

Sustainable Tourism Business Practices in Rote Island: Striking a Balance Between Economic Growth and Environmental Conservation

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ABSTRACT

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This study aims to analyze the practices, challenges, and strategies for implementing sustainable tourism in Rote Island, East Nusa Tenggara. Using a mixed methods approach with a case study design, the research explores the balance between economic growth, environmental conservation, and socio-cultural sustainability. Quantitative data were collected through surveys involving tourists, business operators, local communities, and government representatives, while qualitative data were obtained from in-depth interviews and field observations. The PLS-SEM analysis revealed that business sustainability and profitability are the most dominant factors in strengthening the local economy ($R^2 = 0.717$), followed by environmental and socio-cultural aspects. The findings indicate that tourism practices in Nembrala remain at a moderate to low level across the three pillars of sustainability, characterized by limited waste management systems, low community participation, and unequal distribution of economic benefits. Local community involvement is largely confined to labor roles, while business ownership is dominated by outside investors. This situation creates economic disparities and weak integration of local cultural values into tourism products. The study emphasizes the importance of collaborative governance involving government, businesses, and local communities in strategic decision-making, as well as the adoption of the triple bottom line principles (profit, people, planet) in tourism business models. The implications highlight the need for long-term, regulation-based policies, MSME capacity strengthening, and community empowerment to build inclusive, resilient, and globally competitive tourism destinations.



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Introduction

Tourism is considered a dynamic sector that contributes significantly to global economic growth through job creation, increased investment, and the promotion of cultural exchange (Gupta et al. 2024; Mihalic 2024; Council 2023). In Indonesia, this sector is perceived as the backbone of the economy with promising prospects. In 2024, the number of international tourist visits is expected to reach 12.6 million, a 20.17 % increase from the previous year (Aini 2024), while foreign investment in 2023 reached USD 3.6 billion, primarily in the development of hotels, restaurants, and cafes (González-Pérez 2020). However, tourism also contributes 8-11% of global greenhouse gas emissions annually (UNTWO et al. 2025) and causes environmental degradation, resource exploitation, and gentrification, impacting local communities (Hák, Janoušková, and Moldan 2016; Karamina et al. 2024). The sustainable tourism paradigm emerged as a response to these issues, emphasizing a balance between economic growth, environmental conservation, and cultural preservation (Apriani et al. 2024; Halim 2024). These practices include responsible travel, destination management, and community engagement standards (Place 2023; Tamelan and Harijono 2019).

However, in Indonesia, its implementation still faces obstacles, including low tourist awareness, limited resources to support sustainable practices, and minimal collaboration between stakeholders (Vu et al. 2024; Khan et al. 2021). Several cases, such as the savanna on fire in Bromo, the waste problem on Sanur Beach, ecosystem damage on Mount Rijani, and some inappropriate behavior by foreign tourists in Bali, demonstrate an inadequate implementation of sustainable tourism principles (Manzoor et al. 2019). Eastern Indonesia, including Rote Island, which is located in East Nusa Tenggara, offers tourist attractions such as pristine beaches, unique culture, and rich marine biodiversity, hosting thousands of coral species and fish (Raveendran 2024). However, the growing demand for tourism activities in this region has also triggered problems such as increased plastic waste, coral reef damage, and a decline in the marine ecosystem, and also conflict between local communities and tourism investors (Gössling, Scott, and Hall 2020). These conditions highlight the need for a sustainable tourism model to ensure economic benefits do not compromise ecological sustainability and the well-being of local communities.

Various countries have explored the effectiveness of sustainable practices in tourism. The Philippines closed Boracay Island for six months to restore the environment and strengthen its community-based tourism (Gaonkar and Sukthankar 2025). Doha implemented environmentally friendly development with Leadership in Energy and Environmental Design (LEED) standards and developed public transportation to reduce emissions (Verances, Rusmiatmoko, and Afifudin 2024; Zaghmout 2024). Similarly, Thailand has adopted a low-carbon tourism policy through renewable energy, energy efficiency, and a sustainable waste management system (Al Naimi 2020). However, challenges such as low public awareness, regulatory inconsistency, and low community involvement may continue to limit the successful implementation of sustainable practice in tourism. Therefore, this study seeks to explore strategies and challenges in implementing sustainable tourism in Rote Island, focusing on collaboration between local businesses, government policies, and the community to build an inclusive and competitive tourism model.

The importance of sustainable tourism in balancing economic growth, socio-cultural preservation, and environmental conservation is undeniably crucial, especially for a developing destination like Rote Island, Indonesia (UNWTO 2020; GSTC 2021). Although tourism provides economic opportunities for local communities, uncontrolled growth has led to environmental degradation, cultural commodification, and even social conflict between investors and local communities (Statistik 2024; Kementerian Pariwisata dan Ekonomi Kreatif 2023b). While awareness of sustainability issues continues to grow, empirical research on the collaboration among local actors, businesses, communities, and the government in implementing sustainable tourism practices remains limited (Hall 2019; Bramwell and Lane 2022).

This research aims to analyze the practices, challenges, and strategies for implementing sustainable tourism on Rote Island. The study focuses on how business actors integrate sustainability principles into business practices, how government policies influence sustainability implementation, and how local communities interpret and play a role in supporting an inclusive and environmentally friendly tourism model. The research question underlying this study is: “How do business actors, government, and local communities on Rote Island interpret and implement sustainable tourism, and what strategies can enhance collaboration among these stakeholders to achieve a sustainable tourism model?”

Literature Review

Sustainable Tourism

The concept of sustainability emerged within the framework of sustainable development. According to the United Nations Report by the World Commission on Environment and Development, sustainable development is perceived as “*the development that satisfies the needs of today without limiting the ability of future generations to satisfy theirs*” (Aphisavadh Sirivadhanawaravachara 2024). Conceptually, sustainable tourism is used to enhance the well-being of locals, induce economic growth, and promote health. Undeniably, sustainable tourism requires a full commitment from various stakeholders to maintain the continuity of the natural landscape, strengthen the socio-economic aspect of locals, and preserve the cultural values of the host communities as the basis of tourism practices (Hall 2019; León-Gómez et al. 2021). This statement is also supported through research done by (Xing 2024), which highlights 6 principles of sustainable tourism development, starting with (1) preserving environmental quality; (2) providing benefits to local communities and tourists; (3) ensuring a balanced relationship between tourism and environment, where tourism does not upset the natural balance of the environment; (4) promoting harmony between host communities and

the environment; (5) developing adaptive strategies that align with the environmental carrying capacity; (6) ensuring that all stakeholders collaborate under shared mission for achieving sustainable development goals.

Sustainable Tourism, Economic Development, and Environmental Conservation

Sustainable tourism development serves as a vital bridge between economic growth and environmental conservation, demanding a careful balance for ensuring both the long-term viability of the tourism industry and the conservation of natural habitats (Risfandini, Yulianto, and Wan-Zainal-Shukri 2023). Through the investment in sustainable tourism infrastructure, communities can create long-term economic opportunities that do not compromise their environmental aspects (Baloch et al. 2023; Aphisavadh Sirivadhanawaravachara 2024). As tourism continues to be a key driver of economic growth in many regions, particularly in developing countries, it brings significant benefits, including the creation of jobs, the development of infrastructure, and an increase in local income. However, the expansion of tourism can also have significant negative environmental impacts, including habitat destruction, biodiversity loss, pollution, and increased carbon emissions. This practice requires a shift to responsible tourism, which focuses not only on maximizing profits but also on minimizing the environmental footprint of tourism activities and ensuring that local communities actively participate in and benefit from the tourism sector (Budeanu et al. 2016; Gössling, Scott, and Hall 2021). Sustainable practices, such as the adoption of renewable energy sources, water conservation measures, and waste management strategies, are crucial for mitigating the environmental degradation caused by tourism-related infrastructure and operations (Almeida 2018; Heale and Twycross 2018). The core of responsible tourism lies in the principle of community engagement, which fosters stronger relationships between tourists and host communities. Local communities may be actively involved in tourism activities, including in decision-making processes, which may directly benefit them economically (Tamelan and Harijono 2019; Zhao, Liang, and Dang 2019).

Method

Research Design

This study employed a mixed-methods approach to investigate the balance between economic growth, socio-cultural, and environmental aspects within the context of tourism practices on Rote Island (Creswell, J. W., & Plano Clark 2018). A case study methodology was applied to enable in-depth analysis of real-world examples on the island (Yin, Robert K 2003). A quantitative approach was used to measure tourism's economic impacts, environmental consequences, and awareness and implementation of sustainable practices. The qualitative approach aimed to gain deeper insights into stakeholder perspectives and the challenges in balancing development and conservation. Quantitative data analysis was conducted using average scores for each GSTC pillar (economic, socio-cultural, and environmental) and the Kruskal–Wallis test to evaluate differences in perceptions between groups (Unwto, 2013). Furthermore, PLS-SEM was used to examine relationships between latent constructs, including the validity and reliability of indicators, and the influence of pillars on sustainability perceptions and practices (Singh, Kaur, and Dana 2024). Qualitative analysis was conducted thematically using the UNWTO indicator framework to identify best practices, challenges, and collaboration strategies among actors. The results of both analyses were integrated to provide a comprehensive understanding of the state of tourism sustainability on Rote Island.

Data Collection and Sampling

Quantitative data were collected through surveys distributed to tourists, residents, and tourism operators (Creswell, J. W., & Plano Clark 2018). A stratified sampling technique was used to ensure representation of various stakeholder groups (Etikan 2017). Qualitative data were obtained through semi-structured interviews with tourism operators, government representatives, environmental advocates, and community leaders, as well as through field observations at key tourism sites to assess actual practices such as waste management systems and resources used in tourist destinations (Yin, Robert K 2003; Patton 2015). This combination of methods ensured that the data captured perceptions, practices, and actual conditions, supporting a holistic analysis of sustainable tourism on Rote Island.

Results and Discussion

Respondent Profile

This study involved 86 respondents who were purposively selected based on their relevance and involvement in tourism activities in Nembrala, Rote Island. Respondents included tourism business operators (30), domestic and international tourists (20), residents (30), and local government officials (6). Tourism businesses are primarily dominated by accommodations such as hotels and homestays. These accommodations are largely owned by outsiders, including expatriates. On the other hand, food stalls and convenience stores are mainly managed by locals. On the other hand, business-related local arts and crafts are limited. The international tourists make up a large proportion of the total visitors of Rote Island, accounting for more than half (55%), with specific purposes such as surfing or enjoying nature, resulting in longer stays (4 days→1 week) and staying in homestays or hotels managed by expatriates. Meanwhile, domestic tourists constitute less than half (45%) and have shorter visits (1–3 days), with the purpose of their visits primarily for general recreation.

The local inhabitants are primarily engaged in fishing and farming, where some young people work in the tourism sector as non-managerial staff. Furthermore, the local government respondents (six individuals) represented the Tourism Office, the Environmental Office, the Cooperative/MSME or Creative Economy Office, the Sub-district Office, and Bappeda, providing cross-sectoral perspectives on tourism management and sustainability.

Quantitative Analysis

1. GSTC (Global Sustainable Tourism Criteria)

According to the quantitative GSTC scoring table, tourism practices in Nembrala, Rote Island, are still on a long journey to meet sustainability principles. It shows that none of the main actors, namely, business players, host communities, tourists, and local governments, showed equal achievement across all dimensions of sustainability. It appears in the table that local governments play a relatively more dominant role in sustainability management, particularly in areas such as destination management and the equitable distribution of socio-economic benefits, with a score of 3.0. However, the implementation on the ground remains limited owing to constraints in human resources and inadequate cross-sectoral coordination. Furthermore, cultural preservation and environmental conservation were recorded as low (Scores 2.0 - 2.5), with only a tenth (10%) of locals feeling their culture is represented in tourism, and almost seven-tenths (65%) of international visitors report insufficient access to and limited information related to local customs and cultures. The findings also reveal a lack of integration between foreign business actors and the local community. Around 70% of business actors stated their relationship with the host community was limited to that of service providers or labor providers. What is more, tourism activities operate in a fragmented manner without integrated packages. While waste management systems are still inadequate, with 73% of local communities reporting no waste management facilities provided by local governments or business owners.

These results highlight the gap between policy and practice and the need for a comprehensive approach for strengthening Institutional aspects, technical regulations, and maintaining collaboration between the government, tourism players, and local communities in developing inclusive, culture-based, and sustainable tourism.

2. Kruskal-Wallis Test: The differences in perception among the groups

The Kruskal–Wallis test was used to evaluate differences in perceptions among local communities, business owners, tourists, and the local government regarding the sustainability of tourism in Nembrala across three dimensions: environmental, socio-cultural, and economic.

Environmental: There was no significant difference between groups ($p = 0.351$), indicating a common perception regarding waste management, waste facilities, and the use of renewable energy. The low score signifies a collective awareness of infrastructural and oversight shortcomings as well as the need for a comprehensive strategy encompassing regulation, education, and technological innovation. From the perspective of Socio-cultural, there was a significant difference ($p = 0.037$), with the government scoring higher than the other groups. These results indicate that cultural preservation remains symbolic and incidental, with community involvement and tourist access to local identity very limited. Cultural attractions

appear sporadically, and the community has not yet been a primary stakeholder in the planning and delivery of cultural tourism products. Economic: The most significant difference in perception ($p = 0.012$). Business owners assessed that the tourism activity in Nembrala carries a positive economic impact for business operators, citing stable tourist arrivals. Meanwhile, local communities expressed concern that their involvement is limited to providing labor, with insufficient access to equitable economic benefits. Furthermore, from the perspective of travellers, the range of local products available was relatively limited, which may affect overall cultural experiences, and there were limited opportunities for meaningful interaction with local communities. These findings show the essential of strengthening MSME training programs, enabling local people to participate actively in tourism activities, and diversification of local products for supporting a more inclusive distribution of economic benefits.

Ensure that economic practices align with environmental conservation and cultural preservation. This approach will not only enhance community economic resilience but also ensure that the tourism sector remains sustainable. Overall, the study highlights the gap in perceptions between actors and the need for an integrated approach to improving the environmental, cultural, and economic sustainability of tourism in Nembrala.

3. PLS-SEM Analysis Results

The analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM) indicates the research model predicts the Local Economy variable (Y) well, with an R^2 value of 0.717. This shows that about 71.7% of the variation in the local economy in the Nembrala area is explained by three main dimensions: Environment (X1), Socio-Cultural (X2), and Business Profitability and Sustainability (X3). Each of these variables has a positive and significant effect. The coefficients are $\beta = 0.457$ ($p < 0.001$) for Environment, $\beta = 0.280$ ($p < 0.001$) for Socio-Cultural, and $\beta = 0.507$ ($p < 0.001$) for Business Profitability and Sustainability. These results show that while environmental conservation and local socio-cultural integration strengthen the community-based economy, the primary driver of sustainable tourism in Nembrala is tourism players' ability to maintain profitable and sustainable operations. Sustainable tourism thus relies not only on environmental and cultural awareness but also on local engagement in managing businesses efficiently and responsibly.

In summary, a truly sustainable approach should address economic, environmental, and socio-cultural issues altogether. Local government may consider developing policies that support all three dimensions by strengthening local institutions, providing green business training, and ensuring tourism benefits are shared equitably over time. Interpretation of these results indicates that environmental conservation efforts and the integration of local socio-cultural values contribute significantly to strengthening the community-based economy. However, the most dominant factor is the ability of business actors to maintain the profitability and sustainability of their businesses. This indicates that sustainable tourism in Nembrala depends not only on environmental and cultural awareness but also on the community's economic capacity to manage businesses efficiently and responsibly. Thus, these results emphasize that a sustainability approach should be holistic and mutually reinforcing. The local government needs to promote policies that integrate these three dimensions by strengthening local institutions, providing training in green business management, and implementing regulations that ensure tourism benefits are distributed equitably and sustainably across generations.

Qualitative Analysis

Analysis of tourism sustainability in Nembrala, Rote Island, using the UNWTO indicator framework shows that sustainability remains in the medium-low category across all three main pillars: environmental, socio-cultural, and economic. Regarding the environmental aspect, there is no adequate waste management system for tourism businesses; almost three-fourths (73%) of residents complained about hotel waste disposal, and there is no use of renewable energy among businesses. Clean water infrastructure remains limited, and there are no formally designated tourism conservation areas.

From a socio-cultural perspective, local community participation remains limited as laborers, not decision-makers. Only a tenth (10%) of respondents stated that their local culture is featured in tourism activities, and there are no regular cultural attractions for introducing local customs and traditions to visitors. Although youth have begun to engage in the tourism service sector, women's participation has not

yet manifested in a form of meaningful empowerment. From an economic perspective, tourism may offer informal employment opportunities for local communities, particularly youth; however, the distribution of economic benefits remains uneven, as a significant proportion of businesses are owned by non-local investors. Government efforts to support MSMEs through training and mentoring are still limited and unsustainable. Furthermore, the reliance on the surfing season has made the tourism economy highly seasonal, lacking a clear strategy for diversifying attractions. This finding shows that the sustainability of tourism in Nembrala continues to face major challenges. This includes not enough regulation to support tourism practice, limited innovation in environmental management, and there is minimal socio-economic integration for locals. The policy should be made to strengthen the capacity of MSMEs, enable more community participants, promote the diversification of attractions to rejuvenate local cultural heritages, enable visitors to respect and appreciate local cultural values, and also support environmental conservation to achieve sustainable tourism goals.

Conclusion

The results of this study indicate that sustainable tourism practices in Nembrala, Rote Island, remain in the medium-low category across three main pillars of sustainability: environmental, socio-cultural, and economic. Although awareness of sustainability issues has increased among stakeholders, implementation remains limited to discourse and has not been systematically institutionalized. This aligns with the findings of Bramwell & Lane (2022) dan Hall (2019), which emphasize that the main challenges to sustainable tourism development in developing destinations lie in inadequate coordination between tourism actors, limitations of local resources, and reliance on sectoral policies.

In the context of business actors, the ownership of hotels, homestays, and cafes, dominated by investors from outside the region, including foreign nationals, creates economic leakage. This means the flow of tourism revenue goes to foreign entities or suppliers, rather than benefiting the host community (Gössling, Scott, and Hall 2021). Local communities predominantly act as workers or small business managers without adequate access to capital and training. This situation indicates that the economic benefits of tourism are not evenly distributed, as Scheyvens & Biddulph (2018) argued that sustainable tourism will only have a positive impact if local communities have control over assets and decision-making processes. From the local government perspective, interviews revealed that sustainability policies remain partial, such as cleanliness campaigns or MSME training that are not implemented sustainably. The lack of technical regulations for waste management and renewable energy highlights the gap between planning and implementation. However, the literature confirms that effective destination governance depends on cross-sector coordination and institutional sustainability (Jenkins 2011; UNWTO 2020).

Regarding the socio-cultural aspect, the study found that cultural preservation in Nembrala remains ceremonial and has not been integrated into economically valuable tourism products. Only a small percentage of tourists have access to local cultural experiences, demonstrating the weak connection between local identity and the tourism industry. These findings reinforce Cohen & Cohen (2015) argument that without community participation and an adequate system of cultural interpretation, tourism has the potential to commodify culture and erode the authentic meaning of local traditions. Overall, the results of this study show that collaboration between actors, businesses, communities, and the government remains insufficient, resulting in a lack of synergy across sustainability dimensions. The main challenge is not simply limited resources, but also not enough institutional mechanisms capable of facilitating long-term partnerships. In line with Bramwell & Lane (2022), the success of sustainable tourism in developing destinations requires collaborative governance that integrates the roles of government, communities, and the private sector in an inclusive and participatory system.

Implications

The findings of this study provide several important implications for the development of sustainable tourism models on Rote Island and similar destinations in the coastal areas of Indonesia. First, the implementation of collaborative governance is needed to facilitate partnerships among all stakeholders, such as the government, businesses, and local communities, in developing strategic decision-making that encompasses sustainable goals. This approach aligns with the view of Bramwell & Lane (2011), who assert that the success of sustainable tourism can only be achieved through coordination between stakeholders

through equitable distribution of responsibilities. Local governments need to act as facilitators, not simply regulators, by ensuring the sustainability of policies and cross-sectoral support for inclusive and adaptive destination management (Jenkins 2011).

Second, from the perspective of tourism businesses, the research findings emphasize the importance of integrating the triple bottom line principle, namely, profit, people, and planet, into local business models. The implementation of green practices such as waste management, energy efficiency, and utilization of local resources is not only a social responsibility but also a strategy to increase destination competitiveness (Font and McCabe 2017). Furthermore, providing fiscal incentives for small businesses that adopt sustainability principles can accelerate the transformation towards a more resilient tourism economy (UNWTO 2012).

Third, empowering local communities must be a priority in tourism development policies. Communities need to be involved as co-creators in the development of tourism products, attraction management, and destination promotion, so they can secure a strategic position in the tourism value chain (Scheyvens and Biddulph 2018). Furthermore, strengthening capacity through training, access to essential resources, and partnerships with the private sector will promote economic independence while at the same time maintaining social and cultural sustainability.

Fourth, these findings also imply the need for long-term, integrated policy-based planning. Sustainability cannot be achieved solely through sectoral activities such as festivals or temporary training, but rather through regulations that link environmental conservation, cultural preservation, and economic prosperity. These regulations should be included in regional planning documents such as the Regional Development Plan (RIPPDA) and the Regional Medium-Term Development Plan (RPJMD) (Kementerian Pariwisata dan Ekonomi Kreatif 2023a). What is more, improving the sustainability indicator monitoring system (UNWTO 2020), which may ensure every tourism policy and investment truly delivers across-dimensional and across-generational benefits. Overall, the implications of this research confirm that the success of sustainable tourism development on Rote Island depends on the ability of local actors to build collaborations, strengthen community economic capacity, and make sustainability practices central to business strategies and public policies. Thus, sustainability is not merely development rhetoric but a tangible instrument for realizing social well-being, environmental conservation, and economic resilience in tourist destinations.

Future Research

Future research requires comparative studies across destinations in East Nusa Tenggara to understand variations in sustainability practices and the effectiveness of local policies. A longitudinal approach can be used to assess long-term sustainability changes, particularly following government program interventions. Furthermore, further study is needed on the role of digital innovation, institutional trust, and climate change adaptation as factors that can strengthen collaboration between stakeholders. A participatory and collaborative approach between the government, businesses, communities, and tourists is a strategic step toward managing destinations that are more inclusive, resilient, and globally competitive.

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Author Contributions Statement

SN conceived the study and provided the research framework. EG performed the review and editing of the manuscript. All authors have read and agreed to the published version of the manuscript.

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