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RESEARCH ARTICLE

Green-Tourism-Based Tourism Development Model In Bromo Tengger Semeru National Park (TNBTS) in Tosari District, Pasuruan Regency, East Java

Setyo Tri Wahyudi[1]*, Nurul Badriyah[2], Kartika Sari[3], Rihana Sofie Nabella[4], Radeetha[5]

[1,2,3,4,5]Department of Economics, Faculty of Economics and Business, Universitas Brawijaya, Malang, Indonesia

Correspondence:
Setyo Tri Wahyudi
Email : setyo.tw@ub.ac.id
Address : MT. Haryono 165 Malang, East Java, Indonesia 65145

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Abstract
Tourism is one of Indonesia's foremost economic drivers, including within Bromo Tengger Semeru National Park (TNBTS) in Tosari District, Pasuruan Regency, East Java. Although the rapid visitor growth in 2022 boosted non-tax state income, it also intensified environmental challenges such as climate change, socio-cultural degradation, and ecosystem damage. This study introduces a novel Green-Tourism model that integrates local cultural values and community participation to balance economic and environmental goals. Adopting a mixed-method approach with a SWOT analysis, our findings demonstrate that stakeholder collaboration through green tourism strategies can increase employment while preserving local heritage and mitigating urbanization. These insights provide a basis for policymakers and practitioners to develop sustainable tourism policies, and they open avenues for future research on refining green tourism frameworks in similar conservation areas.

Keywords: Green Tourism, Sustainable Tourism, SWOT Analysis, Tosari District, TNBTS.

INTRODUCTION

Tourism remains one of the most significant contributors to Indonesia's economy, sustaining various community levels. According to [1], tourism is a multifaceted activity encompassing economic, ecological, cultural, and political dimensions. Recent data from the Ministry of Tourism and Creative Economy [2] indicate that Indonesia's tourism contribution to GDP continued to rise from 2013 to 2019, reaching 4.8% in 2019. Within East Java, Bromo Tengger Semeru National Park (TNBTS) stands out as a critical conservation and tourism site, managed under a zoning system to balance research, education, and recreational activities. Notably, TNBTS spans four regencies—Pasuruan, Probolinggo, Malang, and Lumajang—offering diverse natural and cultural assets.

This TNBTS area includes iconic spots such as Penanjakan Hill in Tosari District, Pasuruan Regency, celebrated for its panoramic sunrise views. The region's protected forest status necessitates careful infrastructure development to accommodate visitors without compromising the environment. Adopting a carrying capacity framework [3] helps prevent excessive resource depletion, encompassing ecological, physical, economic, and social dimensions. Moreover, Tosari District is uniquely positioned at high altitude with a distinct Tengger culture**,** providing rich potential for green tourism innovation.

In 2022, the Bromo Tengger Semeru National Park Center reported 318 thousand tourist visits, significantly higher than 137 thousand in the previous year, resulting in increased non-tax state revenue of IDR 11.65 billion. While economically beneficial, this surge poses environmental threats through mass tourism effects, including climate change, socio-cultural erosion, and ecosystem damage [4]. These challenges highlight the importance of community-based tourism (CBT) [5], where local participation in sustainable tourism development mitigates adverse impacts and promotes inclusive growth.

Alternative tourism was developed by the government to minimize the impact of mass tourism and the impact of environmental sustainability, namely through the concept of sustainable tourism. Sustainable tourism is a

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tourism activity that pays attention to present and future economic value, environmental impact, meeting support, environmental industry and local communities [6]. According to Yoeti and Gunadi [7], sustainable tourism is an ongoing process and requires continuous monitoring of its impacts, and can contain proven and corrective actions if needed.

In addition, the concept of Green Tourism is also being developed to support sustainable tourism. According to Weaver in [8], a destination deserves to be classified as Green Tourism if it has four main dimensions, namely natural base, conservation support, sustainability and environmental education. Meanwhile, according to Dodds and Joppe [9], the components of Green Tourism are: (1) Environmental responsibility: Maintaining, preserving, and improving the natural and physical quality of the environment to ensure the health and sustainability of the ecosystem. (2) Strengthening the local economy: Supporting the local economy, local businesses, and communities to ensure the strengthening and sustainability of the local economy. (3) Cultural Diversity: Respect and respect culture and cultural diversity to ensure the sustainability of the welfare of the community and local culture. (4) Enriching experience: Enriching with satisfying experience through activity.

From the concept above, the impact felt is not only on improving economic, socio-cultural, but tourism actors and visitors will be taught how to maintain the natural environment to remain beautiful and sustainable. Therefore, this Green Tourism development model is very relevant to be applied in Bromo Tengger Semeru National Park (TNBTS) Tosari District, Pasuruan Regency, East Java in order to realize sustainable tourism.

The development of the green tourism green tourism model in this study chose several instruments/variables, namely Green Tourism Perception, Environmental Concern, Responsible Tourism Behavior. First, Green Tourism Perception, the importance of understanding tourists' perceptions and reactions to climate change and greenhouse gas emissions has an impact on individual behavior towards environmental degradation in the tourism industry [10]. Second, Environmental Concern to measure it has an effect on tourist attitudes and social influences for environmental protection and resource conservation [11]. Third, Responsible Tourism Behavior, to face the challenges of the world of environmental problems such as climate change, environmental responsibility is needed so that this responsibility has been widely carried out and focuses on tourists [11].

Based on the background described above, the objectives of this study are: (1) to analyze the tourism potential of TNBTS in Tosari District, Pasuruan Regency, East Java, and (2) to formulate context-specific policies aligned with the Green-Tourism development model. Nevertheless, there remains a research gap in understanding how unique cultural practices and environmental conditions shape green tourism implementation in Tosari. Addressing this gap can strengthen sustainable tourism frameworks and enhance Pasuruan Regency's contribution to regional economic growth.

MATERIAL AND METHOD

Research Approach

This research uses a mixed-method approach, combining quantitative and qualitative techniques. The quantitative descriptive component involves the use of statistical analysis to summarize numerical data without necessarily drawing generalized conclusions. Meanwhile, the qualitative-exploratory aspect enriches our understanding by capturing contextual nuances through field observations and interviews. To operationalize our key variables—(1) Green Tourism Perception, (2) Environmental Concern, and (3) Responsible Tourism Behavior—we developed indicators based on prior studies [10, 11]. For instance, Green Tourism Perception encompasses tourists' awareness of eco-friendly practices, Environmental Concern includes attitudes toward resource conservation, and Responsible Tourism Behavior reflects actions that reduce environmental impact and support local communities.

This research also integrates a qualitative-exploratory lens by focusing on in-depth interviews, participant observation, and field evaluations. This approach enables the development of a Green Tourism model that systematically addresses environmental, socio-cultural, and economic factors, as well as providing rich data for refining the conceptual framework and validating our indicators.

Data Location

This research was conducted in the BTS National Park Tourism Area, especially in Tosari District, Pasuruan Regency.

Data Collection Technique

Primary data were obtained through field surveys, semi-structured interviews, and expert discussions. Secondary data, including regional tourism statistics, environmental reports, and local monographs, were collected from government offices and TNBTS management. The operationalization of the variables—Green Tourism Perception, Environmental Concern, and Responsible Tourism Behavior—was supported by a set of measurement items or indicators that were validated through expert consultation prior to data gathering.

1) Document Study

In the form of tourism statistical data, monographs, and other records related to the regional description of the TNBTS Tourism area, especially Tosari District, Pasuruan Regency. Treasuring data is obtained from tracking at relevant government offices/agencies at the district, sub-district and village levels.

2) Interview

Semi-structured interviews were conducted using flexible interview guides designed to capture perceptions and experiences related to Green Tourism. The purposive sampling included local entrepreneurs, TNBTS managers, Tourism and Culture Office representatives, sub-district officials, and community leaders. These interviews specifically probed indicators of Green Tourism Perception (e.g., awareness of eco-friendly initiatives), Environmental Concern (e.g., support for conservation efforts), and Responsible Tourism Behavior (e.g., waste management practices, cultural preservation).

Data Analysis Techniques

Quantitative data were analyzed through tabulation and descriptive statistics to identify patterns in Green Tourism Perception, Environmental Concern, and Responsible Tourism Behavior. Qualitative data from interviews and observations underwent thematic coding to capture nuanced insights, thus complementing the quantitative findings. Two primary analytic methods—AHP and SWOT—were employed to formulate and validate the Green Tourism development model.

Analytical Hierarchy Process (AHP)

AHP is employed to systematically prioritize the key components of Green Tourism—Green Tourism Perception, Environmental Concern, and Responsible Tourism Behavior—by assigning weights to each criterion based on expert judgment [12]. For this study, a panel of six experts was assembled, comprising local government officials from the Tourism and Culture Office, TNBTS park managers, two academics specializing in sustainable tourism, and a representative from a local community organization. Each expert completed pairwise comparisons among the criteria and sub-criteria, and the consistency ratio was checked to ensure reliable weighting.

SWOT Analysis

SWOT analysis was used to integrate the findings from AHP and field data, identifying how internal strengths (e.g., strong local cultural identity) and weaknesses (e.g., limited infrastructure), as well as external opportunities (e.g., growing eco-tourism demand) and threats (e.g., climate change impacts), shape the feasibility of a Green Tourism strategy. Through focus group discussions with the same expert panel, each factor was rated and ranked, providing actionable insights into how Tosari District can refine policy and operational measures to support sustainable tourism.

RESULT AND DISCUSSION

Potential Of Bromo Tengger Semeru Tourism Park Area (TNBTS)

Bromo Tengger Semeru National Park (TNBTS) is a major destination for both domestic and international visitors, located in East Java. As a conservation area with a zoning system, TNBTS offers research, educational, and recreational opportunities. However, the integration of tourism activities with environmental and socio-cultural sustainability remains a critical challenge.

Table 1. Economic Potential of Tosari District

No.	Tourist Destinations	Economic Potential
1	Desa Podokoyo	1. The leading commodities of vegetable farming are potatoes, mustard, and carrots. 2. Creative Economy potential such as sculpture and carving and batik Pesona Tengger although on a small scale 3. Already have homestays and local MSMEs although still on a small scale
2	Desa Wonokitri	• The leading commodity of agriculture is the potato plant
3	Desa Ngadiwono	• Research center and potato nursery
4	Desa Tosari	1. Top commodities are vegetables (cabbage, carrots) 2. There have been many homestay, lodging and hotel businesses, bu limited in cooperation with MSME providers by – by 3. Management of agricultural products into ready-to-eat preparatic (potato chips) that can be marketed to tourists
5	Desa Sedaeng	4. Leading commodities are vegetables (potatoes, cabbage, carrots) 5.
6	Desa Mororejo	• Leading commodities are vegetables (potatoes, cabbage, • carrots)

Source: Primary data 2023

Geographically, TNBTS spans four regencies—Pasuruan, Probolinggo, Malang, and Lumajang—placing management responsibilities under multiple local authorities. According to the Decree of the Minister of Forestry (No. 278/Kpts-VI/1997), TNBTS is a tropical rainforest prioritized for conservation, encompassing core and buffer zones. This multi-regional governance structure

underscores the importance of coordinated policies for effectively implementing green tourism initiatives across administrative boundaries.

Table 2. Total Food Crop Production by Type of Commodity in Tosari District (ton)

Year	Potato	Onion Leaf	Cabbage	Carrot
2017	110.825	17.995	62.800	9.930
2018	146.286	22.100	50.100	10.112
2019	1.292.063	544.810	402.450	146.411
2020	1.622.806	67.193	1.062.000	1.754.470

Source: Pasuruan Regency Agriculture Office, 2021

Agricultural commodities serve as significant economic drivers in the region. In Tosari District, horticultural products—such as potatoes, onions, cabbage, and carrots—are cultivated extensively. This aligns with the concept of green tourism, as integrating agricultural production and eco-tourism experiences can enhance visitors' appreciation of local livelihoods and environmental stewardship.

Table 3. Sustainability Strategy with SWOT Analysis

STRENGTHS (S) **Internal strength factors:** 1. implement sustainable practices in daily operations, such as the use of renewable energy or environmentally friendly waste management 2. Provide training or education to locals to improve skills and help participate in the tourist business. 3. measure the positive impact that tourism businesses have on the long-term maintenance of local culture and community well-being	WEAKNESS (W) **Internal weakness factors:** 1. lack of information to tourist visitors to help maintain environmental sustainability during tourist visits 2. Have not measured the positive economic impact of sustainable practices in the tourism business, such as increased visitor numbers or revenue 3. lack of commitment to maintaining local culture and traditions in the tourist experiences offered
STRATEGY (SO) **4.** **1.** monitor the impact of sustainable strategies and tourism's contribution to job creation. by conducting regular evaluations and measuring relevant performance indicators, such as carbon emission reductions or the number of jobs created. 5. 6. 2. provide opportunities for local communities to be able to contribute to tourism (tour guides, tour managers) and establish cooperation with local (MSMEs) to support the supply of food, handicraft items, or other services that can improve the tourist experience and support the local economy. 3. Long-term commitment to collaborate with local communities and consider input in business development.	**STRATEGY (WO)** 1. create promotions by distributing brochures, videos, or signage to promote tourism and still practice environmentally sustainable strategies, such as wise use of water or proper waste management. 2. collaborate with academics or private parties or organizations that can assist tourism managers in developing and implementing effective measurement methods related to measuring the economic impact of tourism 3. work closely with local communities who work as tour guides or local artists, who can assist in providing visitors with a deep insight into local culture and traditions 4. Work with arts, cultural groups, or local governments to hold cultural events or festivals that promote local heritage in tourism.

Source: Researcher (2023)

Based on Table 2, food crop production from 2017 to 2020 increased significantly—some commodities showed up to a tenfold rise. This remarkable productivity persists despite steep slopes exceeding 45 degrees, demonstrating farmers' resilience and agricultural expertise. Such agricultural strengths also offer potential synergy with green tourism, particularly through agro-tourism experiences that highlight local farming techniques and sustainable practices.

Based on the SWOT analysis, a multifaceted strategy (covering SO, WO, ST, and WT) can enhance local economic growth while preserving culture and the environment. Figure 1 presents a conceptual model illustrating how local participation, cultural identity, and environmental stewardship interact to form a cohesive green tourism framework. Current practices already include local product development and partnerships between TNBTS managers and community members (Primary Data, 2023).

Economic diversification within TNBTS—such as locally made souvenirs—indicates that green tourism can stimulate MSME growth (Primary Data, 2023). By aligning tourism demand with conservation values, TNBTS can generate broad-based benefits**,** including job creation, cultural revitalization, and environmental protection.

In addition to its natural beauty, TNBTS boasts rich cultural heritage, such as the annual Kasada ceremony at Mount Bromo (Primary Data, 2023). These cultural assets echo findings from Sumiyati et al., [13], who noted how local rituals can evolve into heritage-based tourism attractions without compromising ecological balance. Similarly, in Gunung Rinjani National Park**,** green tourism underscores community-led practices like tree planting and eco-education [5]. Such examples reinforce the potential for TNBTS to adopt cultural-ecological integration, ensuring that both community traditions and environmental protection flourish simultaneously.

Reflecting on these field observations and past studies, a green tourism strategy anchored in local participation and cultural traditions is pivotal for TNBTS. By aligning with the SO, WO, ST, and WT strategies, TNBTS can harness community wisdom transmitted across generations—ranging from agricultural skills to traditional ceremonies—while upholding conservation mandates.

A successful green tourism strategy can mitigate urban migration by creating localized employment opportunities, fostering resource conservation, and boosting farmers' incomes through complementary agro-tourism offerings. In doing so, TNBTS may fulfill its dual mandate of economic upliftment and environmental preservation**,** essential to long-term sustainability.

Moreover, shifting tourist preferences toward authentic, nature-based experiences can

position agriculture as a cornerstone within the broader tourism sector. Incorporating farm visits, product demonstrations, and local cuisine showcases can enrich visitors' experiences while expanding revenue streams for rural communities. This aligns with findings from Hidayattuloh et al. [14], who highlighted the importance of markets and agricultural-based tourism in raising community welfare in Cempaka Village.

In conclusion, a community-driven green tourism strategy rooted in local culture ensures that natural areas are preserved rather than exploited, enabling balanced economic growth and ecosystem health. Key challenges at the community level include limited awareness**,** infrastructure gaps**,** and balancing commercialization with tradition**.** Addressing these obstacles requires capacity-building**,** policy support**,** and multi-stakeholder collaboration**.** Theoretically, this study extends existing green tourism frameworks by emphasizing the interplay of cultural heritage and ecological sustainability; practically, it provides a roadmap for policymakers, tourism operators, and local communities to synergize economic development with environmental stewardship.

CONCLUSION

Researchers suggest implementing the SO, WO, ST, and WT strategies within a green tourism framework emphasizing local participation and cultural heritage. In particular, we recommend that policymakers establish incentive programs for environmentally friendly business practices, provide training to local stakeholders on sustainable resource management, and strengthen regulations that protect the unique socio-cultural traditions in Tosari District.

This green tourism approach ensures that natural areas are sustainably utilized rather than exploited, thereby fostering economic growth while preserving cultural identity. However, this study is limited by its focus on one district, highlighting the need for future comparative research across different regions with varying environmental and cultural conditions. Additionally, longitudinal studies could assess the long-term impact of green tourism policies on both ecological health and community welfare. In sum, green tourism offers a viable strategy that supports local communities, protects the environment, and strengthens cultural heritage.

Author Contribution:
Setyo Tri Wahyudi was involved in the concept, design, research process, participated in data collections and statistics, and written the manuscript (original and revision).
Nurul Badriyah was involved in the concept, design, research process, participated in data collections and statistics, and written the manuscript (original and revision).
Kartika Sari supports the methodology process, collections of the data, statistics and econometrics analysis, also collaborate in written of the manuscript (original and revision).
Rihana Sofie Nabella supports the methodology process, collections of the data, statistics and econometrics analysis, also collaborate in written of the manuscript (original and revision).
Radeetha supports the methodology process, collections of the data, statistics and econometrics analysis, also collaborate in written of the manuscript (original and revision).
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