



## Sport tourism in the Seribu Islands area is based on outdoor activities to improve the community's economy through the blue economy concept

*El turismo deportivo en la zona de las Islas Seribu se basa en actividades al aire libre para mejorar la economía de la comunidad a través del concepto de economía azul*

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### Abstract

**Introduction:** sport tourism in kepulauan seribu had developed as a promising sector that combined natural beauty with recreational activities. However, the sustainability of its growth depended on understanding both tourist satisfaction and managerial challenges.

**objective:** this study aimed to analyze the factors influencing sport tourism attractiveness and satisfaction in kepulauan seribu, integrating the perspectives of managers and visitors to provide strategic recommendations for sustainable development.

**methodology:** a mixed-methods sequential explanatory design was applied, beginning with quantitative data from 285 respondents through online questionnaires, followed by qualitative semi-structured interviews with key informants. Data analysis included descriptive statistics, exploratory factor analysis, regression testing, and thematic interpretation to triangulate findings.

**results:** four main factors were identified, namely natural beauty and panorama, infrastructure and public facilities, sports facilities, and sport tourism experiences. Regression analysis confirmed that all factors had significant positive effects on tourist satisfaction, with natural beauty as the strongest predictor ( $\beta = 0.42$ ). Qualitative data emphasized infrastructure limitations and safety issues as persistent challenges.

**discussion:** the results were consistent with prior tourism studies highlighting the balance between natural attractions, infrastructure readiness, and diverse recreational options. The inclusion of local voices enriched the understanding of sustainability concerns often overlooked in quantitative surveys.

**conclusions:** it is concluded that sustainable sport tourism in kepulauan seribu can only be achieved through the preservation of natural capital, improved infrastructure, enhanced safety standards, diversification of activities, and active community involvement.

### Keywords

Community involvement; infrastructure; natural beauty; sport tourism; sustainability.

### Resumen

**Introducción:** el turismo deportivo en las islas seribu se había consolidado como un sector prometedora que combinaba la belleza natural con actividades recreativas. Sin embargo, la sostenibilidad de su crecimiento dependía de comprender tanto la satisfacción de los visitantes como los desafíos de gestión.

**Objetivo:** este estudio tuvo como propósito analizar los factores que influyeron en la atracción y la satisfacción del turismo deportivo en las islas seribu, integrando las perspectivas de gestores y visitantes para ofrecer recomendaciones estratégicas de desarrollo sostenible.

**Metodología:** se aplicó un diseño mixto secuencial explicativo, que comenzó con la recolección de datos cuantitativos mediante cuestionarios en línea a 285 encuestados, seguido de entrevistas semi-estructuradas con informantes clave. El análisis incluyó estadística descriptiva, análisis factorial exploratorio, regresión y análisis temático para triangular los hallazgos.

**Resultados:** se identificaron cuatro factores principales: belleza natural y panorama, infraestructura y servicios públicos, instalaciones deportivas y experiencias de turismo deportivo. El análisis de regresión confirmó que todos los factores tuvieron efectos positivos y significativos en la satisfacción de los visitantes, siendo la belleza natural el predictor más fuerte ( $\beta = 0,42$ ). Los datos cualitativos resaltaron limitaciones de infraestructura y problemas de seguridad como desafíos persistentes.

**Discusión:** los resultados fueron consistentes con estudios previos de turismo que destacaban el equilibrio entre atractivos naturales, preparación de la infraestructura y diversidad de opciones recreativas. La inclusión de voces locales enriqueció la comprensión de la sostenibilidad, a menudo ausente en los estudios cuantitativos.

**Conclusiones:** se concluye que el turismo deportivo sostenible en las islas seribu solo puede lograrse mediante la preservación del capital natural, la mejora de la infraestructura, el fortalecimiento de los estándares de seguridad, la diversificación de actividades y la participación activa de la comunidad.

### Palabras clave

Belleza natural; infraestructura; participación comunitaria; sostenibilidad; turismo deportivo.

## Introduction

The background of this research is that the tourism sector in the Seribu Islands, as part of the Special Region of Jakarta, has the potential for unique marine natural resources, such as coral reefs, biodiversity, and white sandy beaches. However, tourism development in this region has not been optimal, especially in utilizing the Global Sport Tourism trend which is projected to generate revenues of up to 18.7 trillion by 2030 (Alamri, 2025). The tourism sector, whose development is located in the region, is based on special policies with the characteristics of a region, taking into account natural resources, human resources, and institutions (Fadilla, 2024; Gerasymenko et al., 2024; Shelemetieva et al., 2022; Zúñiga-Collazos et al., 2024).

Indonesia is an archipelagic country with approximately 17,508 islands and a maritime nation that relies on tourism for its economy (Amanda et al., 2024; Dewi et al., 2024; Suryani, 2017). Indonesian tourism currently consists of nature tourism and cultural tourism. One of Indonesia's tourism potentials that is currently starting to develop is sports tourism, which is a tourism activity carried out while exercising (I Dewa Gede Atmadja, 2022; Purwanto et al., 2024; Sudarmanto et al., 2024). The high economic turnover of sports tourism activities has led various countries to compete to develop the potential of sports tourism as a strategic tool for economic development and improve their global image by creating new jobs (Getu & Amelia, 2023; Levyda, 2020; Raso & Cherubini, 2023). This aligns with the objectives of the Sustainable Development Goals (SDGs), particularly Goal 8, which aims to promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.

Today, sport is an inseparable activity in modern society, influencing various aspects of life, from social interaction to economic development (Bazić, 2018; Berch, 2023; Penezić, 2020). The purpose of sports tourism is to gain new experiences while traveling (Arisman et al., 2024). The development of tourist areas will impact the surrounding natural environment. A new breakthrough is needed with the development carried out, still making a tourism area grow without damaging the surrounding natural environment. Sports tourism can utilize the natural resources of an area, developed as a place that can be used for sustainable sports tourism, improving the local economy and community welfare (Morfoulaki et al., 2023; Quinta-Nova, 2024; Shahzeidi & Moghimehfar, 2024; Sudarmanto et al., 2024). Research conducted by Hu et al. (2024) shows a symbiotic relationship between the sports and tourism industries, emphasizing the interconnectedness of the two and having positive implications for economic and environmental sustainability. One of the sports tourism activities that can be done is outdoor activities. Outdoor activities involve interaction with nature or the external environment, and are intended for recreation, adventure, and tourism (Hernawan, 2017). Outdoor activities not only enhance the tourism experience but also contribute significantly to the local economy (Jiménez-Martín & Gómez-Encinas, 2008; Perić et al., 2019).

Based on research by Ahmad Firza Fauzan & Agussalim Burhanuddin (2023), the Thousand Islands have great potential as a tourist destination, thanks to their coral reef ecosystems, marine biodiversity, and beautiful beaches. The Thousand Islands, part of the Special Region of Jakarta, have various transportation accesses that support the development of tourism areas, particularly sports tourism. Based on research, sports tourism is a significant driver of economic growth, as it attracts tourists who spend on accommodation, food, and other services, thereby boosting the local economy (Ridho Bastanta Tarigan et al., 2024). Another study Morfoulaki et al. (2023) reveals that sports tourism contributes to SDG 8 by promoting sustainable, inclusive, and sustained economic growth, creating new business opportunities, and generating employment. This fosters economic activities related to tourism and sports, which can lead to full and productive employment. The findings highlight that the growth of sports tourism can stimulate the local economy and improve the overall economic landscape of a destination, aligning with the goal of decent work for all while supporting sustainable development initiatives in the region. Based on this potential, the development of sports tourism in the Thousand Islands can be combined with technology-based outdoor activities, prioritizing environmentally friendly and sustainable activities, while still aiming to improve the community's economy (Ahmad Firza Fauzan & Agussalim Burhanuddin, 2023; Gharibpoor et al., 2024; HIDAYAT et al., 2023; Hu et al., 2024; Sudarmanto et al., 2024). This is in line with one of the ideals proclaimed by the current government, especially the mission of "Downstreaming and Industrialization for Economic Added Value," which focuses on natural resources to increase economic added value. This step is expected to encourage sustainable economic growth and



increase the competitiveness of Indonesian products in the global market. The use of technology in tourism and recreation activities will create an interesting experience for visitors, especially those who want to enjoy recreation in a particular country (Lee et al., 2021).

Based on the problems encountered and the concepts to be developed, this study aims to identify and analyze in depth the potential and challenges of sports tourism development in the Seribu Islands, taking into account the principles of sustainability and the blue economy. The analysis focuses on five key aspects identified in the documentation: (1) pier accessibility and operations, (2) passenger service facilities, (3) local hospitality and interaction, (4) logistics and supporting accommodation, and (5) environmental management and cleanliness. This approach is crucial to ensure that tourism development not only provides economic benefits but also preserves marine ecosystems and empowers local communities. This study adopts a comprehensive analytical framework to evaluate the suitability of marine tourism and environmental carrying capacity, particularly for coastal recreational activities, to assess the potential attractions and limitations of sustainable development. Outdoor activity-based sports tourism in the Seribu Islands can provide significant benefits to local communities, both socially and economically, although it is important to be aware of potential negative impacts on the environment and local communities. Therefore, a holistic development strategy is needed, considering community involvement and resource efficiency to minimize waste and maximize diverse incomes.

## Method

### *Research Design*

This study employed a mixed-methods sequential explanatory design, where the quantitative phase served as the primary basis for analysis and the qualitative phase was used to clarify, deepen, and contextualize the quantitative findings. The sequential structure ensured that qualitative interviews directly addressed unclear or inconsistent patterns identified in the survey results. The quantitative phase consisted of a structured questionnaire designed to map perceptions of destination attractiveness, facility quality, sports participation, and satisfaction. The qualitative phase consisted of semi-structured interviews that explained inconsistencies—especially regarding the roles of tourism managers, local residents, and tourists—and captured contextual insights not measurable by the survey. This approach was chosen to obtain a comprehensive understanding: quantitative findings provided measurable patterns of perceptions and satisfaction, while qualitative narratives enriched interpretation by addressing role differences, operational challenges, and sustainability concerns.

### *Participants*

Respondents in this study consisted of three groups who were directly involved in sports tourism activities in Kepulauan Seribu: tourists, tourism managers (including operators, owners, and service providers), and local residents. Given that several sections of the questionnaire contained consumer-oriented items—such as satisfaction with snorkeling activities or participation in specific sports—the survey was intentionally administered in two different versions to ensure conceptual alignment.

Version A, designed for tourists, included items related to destination attractiveness, facility quality sports activities undertaken, and overall satisfaction. Version B, administered to tourism managers and local residents, focused on destination attractiveness, infrastructure conditions, and the readiness of sports facilities, without including consumer-experience items. This separation allowed each respondent group to answer only the questions relevant to their role, thereby maintaining methodological consistency and preventing misinterpretation or invalid responses due to misaligned questionnaire content.

### *Research Instruments*

Two primary instruments were employed in this study: a structured questionnaire administered through Google Forms and a set of semi-structured interviews. The questionnaire was developed based on sport tourism literature, destination attractive frameworks, infrastructure quality indicators, and constructs related to sport participation and tourist satisfaction. It consisted of four main sections: (1) respondents' profile, (2) destination attractiveness, (3) infrastructure and facility readiness, and (4)

sport participation and satisfaction (tourists only). Several indicators were adapted and contextualized to reflect the characteristics of Kepulauan Seribu.

Prior to large-scale distribution, the instrument underwent a validation process to ensure psychometric adequacy. First, content validity was assessed through expert review by three scholars in sport tourism and tourism management, who evaluated item relevance, clarity, and contextual appropriateness. Second, the questionnaire was pilot tested with 30 respondents to identify ambiguities and improve wording. Third, construct validity was examined using Exploratory Factor Analysis (EFA). Sampling adequacy was confirmed ( $KMO=0.81$ ; Bartlett's Test  $p<0.001$ ), indicating suitability for factor analysis. All extracted factors demonstrated acceptable internal consistency, with Cronbach's Alpha coefficients exceeding 0.70.

These procedures ensured that the instrument met established standards of validity and reliability. Semi-structured interviews were subsequently conducted with purposely selected representatives from each stakeholder group (tourist, managers, and local residents). An interview guide was developed based on quantitative findings requiring clarification, particularly regarding infrastructure limitations and sustainability concerns. All interviews were conducted with informed consent, recorded, transcribed verbatim, and analyzed using thematic analysis.

### **Procedures**

Data collection was carried out in July 2025 in Kepulauan Seribu (DKI Jakarta) using two complementary methods: an online questionnaire and on-site or virtual semi-structured interviews. The process began with coordination with local tourism managers and community leaders to obtain research permission, ensure respondent accessibility, and secure community support. The online questionnaire was distributed through a Google Forms link to eligible participants – tourism managers, local residents, and tourists-who completed the survey independently based on their perceptions and experiences related to sports tourism in the area.

Following the quantitative phase, qualitative data were collected through semi-structured interviews with purposely selected managers, residents, and tourists. These interviews were designed to clarify unexpected or contradictory survey findings, deepen understanding of contextual challenges, and explore stakeholders' perspectives on sports tourism development and sustainability. All interviews were conducted with informed consent, recorded, transcribed, and analyzed to support the interpretation and integration of the quantitative results.

### **Data Analysis**

Data analysis was conducted using an integrated quantitative and qualitative approach within a mixed-methods sequential explanatory design. The quantitative phase was analyzed first to identify statistical patterns and relationships, followed by qualitative analysis to clarify, deepen, and contextualize the quantitative results.

#### **1. The Quantitative Analysis**

The quantitative dataset was analyzed through three procedures. First, descriptive statistics were used to profile respondents and examine the distribution of perceptions related to destination attractiveness, infrastructure, facility readiness, and sports tourism activities. Second, an Exploratory Factor Analysis (EFA) was performed to identify the underlying dimensions structuring destination attractiveness. EFA was conducted only on the tourist subsample, as tourist satisfaction and sport-experience items represent consumer-based constructs and are not applicable to managers or local residents. Data adequacy met statistical requirements ( $KMO=0.81$ ; Bartlett's Test  $p<0.001$ ), and factors were extracted using principal component analysis with varimax rotation. A confirmatory factor analysis (CFA) was not conducted because several indicators were adapted or newly developed for the local context, making EFA more appropriate for establishing the empirical factor structure. Third, multiple regression analysis was used to examine the determinants of tourist satisfaction, and this analysis was likewise performed only on tourist data to maintain conceptual validity.

#### **2. The Qualitative Analysis**



The qualitative phase involved thematic analysis of interview transcripts. The process included open coding, categorization into higher-order themes, and interpretive synthesis. Qualitative findings provided contextual explanations for quantitative patterns, clarified unexpected or contradictory results, and captured managerial, operational, and sustainability-related insights that were not measurable through the survey.

### 3. Data Integration

Integration of quantitative and qualitative results was conducted using a side-by-side comparison approach. This procedure identified areas of convergence, divergence, and complementarity across data sources, allowing for a more comprehensive and theoretically grounded interpretation of sport tourism dynamics in Kepulauan Seribu. Importantly, this integration distinguished which findings corresponded to which respondent groups -tourist, managers, or local residents- thereby addressing concerns regarding analytic clarity and ensuring methodological consistency.

## Results

### *Respondent Profile*

A total of 285 respondents participated in the study, consisting of 132 tourists (46.3%) and 153 tourism managers (53.7%). Local residents were included within the manager category, as many of them were directly involved in providing or supporting tourism services. Only tourists completed the sections on sports participation and satisfaction, whereas managers and residents responded to items related to destination attractiveness, infrastructure, and facility readiness. This separation ensured that each respondent answered questions appropriate to their role.

In terms of geographic origin, the sample reflected both local and external perspectives. Approximately 60% of respondents were residents of Kepulauan Seribu: primarily from Panggang, Pramuka, Kelapa, Tidung, and Sabira Islands -while the remaining 40% came from surrounding urban areas such as Jakarta, South Tangerang, and Banten. This distribution highlights the involvement of local stakeholders in tourism operations and the continued interest of external visitors who serve as primary consumers of sports tourism activities.

### *Destination Attractiveness and Sports Tourism Experience*

Table 1 presents comparative descriptive statistics of destination attractiveness assessments between tourists and tourism managers in Kepulauan Seribu. Both groups consistently identified landscape and natural attractions as the strongest components of sports tourism, with panorama and natural beauty achieving the highest mean scores (3.4-3.6). Tourists rated natural beauty more positively than managers (70% vs 58%), underscoring the central role of environmental aesthetics in shaping visitor perceptions.

Evaluations of local experience and food were more moderate. Local cuisine received a mean score of 3.1, with relatively similar responses from tourists (38%) and managers (32%), indicating that while culinary elements contribute to the tourism experience, they are not perceived as primary attractions. Greater divergence emerged in assessments of infrastructure and public facilities. Road conditions and public transportation recorded lower mean scores (2.7-2.8), highlighting accessibility as a relative weakness. Managers evaluated road conditions more favorably than tourists (64% vs. 50%), whereas tourists reported lower satisfaction with public transportation (30% vs. 35%), suggesting higher sensitivity to mobility constraints among visitors.

In contrast, basic service facilities-including toilets, information centers, and pedestrian paths-were rated positively by both groups (mean scores 3.6-3.8), with managers consistently reporting higher evaluations. This discrepancy may reflect a gap between service provision and user experience, particularly from the visitor perspective. Finally, canteens and restaurants received moderate ratings (mean=3.3) with minimal perceptual differences between respondent groups, suggesting that food service infrastructure is adequate but not yet a distinctive competitive feature.

Table 1. Descriptive Attractiveness of Sport Tourism Destinations (N = 285)

	Aspect	Tourist (%)	Managers (%)	Mean Score
Landscape and Natural Attractions	Panorama	55	45	3.4
	Natural beauty	70	58	3.6
Local Experience & Food	Local food	38	32	3.1
	Road conditions	50	64	2.7
Infrastructure & Public Facilities	Public transportation	30	35	2.8
	Toilet	78	85	3.8
	Information center	67	75	3.7
	Pedestrian path	62	70	3.6
	Canteen/restaurant	48	44	3.3

Complementing these perceptions, Table 2 summarizes sport tourism activities reported exclusively by tourists. Water-based activities dominated the tourism experience, with snorkeling and diving accounting for 64.2% of all reported activities. This finding aligns with the high attractiveness scores for natural and marine environments, reinforcing the importance of marine biodiversity as the primary driver of sports tourism in Kepulauan Seribu. Beach land sports – such as beach volleyball, beach soccer, and beach jogging – were reported less frequently (approximately 7-11%), while adventure-based activities, including island-hopping experiences, accounted for around 7% of reported participation. Although these activities currently attract a smaller proportion of tourists, their presence indicates opportunities for diversification beyond marine-focused sports tourism products.

Table 2. Descriptive Sport Tourism Experience

Activity Categories	Main Activities	Number of Respondents	Percentage
Water Sports	Snorkeling & Diving	183*	64,2%
Beach Land Sports	Beach Volleyball/Soccer, Beach Jogging	20-31*	7-11%
Adventure Sports	Island Hopping Adventure	±20*	7%

Notes: \*multiple responses were allowed; therefore, the number of responses exceeds the total number of tourist respondents (N= 132). This table reflects tourist participation only. Tourism managers and local residents did not respond to sport participation items.

### EFA and Regression Analysis

The results of The Exploratory Factor Analysis (EFA) are presented in Table 3. The analysis extracted four factors explaining 68.4% of the total variance, indicating a satisfactory factor structure. Sampling adequacy was confirmed (KMO=0.81; Barlett's Test  $p < 0.001$ ) demonstrating that the dataset was appropriate for factor analysis. The first factor, natural beauty and panorama, included indicators related to scenic landscapes and marine natural beauty, confirming natural attractions as the primary pull factor. The second factor, infrastructure and public facilities, comprised toilets, visitor information centers, pedestrian paths, and public transportation, highlighting infrastructure as a key support element for visitor comfort. The third factor, sports facilities, encompassed equipment condition and safety provisions for water and outdoor sports. The fourth factor, sport tourism experience, captured participation in water, beach, and adventure sports, reflecting the experiential dimension of sports tourism.

Table 3. Results of Exploratory Factor Analysis (EFA) of the Attractiveness of Sport Tourism in the Islands One thousand

Statement Items	Factor 1: Natural Beauty & Panorama	Factor 2: Infrastructure & Public Facilities	Factor 3: Facilities Sport	Factor 4: Sport Tourism Experience
Panorama of beaches and islands	0.81	-	-	-
Beauty natural sea and ecosystem	0.84	-	-	-
Food local typical island	0.65	-	-	-
Toilet	-	0.79	-	-
Information center visitors	-	0.82	-	-
Pedestrian path	-	0.77	-	-
Transportation public	-	0.71	-	-
Facility supporters sports (bicycles, etc.)	-	-	0.74	-
Condition equipment sport	-	-	0.82	-
Security facility sport	-	-	0.79	-
sports activities (snorkeling , diving)	-	-	-	0.81
Sports activities beach (volleyball, jogging)	-	-	-	0.76



Sports activities adventure (parasailing)	-	-	-	0.73
Satisfaction enjoy natural	-	-	-	0.78

Note : Loading factors  $\geq 0.50$  are displayed , loading below threshold no displayed ( given - sign ).; KMO = 0.81; Bartlett's Test  $p < 0.001 \rightarrow$  data is valid analyzed ; Total variance explained : 68.4%.

The results of multiple regression analysis are presented in Table 4. As shown, all four factors derived from the EFA significantly predicted tourist satisfaction, explaining 61% of the variance ( $R^2 = 0.61$ ). Natural beauty and panorama emerged as the strongest predictor ( $\beta=0.42$ ,  $p<0.001$ ), confirming the dominant role of natural attractions in shaping tourist satisfaction. Infrastructure and public facilities also exerted a substantial influence ( $\beta=0.31$ ,  $p<0.001$ ), indicating that accessibility and basic services are critical determinants of visitor comfort. Similarly, sports facilities had a significant positive effect ( $\beta=0.27$ ,  $p=0.001$ ), highlighting the importance of facility quality and safety in supporting sports tourism activities. The sport tourism experience factor also contributed significantly to satisfaction ( $\beta=0.18$ ,  $p=0.004$ ), although its effect size was comparatively smaller. This result suggests that while direct participation in sports activities enhances the tourism experience, its impact on overall satisfaction is secondary to environmental and infrastructural conditions.

Table 4. Analysis Results Regression

Variables Independent	$\beta$ coefficient	t-value	Sig. (p)
Beauty nature & panorama	0.42	6.87	0.000
Infrastructure & facilities general	0.31	5.12	0.000
Facility sport	0.27	4.38	0.001
Sports tourism experience	0.18	2.94	0.004
$R^2 = 0.61$			

## Quantitative and Qualitative Integration

Table 5 presents the integration of quantitative and qualitative findings. As shown in Table 5, strong convergence emerged regarding the importance of natural beauty. Infrastructure limitations identified in survey data were reinforced by interview narratives. Importantly, sustainability concerns emerged exclusively in qualitative findings, indicating an additional conceptual dimension not captured in the quantitative instruments.

Table 5. Integration of Quantitative and Qualitative Results of Sport Tourism in Kepulauan Seribu

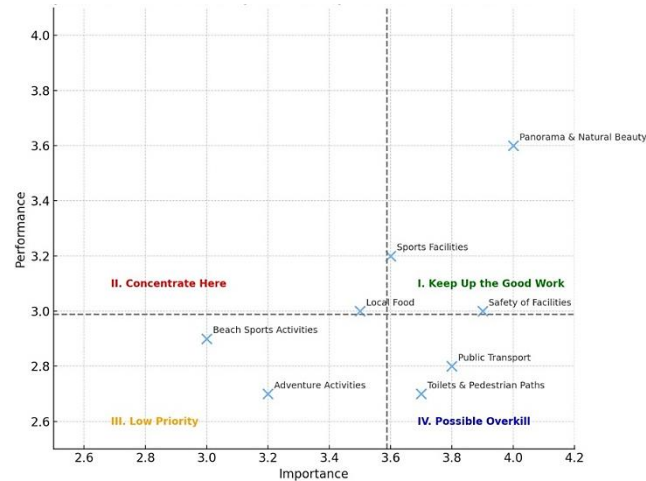
Theme	Quantitative Results	Qualitative Results	Integration Interpretation
Natural nature & panorama	highest average score (3.4-3.6); strongest predictor of satisfaction ( $\beta=0.42$ , $p<0.001$ ).	"Tourists like it the most, snorkeling and diving because the sea is Still natural and the view is beautiful." (P1)	Quantitative data and interviews consistently confirm beauty naturally as a strength main destination.
Infrastructure & public facilities	Score more-low (road 2.7; transportation 2.8). Significant factor ( $\beta=0.31$ , $p<0.001$ ).	"If the toilet is more -clean and transportation inter-island more-smooth, tourists will feel more at home." (W1)	Both of them show that even though important, infrastructure still so points weak that it needs to be improved.
Sports facilities	Sufficient score high (condition equipment = 3.6; security = 3.0). Significant factors ( $\beta=0.27$ , $p=0.001$ ).	There is snorkel equipment, but standard security like buoys and instructions safety still less." (M1)	Show that the facility is available, but quality security needs to be improved for optimal satisfaction.
Sports tourism experience	Dominant activities: snorkeling /diving (64.2%). Beach / adventure activities more-low (7-11%). Significant factor ( $\beta=0.18$ , $p=0.004$ ).	"Potential sport adventure big, like parasailing or cliff jumping, but " The promotion is minimal." (P2)	Main activities-based sea, while diversification (beach / adventure) still not enough maximized.
Sustainability tour	Do not appear directly in survey.	"If you want sport tourism developing, nature must still guarded. Don't until damaged Because too crowded." (M2)	Qualitative data add dimensions new about sustainability that is not measurable in survey quantitative.

The integration of quantitative and qualitative findings demonstrates strong convergence across data sources. Natural beauty consistently emerged as the dominant driver of sports tourism satisfaction,



while infrastructure and facility safety were identified as critical weaknesses despite their high importance. Qualitative insights further expanded the analysis by introducing sustainability concerns that were not captured in the quantitative survey, reinforcing the need for balanced development strategies that protect natural assets while improving infrastructure and service quality.

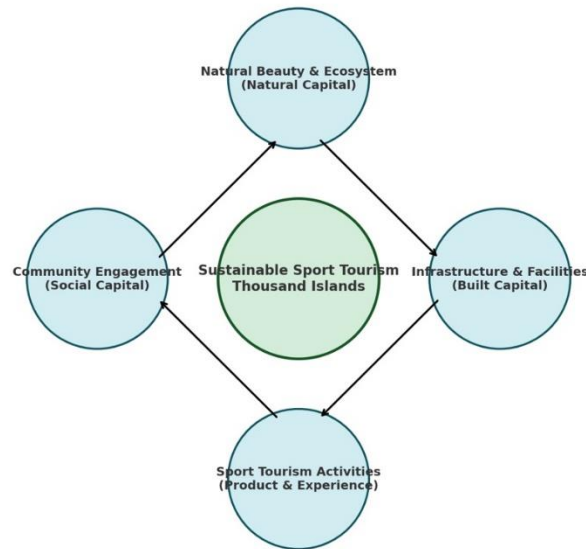
Figure 1. Importance-Performance Analysis (IPA) of Sport Tourism in Kepulauan Seribu



As illustrated in Figure 1, panoramic views, natural beauty, and sport facilities were positioned in Quadrant I (Maintain Performance), indicating that these attributes are perceived as highly important and demonstrate strong performance. These findings confirm that environmental aesthetics and facility readiness constitute the core competitive strengths of sport tourism in Kepulauan Seribu. This result is consistent with the regression analysis, which identified natural beauty as the strongest predictor of tourist satisfaction. Quadrant II (Priority for Improvement) comprised public transportation, restrooms, pedestrian paths, and facility safety. Although highly important, their relatively low performance indicates that improvements in basic infrastructure and safety should be prioritized. Quadrant III (low Priority) included beach sports and adventure activities, which exhibited low importance and low performance, suggesting potential for long-term product diversification. No attributes were positioned in Quadrant IV (excessive).

Figure 2. Circular Policy Cycle Model: Sustainable Sport Tourism Development

Circular Policy Cycle Model: Sustainable Sport Tourism Development



Based on empirical findings, Figure 2 presents the proposed Circular Policy Cycle Model. The model is built upon four interrelated pillars. First, natural beauty and ecosystem (natural capital) constitute the fundamental assets that position the Seribu Islands as a leading sports tourism destination and require continuous protection through marine conservation, coral reef preservation, and visitor education. Second, infrastructure and facilities (built capital) support tourist comfort and accessibility. In line with the IPA results, limitations in transportation, sanitation, and pedestrian infrastructure highlight infrastructure improvement as a policy priority. Third, sports tourism activities (products and experiences) shape tourist satisfaction. While snorkeling and diving dominate current offerings, beach and adventure sports remain underutilized, indicating opportunities for product diversification. Fourth, community involvement (social capital) plays a critical role in sustaining destination development through service provision, cultural promotion, and the monitoring of tourism activities. Together, these four pillars form a dynamic and interdependent cycle oriented toward sustainable sports tourism. The model emphasizes that long-term sustainability can only be achieved through a balanced integration of environmental preservation, infrastructure development, experience diversification, and community empowerment.

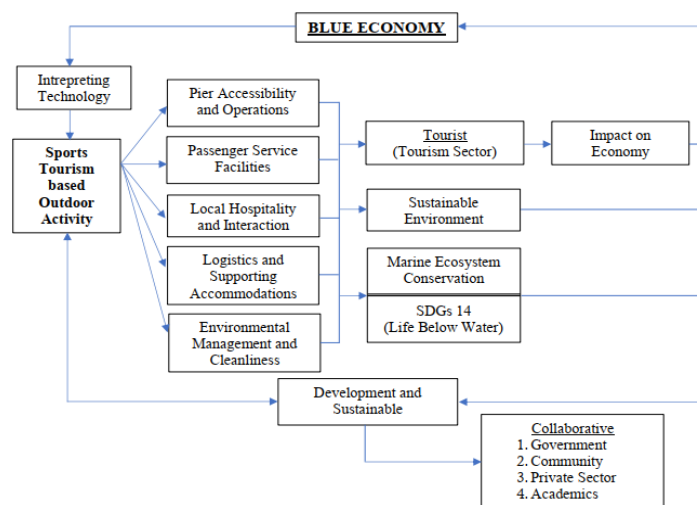
## Discussion

This study provides empirical evidence that sport tourism development in the Seribu Islands is fundamentally shaped by four interconnected dimensions: natural capital, infrastructure, sports facilities, and experiential quality. Our findings demonstrate that natural beauty and panorama ( $\beta = 0.42$ ,  $p < 0.001$ ) constitute the strongest predictor of tourist satisfaction, aligning with ecological theory in tourism which posits that pristine natural environments serve as primary attraction bases for destination competitiveness (Adnan & Omar, 2021; Sarker et al., 2021). The dominance of natural factors underscores the critical importance of marine ecosystem preservation as the foundation for sustainable tourism development. The significant positive effects of infrastructure and public facilities ( $\beta = 0.31$ ,  $p < 0.001$ ) and sports facilities ( $\beta = 0.27$ ,  $p = 0.001$ ) on satisfaction highlight the complementary role of built capital in enhancing the tourism experience. However, our qualitative data reveal persistent challenges in transportation accessibility, sanitation facilities, and safety standards, creating a "service gap" that potentially undermines the destination's competitive advantage. This finding resonates with contemporary tourism research emphasizing the necessity of adequate infrastructure in peripheral island destinations (Carneiro et al., 2016; Orden-mejía et al., 2022).

The integration of quantitative and qualitative methods revealed critical insights that would remain obscured in a singular methodological approach. While quantitative data identified natural beauty as the dominant satisfaction driver, qualitative findings illuminated underlying sustainability concerns, particularly regarding carrying capacity and environmental degradation from tourism activities. This methodological triangulation aligns with recent calls for mixed-methods approaches in tourism research to capture the complexity of socio-ecological systems (Khoo-lattimore et al., 2017; Molina-azorín & Font, 2015). From a theoretical perspective, our study extends the Sport Tourism Framework by integrating Blue Economy principles, thereby creating a more comprehensive model for marine-based tourism development (Balestracci et al., 2025). The Circular Policy Cycle Model we propose emphasizes the dynamic interactions between natural, built, social, and experiential capitals, contributing to the evolving literature on sustainable sport tourism (Carvache-franco et al., 2025; Jin et al., 2019; Kelman, 2019). Our findings challenge the conventional economic-centric approach to tourism development by demonstrating the indispensability of ecological preservation for long-term competitiveness.

The blue economy approach is crucial in this context, by utilizing marine resources sustainably for inclusive economic growth and improving people's welfare (Mahadiansar et al., 2023). This is in line with the objectives of Indonesia's maritime policy which seeks to achieve equitable prosperity for coastal communities and small islands, while simultaneously increasing economic growth and the competitiveness of the maritime sector (Rahman et al., 2023). The implementation of the blue economy policy in Indonesia, particularly in the tourism sector, has been proven to contribute significantly to gross domestic product and attract high interest from international tourists for marine tourism activities (Martínez Vázquez et al., 2021; Nasution et al., 2025). This strategic orientation not only drives economic growth but also aligns with broader environmental sustainability goals by promoting responsible resource use and marine ecosystem conservation. Furthermore, the blue economy framework integrates the concept of ecosystem services, providing a pathway to equitable and sustainable community-based ecotourism (Campayo-Sanchez et al., 2026). This involves empowering local communities in decision-making processes and ensuring equitable access to resources, mirroring successful co-management strategies observed in sustainable fisheries (Setiawan, 2023). Such an approach requires a robust governance structure that incorporates local knowledge and scientific data to inform policy and management, thus optimizing resource allocation and mitigating potential conflicts between stakeholders (Praptiwi et al., 2021). Thus, blue economy initiatives in the Seribu Islands can go beyond mere economic gains and foster resilient socio-ecological systems that benefit both human populations and marine biodiversity.

Figure 3. Framework of Development by Sports Tourism based Outdoor Activity through Blue Economy



Strengthening regulations and oversight of economic activities in the marine and fisheries sector is crucial to mitigate negative impacts on the environment. Therefore, collaborative efforts between the government, communities, the private sector, and academic institutions are needed to encourage the implementation of sustainable public policies (Rudi, 2023; Setiawan, 2023). This collaborative approach

ensures the development of robust strategies for marine resource management and the promotion of environmentally friendly technological innovations within a blue economy framework. Such initiatives are crucial for improving the quality and sustainability of marine ecosystems, which in turn will support various economic sectors such as tourism and fisheries, ultimately contributing to long-term sustainable development in coastal and marine areas (Alfiandri & Mayarni, 2023). The emphasis on integrating economic and environmental aspects within a blue economy framework helps minimize disaster risks and improve community well-being by encouraging sustainable marine resource management (Martínez-Vázquez et al., 2021). This comprehensive strategy also supports the development of environmentally friendly infrastructure and the application of efficient technologies for marine resource management, thereby increasing productivity in the marine and fisheries sector (Rudi, 2023). Furthermore, effective governance and a clear policy framework are crucial for managing shared marine resources, requiring the integration of ecological, social, and economic dynamics to identify gaps and design sustainable outcomes. This holistic approach to the blue economy, emphasizing integrated marine management, has proven successful in strengthening the foundations of coastal resources and improving the well-being of communities across diverse regions (Elegbede et al., 2025). In particular, the development of more efficient and environmentally friendly technologies, such as hybrid ship engines or solar-powered systems, is increasingly helping to minimize negative environmental impacts while accelerating the economic benefits of marine activities, including the development of technology-based sports tourism (wearables).

These technological advances, coupled with a robust policy framework and community engagement, are crucial to ensuring that the expansion of the blue economy in the Seribu Islands remains environmentally sustainable and socio-economically equitable (Campayo-Sanchez et al., 2026; Mahadiansar et al., 2023). These efforts are crucial given the challenges of implementing ecosystem principles and ensuring adequate understanding and awareness among stakeholders, necessitating integrated education and outreach efforts. Furthermore, enhancing human resources through training and education for local communities is crucial to improving the management and promotion of coastal ecotourism, ensuring that its benefits are widely distributed (Alfiandri & Mayarni, 2023; Happ et al., 2023). Sustainable development of marine resources requires a balanced approach between economic exploitation and ecological preservation, recognizing that the ocean is not simply a resource but a dynamic ecosystem (Haas et al., 2022; Saddington, 2023). Therefore, public policy research on the Blue Economy concept plays a crucial role in guiding the government in formulating appropriate policies for disaster anticipation and sustainable marine resource management (Voyer et al., 2018). This framework specifically aims to reduce marine environmental damage, such as coral damage, pollution, and overfishing, by prioritizing restoration and rehabilitation efforts to rebuild healthy marine ecosystems (Rudi, 2023; Tian et al., 2023). One approach is the development of sports tourism, a sector within the community's economic development, contributing to prosperity and contributing to the Blue Economy concept. This holistic strategy not only supports economic sustainability in the marine sector but also provides significant social benefits for local communities by fostering a balance between economic, environmental, and societal needs.

Accessibility within the blue economy framework for sports tourism development must be adequate and easy to implement for the tourism community (Picken, 2025). One approach is the government's promotion of an integrated system to streamline ecotourism management (Bichler & Pikkemaat, 2021; Surahman et al., 2025). Furthermore, the sport tourism concept being developed utilizes wearable technology. Further research is needed to explore ways to optimize e-government tools for managing ecotourism while upholding sustainability and respecting local culture and customs, particularly in the context of implementing a governance policy model for coastal ecotourism in Indonesia (Alfiandri & Mayarni, 2023; Nasution et al., 2025). This optimization requires strengthening inter-agency coordination, increasing community and business understanding of ecotourism principles, and developing human resource capacity for effective ecotourism management (Vázquez et al., 2021). Furthermore, evaluations of socio-economic benefits and environmental impacts must be conducted to ensure that ecotourism positively contributes to local communities and ecosystems, with policies and guidelines aimed at minimizing adverse impacts (Hua et al., 2013). Therefore, a robust regulatory framework, clear guidelines, and effective communication channels are needed to ensure all stakeholders are aware of their roles and responsibilities in the development process. A participatory approach that integrates local interests

and needs is crucial for successful ecotourism development, alongside effective promotional and marketing strategies (Nasution et al., 2025). Ultimately, achieving sustainable sports tourism in the Seribu Islands, based on outdoor activities and the blue economy, depends on a governance model that facilitates synergy between government agencies, local communities, and economic actors, while simultaneously building human resource capacity and ensuring robust infrastructure.

Proactive government involvement in utilizing e-government for tourism advancement, supported by the concept of sports tourism through wearable technology-based outdoor activities, particularly in introducing coastal tourism offerings to potential tourists, thereby increasing awareness among them (Rahman et al., 2023; Weed, 2009). This strategy is crucial given the common challenges in coastal ecotourism development, such as fragmented government oversight and limited local understanding of the ecotourism concept (Baptista & Pereira, 2022). The government's emphasis on e-government tools, as seen in the strategy of optimizing blue economy policies in the tourism sector, can significantly improve information dissemination and encourage public engagement with coastal areas (Surahman et al., 2025). Furthermore, effective implementation of blue economy policies is crucial for achieving equitable prosperity for coastal communities and increasing economic competitiveness in the maritime sector (Rahman et al., 2023; Rudi, 2023). To achieve this, strong government oversight and control are essential, especially in geographically dispersed areas like the Seribu Islands, to ensure adherence to sustainable development principles. This can be achieved through a multifaceted approach, combining top-down policy directives with bottom-up community participation, supported by strong interagency collaboration and resource allocation (Alfiandri & Mayarni, 2023; Stjepić et al., 2022). This approach will involve leveraging digital platforms and data analytics to monitor environmental health, tourist flows, and economic impacts, providing real-time insights for adaptive management and policy adjustments. Given Indonesia's vast maritime territory and coastline, the blue economy is crucial to national prosperity, with marine and coastal tourism playing a substantial role in the country's GDP (Perić et al., 2019). Therefore, strategic government investment in infrastructure, human resources, and supporting policies is crucial to facilitating ecotourism in coastal border areas.

Establishing clear regulations and providing incentives for sustainable practices, as well as ensuring that local communities directly benefit from sports tourism activities through outdoor activities, can significantly improve accessibility and attractiveness for international tourists. Furthermore, efforts to simplify administrative processes and integrate visa issuance features and online applications can significantly increase accessibility and attractiveness for international tourists (Rahman et al., 2023; Wright, 2019). These initiatives align with the broader blue economy goal of generating economic value from marine resources while maintaining environmental balance and benefiting local communities (Mahadiansar et al., 2023). Therefore, the successful implementation of blue economy policies in the tourism sector, particularly in the sports tourism sector, particularly in island regions such as the Seribu Islands, requires an effective platform that attracts tourists by leveraging technology, encouraging citizen engagement, and facilitating collaboration with the business sector.

The managerial implications are multifaceted. Destination managers should prioritize: (1) implementing carrying capacity regulations to prevent environmental degradation; (2) investing in basic infrastructure, particularly sanitation and inter-island transportation; (3) establishing standardized safety protocols for water sports activities; and (4) developing differentiated tourism products to diversify the experience beyond snorkeling and diving. These measures align with sustainable tourism governance principles that balance economic, environmental, and social objectives (Carius & Job, 2019; Carneiro et al., 2016; Orden-mejía et al., 2022). This study has several methodological limitations that warrant consideration. First, the cross-sectional design limits causal inference about the relationships between tourism factors and satisfaction. Second, the sample, while diverse, predominantly represents domestic tourists and local managers, potentially limiting the generalizability to international tourist segments. Third, the study focused primarily on visitor satisfaction metrics, with sustainability considerations emerging secondarily from qualitative data rather than being systematically measured in the quantitative instrument. Future research should address these limitations through longitudinal designs tracking satisfaction and environmental indicators over time. Additionally, studies could employ discrete choice experiments to quantify tourist trade-offs between experiential quality and environmental conservation. Comparative research across Indonesian archipelago destinations would elucidate contextual fac-

tors influencing sport tourism development pathways. Further investigation is also needed on the implementation challenges of Blue Economy principles in tourism governance, particularly regarding stakeholder coordination and policy integration.

## Conclusions

This study confirms that natural capital constitutes the most influential element in the attractiveness of sport tourism in the Seribu Islands, complemented by infrastructure, sports facilities, and outdoor activity experiences. However, the cross-sectional design and mixed composition of respondents limit direct generalisations regarding tourist satisfaction. In addition, a notable part of satisfaction variance remains unexplained, suggesting the existence of additional determinants beyond those examined in the model. Qualitative findings revealed sustainability concerns, particularly ecological vulnerability and carrying capacity, which were not fully reflected in the quantitative analysis. Consequently, future studies should integrate explicit sustainability indicators and differentiate between visitor profiles to obtain more robust interpretations. Despite these constraints, the result contributes to understanding the determinants of sport tourism in small-island contexts and provides useful orientations for destination management. Further research should examine longitudinal developments, compare coastal destinations, and evaluate emerging sport tourism modalities in relation to environmental, social, and economic sustainability.

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