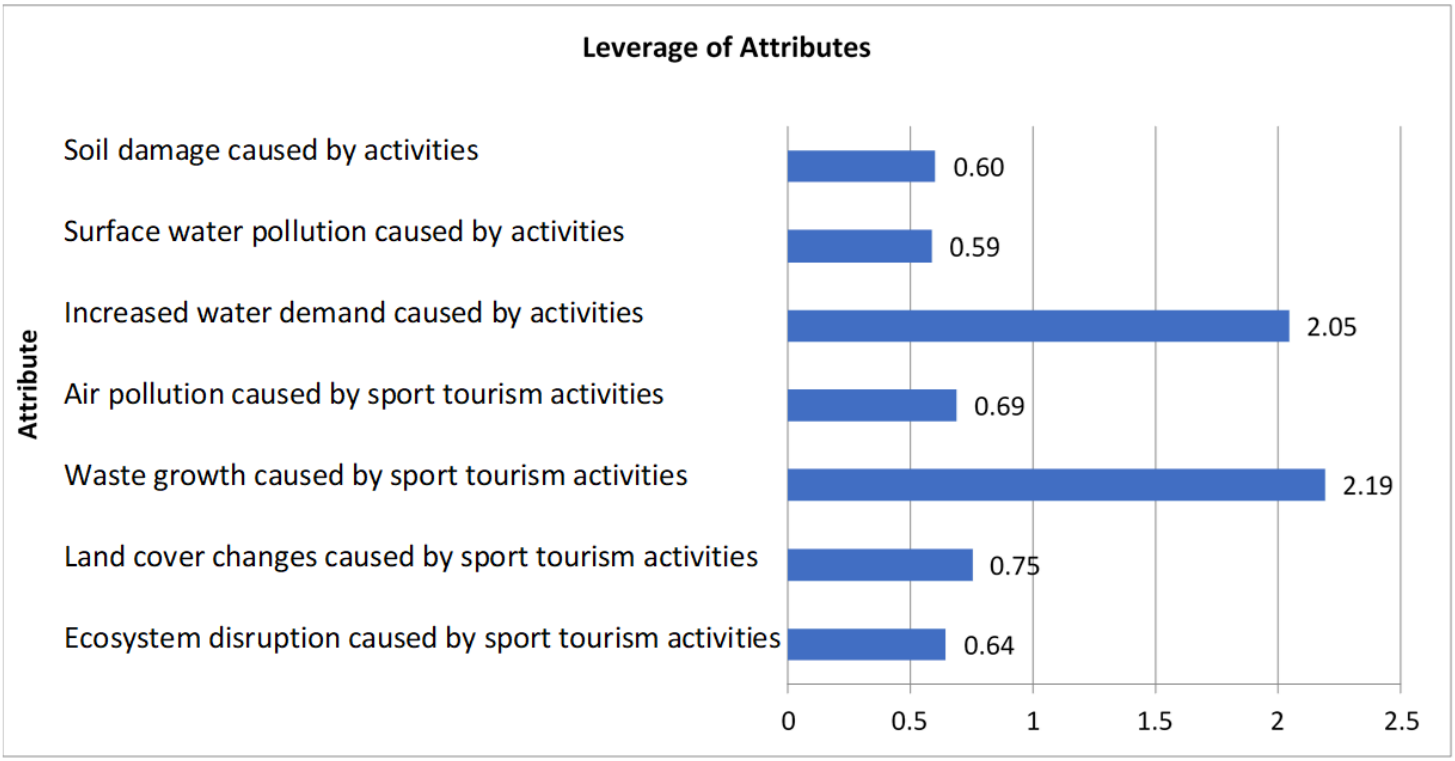

Figure 12

Results of the Leverage analysis on the environmental dimension

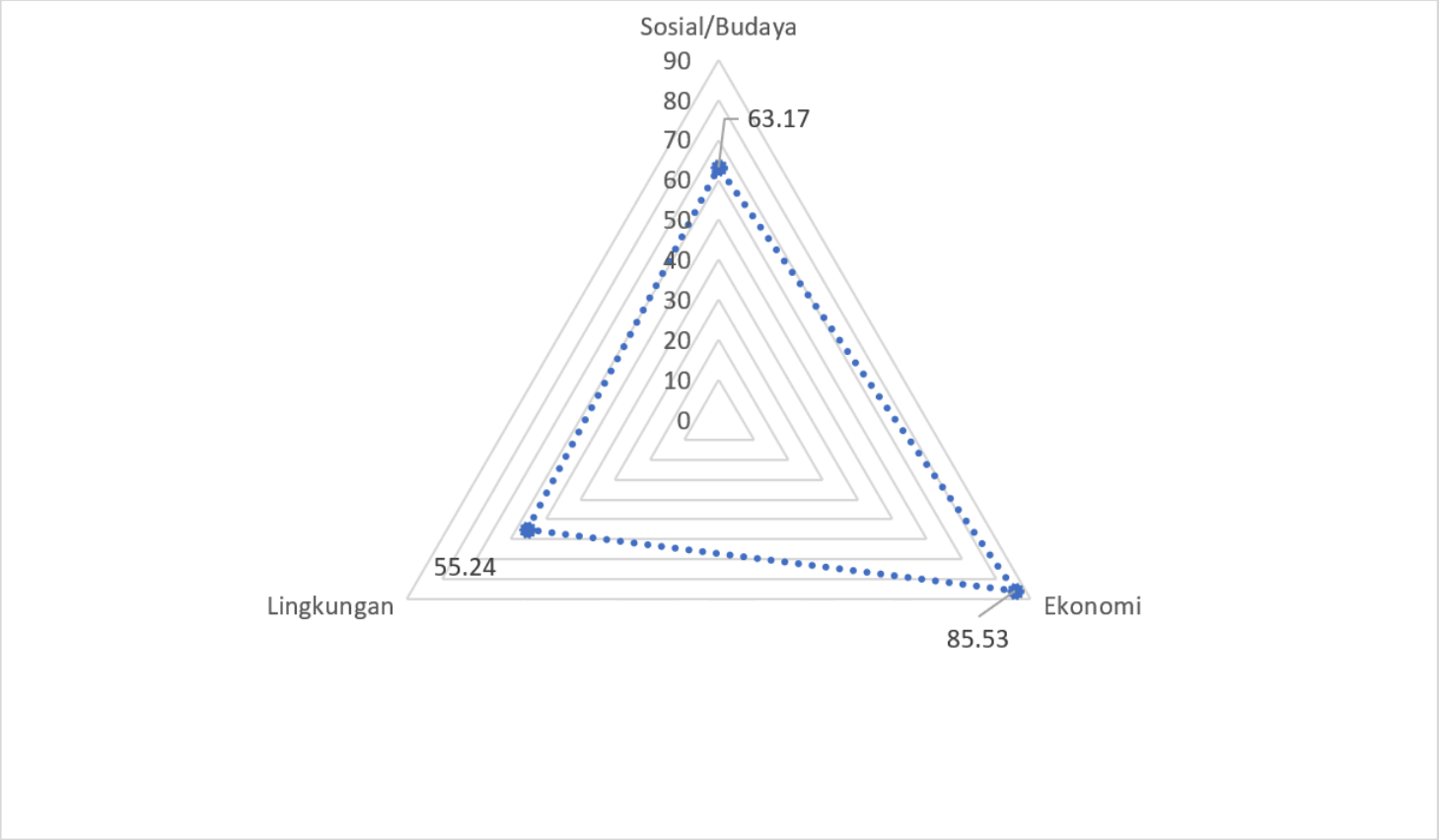

Figure 13

Sustainability status kite diagram

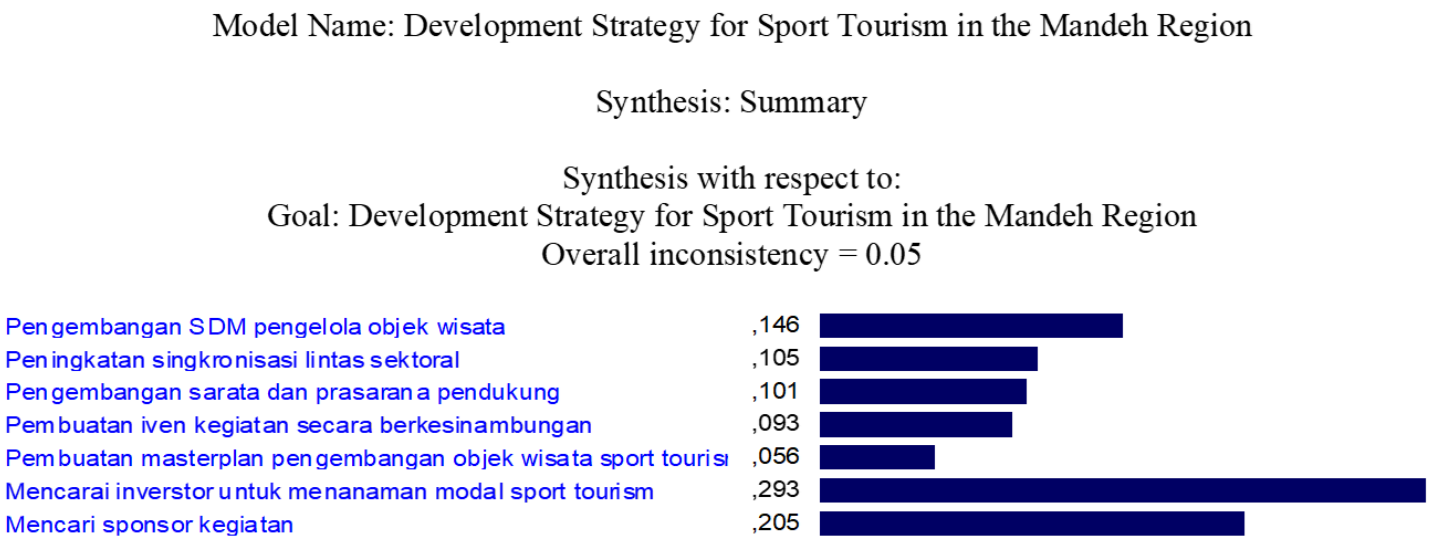

Figure 14

AHP graph on sport tourism development strategies

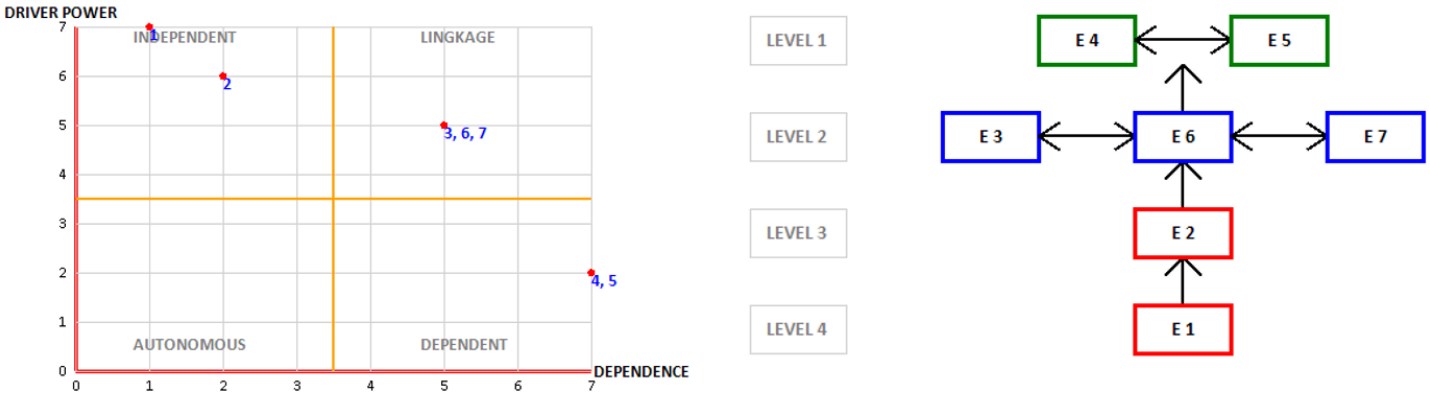

Figure 15

(a) Matrix of the relationship between driving power (DP) abd dependence (D), **(b)**Hierarchical structure of stakeholders