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Strategic Development of Community-Based Tourism Entrepreneurship in Volcanic Ecotourism Destinations

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ABSTRACT

This study aims to formulate strategic directions for the development of community-based tourism entrepreneurship in a volcanic ecotourism destination by examining its internal and external conditions. The analysis employed the Internal Factors Analysis Summary, External Factors Analysis Summary, and SWOT framework to identify the main strategic priorities for sustainable destination development. Secondary data derived from visitor perceptions and management assessments were used to evaluate the destination's strengths, weaknesses, opportunities, and threats. The findings indicate that internal strengths, particularly the attractiveness of the volcanic landscape and strong community participation, slightly outweigh existing limitations such as inadequate amenities and limited accommodation capacity. The external environment is also relatively favorable, supported by increasing demand for nature-based tourism and educational tourism activities, although challenges remain in the form of volcanic hazards and potential environmental degradation. The integration of IFAS, EFAS, and SWOT results highlights several strategic priorities, including geotourism development, community-based homestay expansion, hazard mitigation systems, and infrastructure improvement. This study contributes a context-sensitive strategic framework that integrates conservation, disaster risk awareness, and local entrepreneurship within community-based tourism development. The findings provide practical implications for policymakers, destination managers, and local communities in promoting sustainable ecotourism development in environmentally sensitive tourism areas.

Keywords: community-based tourism, disaster risk management, ecotourism, swot analysis, tourism entrepreneurship

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1. INTRODUCTION

Ecotourism has become an important approach to sustainable tourism development by integrating environmental conservation, education, and community empowerment. In Indonesia, ecotourism is widely promoted as a strategy to balance biodiversity protection with socio-economic development, particularly in rural and protected areas. Volcanic landscapes, such as those surrounding Mount Merapi, offer unique opportunities for ecotourism due to their geological characteristics, scenic value, and educational potential (Weaver, 2008; Budeanu et al., 2016; Fennell, 2020).

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Figure 1. Landscape view of Kalitalang Ecotourism, Mount Merapi National Park, Central Java, Indonesia Source: Alodia Tour (2025).

Kalitalang Ecotourism was first opened and managed in September 2016. Kalitalang Ecotourism is located within the Mount Merapi National Park and features an open volcanic landscape, panoramic views of Mount Merapi, and active involvement of the local community through a tourism awareness group (Pokdarwis). A feasibility study conducted in 2025 concluded that Kalitalang is highly feasible for development, with a feasibility index of 75.58% (Triwahyuningsih et al., 2025). Despite this potential, several challenges remain, including limited accommodation, inadequate basic facilities, and the need for structured tourism products.

Previous studies on ecotourism in Merapi areas have focused mainly on potential identification and visitor perception, while strategic development planning remains limited. Despite the growing body of literature on ecotourism potential and visitor perception in volcanic regions, strategic development studies that explicitly integrate conservation principles, disaster risk awareness, and community-based tourism (CBT) within protected volcanic landscapes remain limited, particularly in the Indonesian context. Most existing studies tend to focus either on feasibility assessment or visitor satisfaction, without systematically translating internal–external conditions into operational development strategies that align conservation objectives with community empowerment (Mtapuri & Giampiccoli, 2019; Esti et al., 2020; Kamaluddin et al., 2025). This study addresses this gap by employing an integrated IFAS–EFAS and SWOT framework to formulate strategic development directions for Kalitalang Ecotourism within Mount Merapi National Park. By explicitly positioning conservation management and CBT as interdependent pillars of development in a high-risk volcanic environment, this study contributes a context-specific strategic model that is applicable to ecotourism planning in protected volcanic areas. The findings provide not only site-specific insights for Kalitalang, but also broader implications for policymakers and park managers in designing resilient, community-driven ecotourism strategies in dynamic natural hazard landscapes.

In addition to its environmental and tourism value, ecotourism development increasingly serves as a platform for local entrepreneurship and micro-enterprise growth. Community-based tourism initiatives create opportunities for the emergence of small-scale tourism businesses, including homestays, guiding services, culinary enterprises, and handicraft production. These entrepreneurial activities not only strengthen local economic resilience but also contribute to sustainable destination development by encouraging community ownership and innovation. Therefore, integrating entrepreneurship perspectives into ecotourism planning is essential to ensure that tourism development generates long-term socio-economic benefits for local communities.

This study aims to formulate strategic development directions for Kalitalang Ecotourism while identifying opportunities for community-based tourism entrepreneurship that support sustainable local economic development.

2. METHOD

This study employed a qualitative descriptive approach using secondary data obtained from the Kalitalang Ecotourism feasibility study published in 2025 (Triwahyuningsih et al., 2025). The dataset includes:

- Visitor perceptions (n = 90) on attraction quality, accessibility, accommodations, amenities, supporting facilities, clean water availability, and safety
- Management perceptions (n = 10) from TNGM/Pokdarwis (tourism awareness group)
- Feasibility index calculations using ADO-ODTWA criteria

The use of secondary data from the 2025 feasibility study ensures data reliability, as the dataset was collected using standardized tourism feasibility assessment procedures. The use of secondary data allows the study to build upon validated feasibility results while enabling strategic-level analysis without duplicating primary surveys.

The data were analyzed using Internal Factors Analysis Summary (IFAS) and External Factors Analysis Summary (EFAS) to identify strengths, weaknesses, opportunities, and threats (Ilyas, 2023). Each factor was assigned a weight and rating based on perceived importance and performance, and weighted scores were calculated to determine overall internal and external conditions. These analyses were further integrated into a SWOT framework to formulate strategic development recommendations. The use of IFAS–EFAS and SWOT analysis allows systematic prioritization of strategic factors and is widely applied in ecotourism planning within protected areas (Asadpourian et al., 2020; Mallick et al., 2020; Sari, 2024).

3. RESULTS AND DISCUSSION

RESULTS

Based on the analytical framework described above, the results are presented in relation to internal and external strategic conditions.

3.1. Internal Conditions of Kalitalang Ecotourism

The feasibility study indicates that Kalitalang possesses strong internal attributes, including high-quality natural attractions, positive visitor perceptions, and active community participation. These strengths are accompanied by several weaknesses, particularly limited accommodation, inadequate sanitation facilities, insufficient signage, and the lack of diversified tourism products.

To objectively evaluate internal conditions, an Internal Factors Analysis Summary (IFAS) was conducted. The IFAS identifies key strengths and weaknesses and assigns weights, ratings, and weighted scores to each factor.

The IFAS table is presented below.

Table 1. Internal Factors Analysis Summary (IFAS)

Internal Factors	Weight	Rating	Weighted Score
Strengths			
Strong natural attraction	0.15	4	0.60
High visitor interest (dominated by young visitors)	0.10	3	0.30
Positive visitor perception of safety	0.08	3	0.24
Availability of clean water	0.05	3	0.15

Internal Factors	Weight	Rating	Weighted Score
Community involvement (Pokdarwis)	0.10	4	0.40
Weaknesses			
Limited accommodation facilities	0.12	2	0.24
Lack of sanitation & waste management	0.10	2	0.20
Insufficient signage & interpretation tools	0.08	2	0.16
No direct public transportation	0.07	2	0.14
Undiversified tourism products	0.15	1	0.15
Total IFAS Score	**1.00**		**2.58**

The analysis indicates that Kalitalang possesses strong internal potential supported by its volcanic landscape and active community participation. The IFAS score suggests that destination competitiveness is driven primarily by experiential value and social capital rather than infrastructure readiness.

3.2. External Conditions of Kalitalang Ecotourism

Kalitalang also benefits from strong external opportunities. Growing ecotourism demand, increasing public interest in outdoor recreation, and strong potential for educational tourism create a favorable environment for development. At the same time, threats such as volcanic hazards, competition from nearby destinations, and environmental degradation risks must be managed.

To assess these external influences, an External Factors Analysis Summary (EFAS) was developed. The EFAS identifies key opportunities and threats and assigns weight, rating, and weighted scores to each factor. The EFAS table is presented below.

Table 2. External Factors Analysis Summary (EFAS)

External Factors	Weight	Rating	Weighted Score
Opportunities			
Growing demand for ecotourism	0.15	4	0.60
Potential for educational tourism	0.10	4	0.40
Government support for sustainable tourism	0.08	3	0.24
Local economic empowerment opportunities	0.12	3	0.36
Potential collaboration with universities	0.10	3	0.30
Threats			
Volcanic hazards	0.15	2	0.30
Environmental degradation risks	0.10	2	0.20
Weather dependence	0.05	2	0.10
Competition with nearby attractions	0.08	2	0.16
Total EFAS Score	**1.00**		**2.66**

This score reflects a favorable external environment characterized by strong development opportunities. Opportunities—especially nature-based tourism demand and educational activities—outweigh threats, although volcanic risk remains a major factor requiring mitigation.

3.3. SWOT-Based Strategic Development

The integration of Internal Factors Analysis Summary (IFAS) and External Factors Analysis Summary (EFAS) through the SWOT framework resulted in four groups of strategic development directions for Kalitalang Ecotourism. These strategies were formulated by

systematically combining internal strengths and weaknesses with external opportunities and threats to support sustainable ecotourism development within Mount Merapi National Park.

Strength–Opportunity (SO) strategies emphasize the utilization of Kalitalang's strong natural attractions, high visitor interest, and active community involvement to capitalize on growing demand for ecotourism and educational tourism. These strategies include the development of integrated ecotourism products such as trekking routes, geotourism interpretation, and environmental education packages. Destination branding is also directed toward positioning Kalitalang as part of a broader Merapi ecotourism network to enhance visibility and market reach.

Weakness–Opportunity (WO) strategies focus on addressing internal limitations by leveraging external opportunities. Key actions include improving basic infrastructure and visitor facilities, particularly accommodation, sanitation, signage, and interpretive media. Community-based homestays are identified as a strategic solution to accommodation shortages while simultaneously supporting local economic empowerment. Accessibility improvements and collaboration with educational institutions are also included to strengthen destination competitiveness.

Strength–Threat (ST) strategies aim to use internal strengths to mitigate external risks, particularly volcanic hazards and environmental degradation. These strategies prioritize the implementation of visitor safety measures, hazard communication systems, and evacuation preparedness supported by strong community participation and management capacity. Environmental protection measures, including visitor flow management and erosion-sensitive trail design, are also emphasized to reduce ecological impacts.

Weakness–Threat (WT) strategies are oriented toward minimizing vulnerabilities and preventing unsustainable development. These strategies include establishing minimum service standards, phasing development according to environmental carrying capacity, and diversifying tourism products to reduce dependence on favorable weather conditions. Environmental monitoring and community-based conservation initiatives are also incorporated to ensure that tourism development remains within ecological limits.

Overall, the SWOT-based strategic directions provide a structured framework for guiding Kalitalang Ecotourism development by aligning internal capacities with external conditions while maintaining conservation principles and community participation. These strategic directions form the foundation for further thematic interpretation, including conservation orientation, community participation, and sustainability implications presented in the following sections.

3.4. Conservation Orientation in Kalitalang Ecotourism

Beyond strategic positioning and growth-oriented development, conservation considerations play a fundamental role in shaping the direction of Kalitalang Ecotourism, particularly within the context of a dynamic volcanic landscape (Stronza et al., 2019; Hasana et al., 2022; Das & Chatterjee, 2024).

Conservation constitutes a central pillar in the strategic development of Kalitalang, particularly due to its location within the dynamic volcanic landscape of Mount Merapi National Park. The feasibility assessment and subsequent strategic analysis demonstrate that conservation principles are not treated merely as supporting elements, but rather as an integral framework guiding tourism development.

The proposed development strategies emphasize environmentally sensitive and low-impact infrastructure. Considering the fragile volcanic terrain, facilities should be designed to minimize ecological disturbance through lightweight structures, environmentally friendly trekking paths, and non-intrusive signage. This approach aims to prevent soil instability, reduce

vegetation damage, and maintain habitat continuity, in line with sustainable tourism guidelines for protected areas (Teguh et al., 2022; Wachidatullailiya et al., 2025).

Conservation planning in Kalitalang is also closely linked to disaster risk reduction, as volcanic hazards are inherent to the Merapi ecosystem. The strategic framework integrates risk mitigation measures, including the provision of hazard interpretation boards, clearly marked evacuation routes, and visitor standard operating procedures during elevated volcanic alert levels. In addition, local guides are trained to communicate hazard information effectively, ensuring visitor safety while maintaining environmental awareness. This integration positions Kalitalang as a potential model for risk-aware ecotourism in volcanic regions.

Environmental education further strengthens the conservation orientation of Kalitalang Ecotourism. The area offers opportunities for geology interpretation, biodiversity learning, and conservation-oriented activities that enhance visitor understanding of volcanic ecosystems. Interpretive media such as geotourism panels, biodiversity information boards, and digital learning tools are proposed to foster pro-environmental behavior among visitors and support conservation objectives.

3.5. Community-Based Tourism (CBT) as a Foundation of Kalitalang's Development

Community-based tourism (CBT) serves as the foundational framework of Kalitalang's development model. As a tourism destination managed collaboratively by local communities, the Tourism Awareness Group (Pokdarwis), and Mount Merapi National Park authorities, Kalitalang reflects the core principles of CBT, including local participation, empowerment, and equitable benefit distribution.

Local community involvement has been evident since the early stages of Kalitalang's development. Residents actively participate in planning processes, maintenance of trekking routes, and daily visitor management. The strategic framework reinforces participatory governance through village-level consultations, collaborative decision-making with park authorities, and continuous capacity-building initiatives. This participatory approach ensures that development decisions remain aligned with both local needs and conservation objectives.

Economic empowerment constitutes a key component of the CBT framework in Kalitalang. Strategic recommendations emphasize the development of community-based homestays, local food and beverage micro, small, and medium enterprises (MSMEs), and handicraft production. In addition, training programs for local residents as certified ecotourism guides are prioritized to enhance service quality and expand livelihood opportunities. By directing tourism-generated income to local households and community groups, CBT strengthens economic resilience and fosters long-term community commitment to sustainable tourism practices (Miangtari et al., 2017; Tseng et al., 2019; Kamaluddin et al., 2025).

Local communities also play a central role in environmental stewardship. Community members are involved in waste management initiatives, vegetation rehabilitation, wildlife monitoring, and the maintenance of ecotourism facilities. These activities reinforce the reciprocal relationship between environmental conservation and community welfare, which is a defining characteristic of CBT-based ecotourism.

Capacity building and knowledge transfer are essential to sustaining CBT implementation in Kalitalang. The strategic development plan includes structured training in hospitality services, environmental interpretation, digital marketing, and safety management. These initiatives enhance local competencies, reduce dependency on external stakeholders, and ensure the continuity of community-based ecotourism management. Overall, the CBT framework in Kalitalang demonstrates how active community participation can serve as a driving force for sustainable tourism development while supporting conservation goals and improving local livelihoods (Mtapuri & Giampiccoli, 2019; Kunjuraman et al., 2022; Hafezi et al., 2023).

The discussion above indicates that conservation orientation and community-based tourism represent two interrelated dimensions in the development of Kalitalang Ecotourism. While conservation strategies focus on protecting ecological integrity, managing environmental risks, and maintaining the resilience of the volcanic landscape, community-based tourism emphasizes local participation, empowerment, and equitable distribution of benefits. In practice, these two approaches do not operate independently. Instead, sustainable ecotourism development in Kalitalang emerges from the integration of conservation objectives with community-driven management, where ecological protection and local livelihoods mutually reinforce one another.

The integration of conservation and community-based approaches creates a synergistic framework for sustainable development. Kalitalang's natural attractions form the ecological foundation for ecotourism, while community participation ensures responsible management, cultural relevance, and equitable distribution of benefits. The preceding discussion demonstrates that both conservation orientation and community-based tourism constitute essential pillars of Kalitalang Ecotourism. However, their contribution to sustainable tourism becomes most evident when these approaches are integrated into a coherent development model. This integration highlights how ecological protection and community participation jointly shape sustainable ecotourism outcomes.

The integration of conservation and community-based tourism (CBT) ensures that tourism development not only protects the environment but also provides direct economic benefits to local residents (Mtapuri & Giampiccoli, 2019; Kunjuraman et al., 2022; Hafezi et al., 2023). Figure 2 illustrates the integration of conservation and community-based tourism (CBT), demonstrating how tourism development simultaneously supports environmental protection and provides direct economic benefits to local communities.

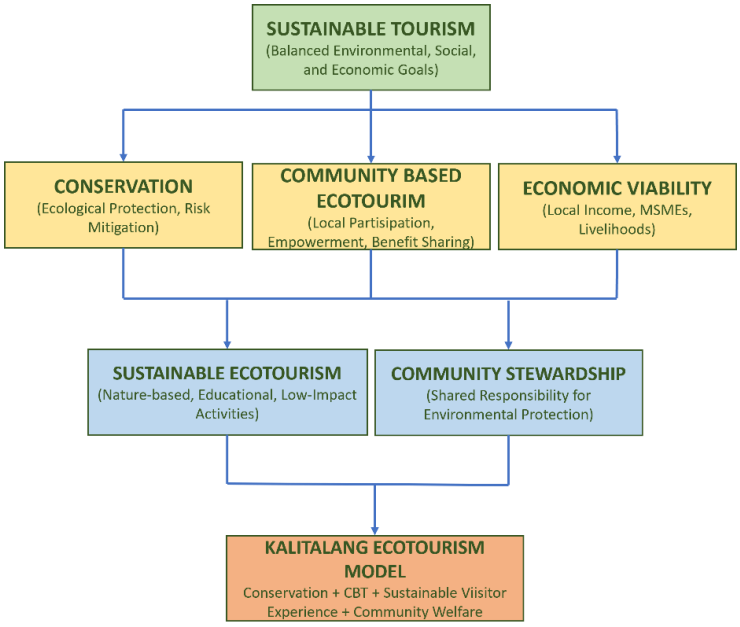

Figure 2. Conceptual relationship between conservation, community-based tourism (CBT), and sustainable tourism in Kalitalang Ecotourism. Source: Author's elaboration.

Overall, Kalitalang demonstrates strong potential as a model for conservation-driven, community-based ecotourism in Indonesia's volcanic regions.

From an entrepreneurship perspective, community-based tourism in Kalitalang provides a foundation for the development of local tourism enterprises. The establishment of homestays, guiding services, food stalls, and souvenir production reflects the emergence of small-scale entrepreneurial activities driven by local residents. These initiatives demonstrate how tourism development can function as an entrepreneurial ecosystem that encourages innovation, value creation, and local economic diversification.

3.6. Ecological Implications of Ecotourism Development in Kalitalang

Ecotourism development in Kalitalang presents both ecological opportunities and environmental challenges, particularly due to its location within an active volcanic landscape. One of the primary ecological concerns relates to soil stability and erosion risk along trekking paths and open viewing areas. Although volcanic soils are fertile, they are structurally fragile and highly susceptible to compaction under intensive visitor movement. Without proper trail design and maintenance, repeated trampling may lead to soil degradation, vegetation loss, and reduced landscape resilience. Similar ecological impacts have been documented in protected volcanic tourism areas where visitor flow is not properly regulated.

Vegetation disturbance also represents a significant ecological risk associated with expanding tourism activities. Although Kalitalang currently retains relatively natural vegetation patterns, uncontrolled visitor movement outside designated pathways may damage vegetation cover and reduce biodiversity integrity. The establishment of designated trekking routes and visitor zoning systems is therefore essential to minimize ecological disturbance and maintain habitat continuity.

Another critical ecological consideration involves waste management and environmental cleanliness. Increased tourism activity may lead to the accumulation of solid waste, particularly plastic materials, which can degrade visual landscape quality and negatively affect soil and water conditions. Community-based waste management systems and environmental awareness campaigns are therefore necessary to ensure that tourism development does not compromise ecological sustainability.

The concept of environmental carrying capacity plays a fundamental role in maintaining ecological balance within Kalitalang Ecotourism. Carrying capacity assessment enables managers to determine the maximum number of visitors that can be accommodated without causing irreversible environmental damage. The integration of visitor limitation policies, designated activity zones, and guided visitation systems is recommended to ensure that tourism activities remain within ecological thresholds.

Overall, the ecological implications of ecotourism development in Kalitalang highlight the importance of balancing tourism growth with environmental protection. The implementation of ecological safeguards, including trail management, vegetation protection, waste control, and visitor regulation, ensures that ecotourism development contributes to long-term ecosystem sustainability within Mount Merapi National Park.

3.7. Socio-Economic Implications of Community-Based Ecotourism Development

The socio-economic implications of community-based tourism in Kalitalang primarily reflect the outcomes of participatory governance and local engagement. Rather than focusing on institutional structures, this section highlights measurable livelihood benefits generated through tourism-related activities.

One of the primary socio-economic opportunities involves the establishment of community-based homestays and local culinary services. The development of homestay facilities not only addresses the current limitation of accommodation infrastructure but also provides direct financial benefits to local households. In addition, small-scale enterprises such as food

vendors, handicraft production, and guiding services create additional employment opportunities and stimulate local economic circulation.

Tourism activities also contribute to the development of human capital within local communities. Training programs focusing on hospitality services, environmental interpretation, digital marketing, and safety management improve local competencies and enhance service quality. These capacity-building initiatives enable community members to adapt to changing tourism demands and strengthen long-term economic resilience.

Beyond direct economic benefits, ecotourism development also promotes social cohesion and institutional strengthening within the local community. Collaborative management practices encourage collective decision-making, shared responsibilities, and mutual accountability among stakeholders. This participatory approach reinforces community ownership and strengthens local commitment to sustainable tourism management.

Although this study does not quantitatively measure economic impacts, the observed development trends indicate strong potential for community-based ecotourism to function as a catalyst for rural economic development. The integration of economic benefits with conservation-oriented practices ensures that tourism growth contributes to both environmental sustainability and community welfare.

The expansion of tourism-related activities also stimulates the growth of micro, small, and medium enterprises (MSMEs) within the local community. These enterprises contribute to job creation, increase household income, and strengthen rural entrepreneurship capacity. The development of tourism-based MSMEs not only supports economic sustainability but also enhances local competitiveness by encouraging innovation and product diversification.

3.8. Policy and Practical Implications for Sustainable Ecotourism Management

The results of the SWOT-based strategic analysis highlight the importance of integrating policy frameworks with practical management actions to ensure effective ecotourism governance in Kalitalang Ecotourism. Given its location within Mount Merapi National Park, tourism development must align with conservation regulations, disaster risk management policies, and community-based governance mechanisms.

One of the most critical policy priorities is the development and implementation of standardized operational guidelines. The absence of formal Standard Operating Procedures (SOPs) may result in inconsistent visitor management practices and increased environmental risks. Therefore, the establishment of SOPs covering visitor safety, environmental management, emergency response, and waste handling is essential to ensure operational consistency and environmental protection.

Disaster risk management represents a critical policy dimension in Kalitalang. As a destination located in an active volcanic region, the integration of hazard communication systems, evacuation planning, and early warning coordination with Mount Merapi National Park authorities is necessary to enhance visitor safety. Clear signage, designated evacuation routes, and periodic safety drills are recommended as part of routine operational procedures. These measures support the concept of risk-aware ecotourism, where visitor safety and environmental awareness are managed simultaneously.

Visitor regulation policies are also necessary to control tourism pressure and maintain environmental quality. The implementation of visitor limitation systems, designated activity zones, and guided visitation programs enables managers to maintain environmental carrying capacity within acceptable limits. Such policies not only reduce ecological pressure but also enhance visitor experience by preventing overcrowding and maintaining landscape quality.

Institutional collaboration between park authorities, local governments, and community organizations plays a strategic role in strengthening governance capacity. Effective collaboration ensures the alignment of conservation objectives with tourism development goals. The integration of local community groups, particularly tourism awareness groups (Pokdarwis), into policy implementation processes also strengthens accountability and promotes community ownership of conservation-oriented tourism management.

Overall, policy integration and practical management actions represent key components in ensuring that Kalitalang Ecotourism development remains environmentally responsible, socially inclusive, and economically beneficial. The formulation of clear operational standards and collaborative governance frameworks will support long-term sustainability within Mount Merapi National Park.

3.9. Strategy Priority Ranking for Kalitalang Ecotourism Development

To enhance the practical applicability of SWOT-based strategies, a priority ranking was developed to identify the most critical and feasible actions for sustainable ecotourism development in Kalitalang. The prioritization process considered ecological importance, community involvement, disaster risk relevance, and feasibility of implementation within the Mount Merapi volcanic landscape. The results of the priority ranking are presented in Table 3.

Table 3. Strategy Priority Ranking for Kalitalang Ecotourism

No	Strategic Program	Strategy Type	Priority Level	Implementation Focus	Expected Outcomes
1	Development of integrated geotourism and environmental education programs	SO	High Priority	Trekking routes, geological interpretation boards, guided tours	Increased visitor learning and conservation awareness
2	Development of community-based homestays and local tourism services	WO	High Priority	Homestay establishment, local culinary services	Improved local income and visitor stay duration
3	Implementation of volcanic hazard mitigation and visitor safety systems	ST	High Priority	Hazard signage, evacuation routes, safety SOPs	Enhanced visitor safety and disaster preparedness
4	Improvement of sanitation, signage, and interpretive infrastructure	WO	Medium Priority	Toilets, directional signage, educational panels	Increased visitor comfort and environmental awareness
5	Strengthening destination branding within the Merapi ecotourism network	SO	Medium Priority	Digital promotion and integrated tourism packages	Increased destination visibility
6	Establishment of environmental monitoring and carrying capacity control	WT	Medium Priority	Visitor limitation and zoning systems	Reduced environmental degradation

3.10. Implementation Roadmap for Strategic Development

Following the identification of priority strategies, an implementation roadmap was developed to guide the sequential execution of strategic actions for Kalitalang Ecotourism. The

roadmap provides a structured timeline that aligns infrastructure development, community capacity building, and environmental management with long-term sustainability goals. The implementation roadmap is presented in Table 4.

Table 4. Implementation Roadmap for Kalitalang Ecotourism Development

Phase	Time Frame	Strategic Focus	Key Activities
Phase 1	Year 1	Capacity Building and Safety Preparation	Training local guides, environmental education programs, preparation of hazard communication systems
Phase 2	Year 2	Infrastructure and Visitor Management	Improvement of sanitation facilities, installation of signage and interpretation boards, development of trekking routes
Phase 3	Year 3	Institutional Strengthening	Development of SOPs, visitor regulation policies, and environmental monitoring systems
Phase 4	Continuous	Promotion and Sustainability	Digital promotion, evaluation of environmental impacts, adaptive management practices

3.11. Indicators of Strategy Success

To support effective monitoring and evaluation, measurable indicators were developed to assess the success of each strategic program implemented in Kalitalang Ecotourism. These indicators provide a framework for tracking progress, evaluating outcomes, and supporting adaptive management processes. The indicators of strategy success are presented in Table 5.

Table 5. Indicators of Strategy Success

Strategy	Indicator	Measurement
Development of environmental education programs	Number of educational activities	Programs/year
Community capacity improvement	Number of trained local participants	Participants/year
Visitor safety and hazard preparedness	Availability of evacuation signage and drills	Facility status
Carrying capacity control	Visitor compliance rate	% compliance
Infrastructure improvement	Availability of sanitation and signage	Unit availability
Digital promotion	Visitor engagement on digital platforms	Views/month
SOP implementation	Availability of formal operational guidelines	Document status
Environmental management	Waste reduction and cleanliness levels	% reduction

DISCUSSION

While the results describe the structural conditions and strategic directions of Kalitalang Ecotourism, further interpretation is necessary to understand their broader implications. This discussion interprets the results of the IFAS–EFAS and SWOT analyses to identify strategic directions for sustainable ecotourism development.

The IFAS score (2.58) indicates that Kalitalang's internal strengths slightly outweigh its weaknesses, with natural attraction quality and strong community involvement emerging as the

most influential factors. This finding confirms that the competitiveness of Kalitalang Ecotourism is primarily driven by experiential value and social capital rather than infrastructure readiness. Such conditions are typical of early-stage ecotourism destinations located within protected areas, where ecological integrity and community participation constitute the core assets. However, the dominance of experiential strengths also implies that without strategic infrastructure enhancement and product diversification, visitor satisfaction and length of stay may remain limited.

The EFAS score (2.66) reflects a favorable external environment characterized by increasing demand for nature-based tourism, opportunities for educational collaboration, and policy support for sustainable tourism development. These opportunities provide a strategic window for Kalitalang to strengthen its positioning as an ecotourism destination. Nevertheless, volcanic hazards and environmental degradation risks represent structural constraints that cannot be eliminated, but must be systematically managed. This finding underscores the necessity of embedding disaster risk awareness and environmental safeguards within tourism planning, particularly in volcanic protected areas.

The integration of internal and external factors through the SWOT framework results in development strategies that prioritize growth while maintaining ecological and social resilience. The dominance of strength–opportunity (SO) strategies indicates that Kalitalang possesses strong internal capacity to respond to growing ecotourism demand. This condition reflects the importance of experiential landscape value as a primary driver of destination competitiveness.

Weakness–opportunity (WO) strategies address infrastructure and service limitations by aligning facility improvement with community empowerment. The development of community-based homestays represents a strategic response to accommodation shortages while ensuring that economic benefits remain within local households. Improvements in sanitation, signage, and interpretive infrastructure not only enhance visitor comfort but also function as tools for environmental education and impact mitigation. This approach demonstrates how infrastructure development can be aligned with conservation and CBT principles rather than undermining them.

Strength–threat (ST) strategies emphasize the role of community capacity and local governance in mitigating external risks. Active community involvement enables the implementation of visitor safety protocols, hazard communication systems, and evacuation preparedness without compromising visitor experience. In addition, carrying capacity management and erosion-sensitive trail design reduce the risk of environmental degradation caused by increased visitation. These strategies highlight the importance of adaptive management in destinations exposed to dynamic natural hazards.

Finally, weakness–threat (WT) strategies focus on strengthening institutional resilience and preventing premature overexploitation. Establishing minimum service standards, phasing development according to environmental carrying capacity, and diversifying tourism products toward educational and interpretive activities reduce dependency on favorable weather conditions and peak visitation periods. Environmental monitoring and community-based conservation initiatives further ensure that tourism growth remains within ecological limits.

Overall, the discussion demonstrates that sustainable ecotourism development in Kalitalang is not achieved through isolated interventions, but through the strategic integration of conservation management, disaster risk awareness, and community-based tourism. This integrated framework positions Kalitalang as a context-specific model for ecotourism development in protected volcanic landscapes, where ecological protection and community welfare must be addressed simultaneously. These findings are consistent with previous studies indicating that community participation and landscape value are key drivers of early-stage ecotourism development in protected areas (Asadpourian et al., 2020; Mallick et al., 2020).

From an entrepreneurship perspective, the strategic development of Kalitalang Ecotourism reflects the transformation of natural resources into community-based business opportunities. The integration of conservation principles with tourism entrepreneurship creates a sustainable economic model in which environmental protection and income generation coexist. This model demonstrates that ecotourism development can function as a catalyst for rural entrepreneurship by promoting innovation, skill development, and local enterprise growth.

4. CONCLUSIONS AND RECOMMENDATIONS

Kalitalang demonstrates strong potential for sustainable development supported by its volcanic landscape, active community participation, and favorable external conditions. Strategic development based on IFAS–EFAS and SWOT analysis emphasizes the importance of infrastructure improvement, product diversification, conservation-oriented management, and disaster risk mitigation within a community-based tourism framework. The proposed strategic framework can be used as a practical reference for park managers and local governments in designing adaptive ecotourism development programs in volcanic protected areas. Beyond site-specific implications, this study offers a strategic model for ecotourism development in protected volcanic areas, where environmental conservation and community empowerment must be addressed simultaneously. A limitation of this study lies in its reliance on secondary data; therefore, future research is encouraged to incorporate longitudinal field observations and participatory assessments to further validate and refine the proposed strategic framework.

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