

Ecotourism development strategies for Chua Chan Mountain, Vietnam: A SWOT–QSPM framework

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Abstract. *Ha NT. 2025. Ecotourism development strategies for Chua Chan Mountain, Vietnam: A SWOT–QSPM framework. Asian J For 9: 361-371.* Ecotourism represents a vital pathway for harmonizing environmental conservation and local development in Vietnam, yet many destinations still lack structured strategies for sustainable growth. This study developed an integrated strategic framework for ecotourism development at Chua Chan Mountain, Dong Nai Province, Vietnam, using the combined Strengths, Weaknesses, Opportunities, Threats (SWOT) and Quantitative Strategic Planning Matrix (QSPM) approaches. Data were collected from field surveys, focus group discussions, and in-depth interviews with local stakeholders to identify and prioritize feasible strategies. SWOT analysis identified key internal and external factors influencing ecotourism potential, while IFEM and EFEM scores of 2.68 and 2.69, respectively, indicated moderately favorable internal and external conditions for sustainable tourism development. QSPM results prioritized strategic alternatives based on Total Attractiveness Scores (TAS), with the highest-ranking strategy being comprehensive ecotourism and community-based tourism planning (TAS=2.14), emphasizing environmental protection and community participation. Lower-priority strategies focus on tourism diversification and attracting researchers and students. Other recommended actions focus on diversifying tourism products, enhancing workforce training, and fostering collaboration with tourism enterprises. These findings highlight the importance of balancing ecological protection, community participation, and economic benefits. This study contributes a replicable framework for integrating SWOT and QSPM into a unified, quantitative decision-making framework for identifying and prioritizing ecotourism development strategies. Future research should assess the long-term socio-economic and environmental impacts to ensure adaptability and sustained growth globally.

Keywords: Community-based tourism, ecotourism strategies, QSPM, sustainable tourism, SWOT analysis

INTRODUCTION

Globally, tourism development encounters major challenges from climate change, biodiversity loss, and the overuse of natural and cultural resources. In recent years, sustainable tourism has gained prominence as an essential strategy for balancing economic growth with environmental conservation and community well-being (Abya et al. 2015; UNWTO 2018; Naserianasl et al. 2021; Olivadeso and Dindo 2025). Sustainable tourism has increasingly been recognized as a crucial approach for balancing economic development with environmental protection and community welfare. It involves travel and recreational activities that generate positive social and ecological outcomes while minimizing environmental degradation and cultural disruption (Fennell 2008; Palmer and Chuamuangphan 2018). To develop sustainable tourism effectively, the optimal exploitation of natural and cultural values must go hand in hand with efforts to minimize problems such as environmental degradation, resource depletion, and limited local community engagement. Among the widely used strategic planning tools today, SWOT analysis (i.e., strengths, weaknesses, opportunities, and threats), along with the Quantitative Strategic Planning Matrix (QSPM), have proven their practical value in analyzing the internal and external factors affecting the tourism industry and supporting the

development of well-founded priority strategies (Reihanian et al. 2012; Ghorbani et al. 2015; Karkehabadi and Shamsi 2017). SWOT analysis serves as a structuring tool, helping to identify key factors influencing the sustainability of tourism activities, while QSPM supports systematic strategic decision-making by quantifying the attractiveness and feasibility of strategic options (Karkehabadi and Shamsi 2017; Raeesi et al. 2020; Fan et al. 2023). These tools have been effectively applied in various contexts, such as ecotourism in Iran or religious tourism in India, to exploit development potential while addressing local socio-economic and environmental challenges (Reihanian et al. 2012; Ghorbani et al. 2015; Jeelani and Shah 2024). Previous applications of SWOT–QSPM, such as in Thailand and Indonesia, have mainly focused on regional tourism potential without systematically incorporating stakeholder perceptions or quantitative prioritization of strategies. This study extends those approaches by combining participatory stakeholder analysis with QSPM scoring to provide a data-driven, inclusive, and context-specific framework for ecotourism strategy development in Vietnam.

Although SWOT and QSPM have been applied in many case studies, the application of these tools to the development planning process for emerging ecotourism destinations in Vietnam remains a research gap (Ly and Bauer 2014). Most previous studies have mainly assessed

tourism development potential from a general perspective, while there is still a lack of comprehensive analyses that can systematically assess both internal and external factors to build development strategies based on empirical data (Tseng et al. 2018; Phuong 2023). In addition, many existing studies still have a fragmented approach, focusing only on a few individual aspects such as infrastructure, cultural tourism, or natural resource conservation, instead of implementing a comprehensive strategic and integrated framework that comprehensively integrates these factors (Phuong 2023).

In Vietnam, sustainable tourism is increasingly viewed as a key driver of socio-economic growth and environmental stewardship. However, many emerging destinations still lack integrated planning frameworks that effectively evaluate internal and external factors influencing development. Chua Chan Mountain, in the Dong Nai Province's Xuan Loc District, is one of the nation's ecotourism destinations with the most room to grow. The mountain is the perfect site for sustainable tourism projects because of its rich biodiversity, historical significance, and cultural attractions. Even though Chua Chan Mountain was named a National Scenic Monument in 2012 and is the second-highest peak in southeast Vietnam, it continues to face issues like poor infrastructure, low community involvement, and environmental vulnerabilities (CCISXL 2022).

To bridge this knowledge gap and address the challenges mentioned above, this study employs SWOT and QSPM methods to provide a comprehensive evaluation of the internal and external factors affecting Chua Chan Mountain's tourism development. The main objectives of this study are: (i) to assess internal and external factors influencing ecotourism development at Chua Chan

Mountain; (ii) to identify and prioritize strategic directions through SWOT and QSPM integration; and (iii) to propose actionable recommendations for sustainable management. The study's novelty lies in its methodological contribution—quantifying qualitative stakeholder perceptions through QSPM scoring—and in its practical relevance to local ecotourism planning.

MATERIALS AND METHODS

Study area

Chua Chan Mountain, located in Xuan Loc District, Dong Nai Province, Vietnam, is a significant natural landmark renowned for its religious status, cultural significance, and rich biodiversity (Figure 1). As the second-highest in southeast Vietnam, it is 837 meters tall above sea level and was designated a National Scenic Monument in 2012. The peak forms part of a larger high-biodiversity ecosystem that includes everything from endemic vegetation to fauna and is also a crucial natural reserve for the region. All these aspects contribute to it possessing an immense potential for sustainable tourism development (CCISXL 2022).

Strategically situated approximately 110 kilometers northeast of Ho Chi Minh City, Chua Chan Mountain is easily accessible, making it a significant attraction for local and international tourists alike. The landscape is described as lush forests, dramatic rock outcroppings, and cascading waterfalls, which provide a range of ecotourism and adventure tourism activities. The tropical climate with rainy and dry seasons supports dense vegetation and sustains year-round tourist activities (CCISXL 2022).

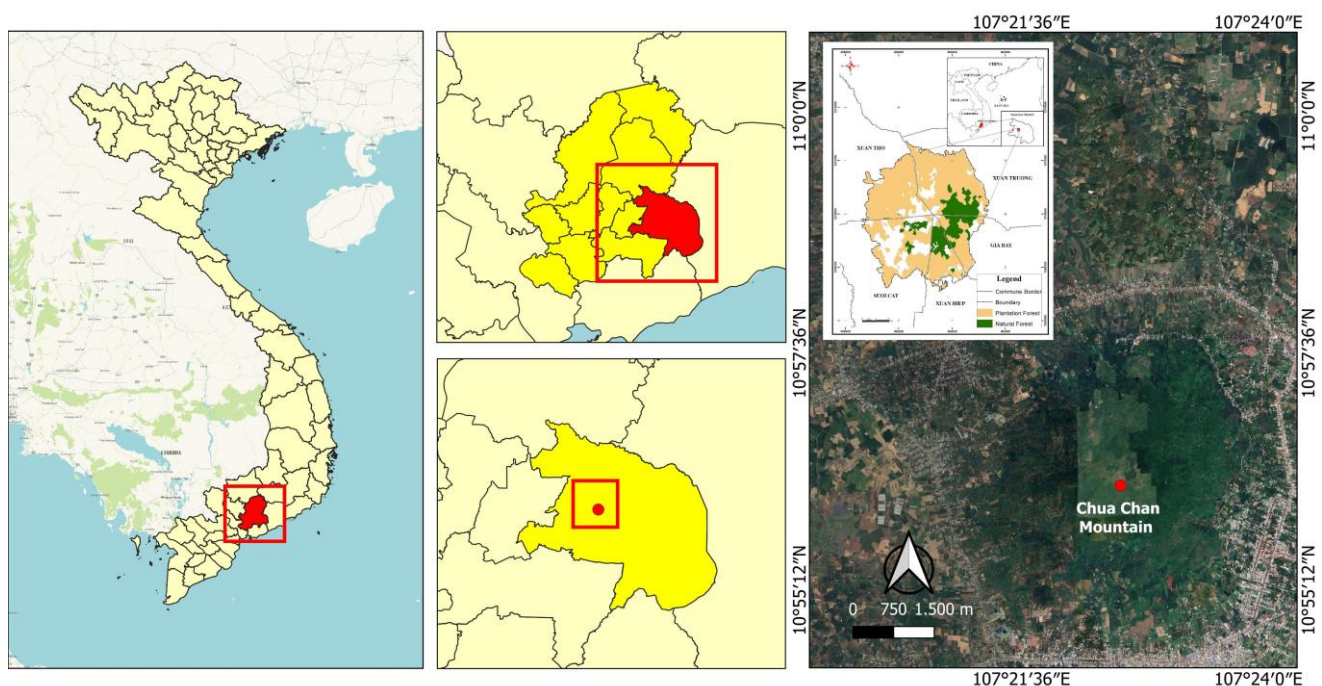


Figure 1. The location of the Chua Chan Mountain, Vietnam

Besides its natural scenery, Chua Chan Mountain is also a sacred spiritual and cultural site that attracts thousands of pilgrims every year. It has significant religious spots, including Buu Quang Pagoda and a century-old banyan tree with three intertwined trunks, which carry profound symbolic meanings to the indigenous people as well as tourists. These cultural and spiritual elements enrich the tourism value of the mountain as a unique destination that balances nature-based tourism and religious heritage. Locally, the site now already attracts a significant number of domestic tourists, with around 1.3 million tourists visiting during the years 2016 to 2022, generating about 17 billion VND in revenue. Yet, the progress of tourism has been hampered by poor infrastructure as well as a lack of quality and diversified tourism products (CCISXL 2022).

Sample study and data collection

The sampling design in this study aimed to capture a diverse range of perspectives from stakeholder groups involved in tourism development in the Chua Chan Mountain area, Xuan Loc District, Dong Nai Province, Vietnam. To ensure representativeness, a stratified random sampling method was used, with stratification into key groups including local residents, tourists, tourism businesses, government agencies, and experts in the field of environment and culture. This approach allows for a comprehensive capture of perceptions and assessments related to the economic, socio-cultural, and environmental dimensions of tourism activities in the study area (Reihanian et al. 2012; Peters et al. 2018).

The sample size was determined based on the formula of Yamane (1967) and Phan et al. (2023), a popular statistical tool in determining the appropriate sample size to balance between accuracy and feasibility in data collection (Yamane 1967; Widiastutie et al. 2025). The formula is applied as follows:

$$n = \frac{N}{1+N.(e)^2}$$

Where, n is the number of samples to be surveyed, N is the size of the target population (including residents and visitors in Xuan Loc), and e is the allowable error level (usually ranging from 1.0% to 10.0%). In this study, the error level was chosen as 6.0% to balance between accuracy and limited research resources. With an estimated total population of 245,979 (including 83,384 residents and 162,595 tourists), the required sample size was calculated as follows:

$$n = \frac{245,979}{1+245,979.(0.06)^2} \approx 277 \text{ (respondents)}$$

To increase the reliability of the results and to provide for non-response, the final sample size was adjusted to 300 participants. The sample allocation was made based on the consideration of the relevance and influence of each stakeholder group on tourism activities in the study area. The final sample structure included: 85 local residents, 165 tourists, 30 tourism business representatives, 10 managers or policy makers, and 10 experts in the fields of

environment and culture. This allocation ensures that perspectives from groups directly and indirectly involved in tourism development are fully and balanced reflected (Shikary and Rudra 2023).

Among stakeholders, local residents living near Chua Chan Mountain were a key group because they provided insights on the social, economic, and environmental impacts of tourism on their livelihoods. Their opinions on cultural values and traditions were especially important for identifying opportunities to incorporate local heritage into sustainable tourism development. To gauge visitor satisfaction and attitudes, tourists were surveyed during their visit to Chua Chan Mountain. Their feedback offered valuable insights into the strengths and weaknesses of existing tourism infrastructure and services. Tourism-dependent businesses, including accommodations, eateries, and souvenir vendors, were consulted to understand the economic potential and challenges of current tourism activities. Additionally, government officials and policymakers from local and regional levels shared their understanding of regulations, infrastructure projects, and policy initiatives affecting tourism in the area. Environmental and cultural experts were also involved, providing deeper perspectives on the environmental and cultural aspects of developing sustainable tourism. Before conducting the survey, a pilot study was carried out to refine the research tools, ensuring the survey questions were relevant and clear. This preparatory step validated the questionnaire's structure and improved the reliability of the data.

The formal data collection was done from November 2023 to June 2024, utilizing semi-structured questionnaires, in-depth interviews, and focus group discussions to offer both qualitative and quantitative details. The questionnaire of the survey consisted of three main sections. The initial section provided the respondents with an introduction to the study objectives and significance so that they respondents could comprehend the context of the research. The second section was given to opinions on Chua Chan Mountain's opportunities, strengths, weaknesses, and threats from stakeholders and potential strategies towards sustainable tourism development. The third section compiled demographic and socio-economic data to put replies into perspective and analyze differences across stakeholder categories.

To guarantee the integrity of the data collection process, a research team with extensive expertise in tourism and sustainable development conducted surveys and in-depth interviews. The data collection process adhered strictly to ethical research principles, focusing on confidentiality, anonymity, and voluntary participation from respondents. Informed consent was obtained from all participants; confidentiality and anonymity were guaranteed during interviews and surveys; and data were stored securely and used solely for academic purposes (Brittain et al. 2020; Ibbett and Brittain 2020; Nguyen et al. 2021).

The gathered data were analyzed using Microsoft Excel 2019 to compute essential quantitative indicators, such as satisfaction levels and opinion assessments. This quantitative analysis was further enriched by qualitative insights derived from semi-structured interviews and focus

group discussions. Together, these data help clarify the components of the SWOT analysis and serve as a foundation for suggesting policy recommendations and development plans. The credibility of these recommendations is validated through the use of the QSPM. Additionally, the expert-assigned weightings were validated through a consistency check. The Coefficient of Variation (CV) for each expert's ratings within the same SWOT category was calculated to assess the level of agreement. Factors with CV values exceeding 0.30 (30%) were reviewed and discussed with the experts, and adjustments were made as necessary to ensure reliable and coherent judgments.

By employing a thorough and systematic approach to sample design and data collection, this study ensures the reliability and clarity of its findings. Consequently, it provides valuable insights into the opportunities and challenges associated with sustainable tourism development in the Chua Chan Mountain region. Moreover, the research results enhance the understanding of how strategic tools can be applied to strike a balance between economic objectives, environmental conservation, and the preservation of cultural and social values in the context of ecotourism development.

The SWOT analysis

The SWOT analysis was the main research method applied in this study, generating a methodical approach to examining the internal and external determinants impacting the sustainable tourism development of Chua Chan Mountain. By classifying these determinants as strengths, weaknesses, opportunities, and threats, the analysis presented a general view of the potential and challenges of the site currently (Figure 2). Surveys, interviews, and field observation were employed to rigorously synthesize data that were utilized to fill the SWOT matrix so that the analysis was based on empirical data and diverse stakeholder inputs. The SWOT method is particularly well-suited for its capacity to identify and organize the most important internal and external factors for success in a particular goal or objective (Harfst et al. 2010; Ommani 2011; Ghorbani et al. 2015; Jeelani and Shah 2024).

Classification of internal and external factors: The first step of the analysis was to classify factors as internal (strengths and weaknesses) and external (opportunities and threats) (Helms and Nixon 2010). Internal factors are those characteristics that are inherent to the destination, such as its biodiversity, infrastructure, and cultural significance, while external factors are general environmental, economic, and social conditions affecting tourism development. The internal factors were plotted in the Internal Factor Estimate Matrix (IFEM), and the external factors were placed in the External Factor Estimate Matrix (EFEM) (Cordon et al. 2023). The matrices were quantitative tools for ascertaining how significant each factor was in relation to sustainable tourism development (Ghorbani et al. 2015; Shikary and Rudra 2023).

Weighting and scoring process: To make the analysis rigorous and data-driven, each factor was assessed and scored by a panel of experts. The process of weighting and scoring was done systematically.

Weight assignment: Each factor was assigned a coefficient between 0 and 1, showing its relative significance in its contribution or inhibition to the development of tourism. A weight close to 1 indicates a very significant factor, while a weight close to 0 suggests minimal relevance.

Scoring: Each factor was then scored on a scale of 1 to 4, where: 1 represents a fundamental weakness, 2 indicates a minor weakness, 3 denotes a strength, and 4 reflects a significant strength.

These scores were based on field observations, stakeholder insights, and an evaluation of Chua Chan Mountain's status as a tourism destination.

Final score calculation: The final score for each factor was obtained by multiplying its weight by its assigned score. For instance, a strength with a weight of 0.03 and a score of 3 would yield a final score of 0.09.

Total score evaluation: The total final score for the IFEM was calculated by summing the weighted scores of all internal factors. A total score: below 2.5 indicates that weaknesses outweigh strengths, above 2.5 suggests that strengths outweigh weaknesses (Bohari et al. 2013).

These steps were repeated for the EFEM, where a total score below 2.5 signifies that threats surpass opportunities, while a score above 2.5 reflects the dominance of opportunities over threats (Karbasi et al. 2007; Mallick et al. 2020).

The findings of the SWOT analysis served as the input for subsequent strategic planning using the QSPM. By the orderly consideration of the factors, the analysis allowed the identification of actionable strategies to leverage the strengths and opportunities and mitigate the weaknesses and threats. By doing so, the recommendations are not only contextually relevant but also in relation to broader sustainability objectives, towards the long-term sustainability of Chua Chan Mountain as a sustainable tourism destination.

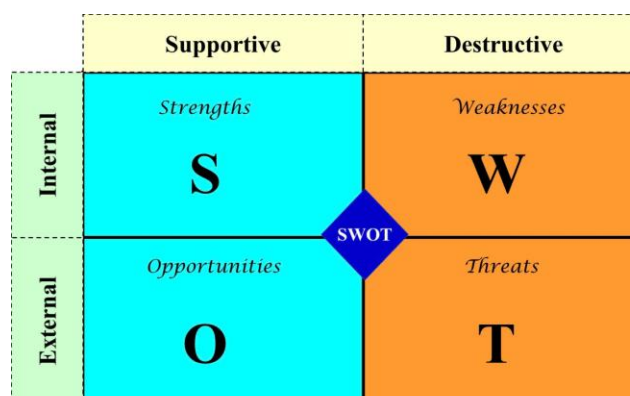


Figure 2. Supportive and destructive aspects of internal and external factors (adapted from Jeelani and Shah (2024))

QSPM approach

The QSPM approach was applied to prioritize strategic options for sustainable tourism development in the Chua Chan Mountain area. Following the SWOT analysis step, QSPM acts as a quantitative tool to support the assessment of the attractiveness of different strategic options by assigning scores based on internal and external factors. This method is particularly useful in transforming qualitative data into a clear quantitative basis, thereby ensuring that the decision-making process is carried out in an objective, well-founded, and transparent manner (Abya et al. 2015; Mallick et al. 2020; Jeelani and Shah 2024).

The QSPM implementation process begins with the selection of key factors from the SWOT analysis, which are grouped into strengths, weaknesses, opportunities, and threats. Each factor is assigned a weight that reflects its relative influence on tourism development outcomes, based on a synthesis of expert opinions and stakeholder perspectives. Strategic options developed based on the SWOT analysis results will be evaluated based on these factors. Each strategy receives a Total Attractiveness Score (TAS), which is calculated by multiplying the weight of each factor by the corresponding attractiveness score of that strategy, then adding the values (Ghorbani et al. 2015; Mallick et al. 2020). A higher TAS value indicates that the strategy has a higher potential for success in a practical context.

Using QSPM not only provides a clear roadmap for prioritizing strategic options but also contributes to increasing transparency and trust in the decision-making process. By combining rigorous quantitative methods with a deep foundation of qualitative data, QSPM helps ensure that proposed strategies for tourism development at Nui Chua Chan are both practically feasible and consistent with local aspirations and global sustainable development orientations.

RESULTS AND DISCUSSION

Internal Factor Estimate Matrix (IFEM)

The IFEM was developed to systematically evaluate the internal factors—both strengths and weaknesses—that influence sustainable tourism development at Chua Chan Mountain. A total of 11 strengths and 10 weaknesses were identified through field surveys and stakeholder consultations (Table 1). These factors were weighted and scored to quantify their relative importance and effectiveness in contributing to or hindering tourism growth. For strengths, the weights assigned to the identified strengths ranged between 0.02 and 0.08, with scores varying from 2 to 4, reflecting their level of contribution to the region's tourism potential. Among the strengths, “Scenic natural beauty, diverse flora and fauna, and high potential for cultural, ecotourism, and festival tourism”, “Rich cultural heritage and historical sites of revolutionary significance”, and “Clean, unpolluted, tranquil environment distant from urban bustle” received the highest weights, highlighting their critical role in attracting visitors and supporting sustainable tourism. In contrast, strengths such as “Favorable geographical location with dynamic economic potential and connectivity to key economic zones (Central Highlands,

South-Central Coast)”, “Handicraft villages producing unique traditional goods attractive to tourists”, and “Sufficient basic infrastructure, with convenient transport and shopping facilities” received lower weights. While these factors are important, their limited current utilization in tourism activities diminishes their overall impact. To the weaknesses, the weights assigned to weaknesses ranged from 0.03 to 0.06, with scores between 2 and 3, reflecting the degree to which these factors constrain tourism development. Among the weaknesses, “Diverse but scattered tourism resources without complete development into cohesive tourism products” and “Limited diversity and appeal of tourism products without distinct local branding” received the highest weights, indicating critical gaps in the region's ability to present unified and appealing tourism offerings. Conversely, weaknesses such as “Outdated and limited information and communication systems at tourism sites” and “Lack of knowledge and skills in tourism activities, especially for international visitors” were assigned lower weights, reflecting their relatively minor yet notable impact on the overall tourism experience.

The final scores for each internal factor were calculated by multiplying their respective weights by their scores. In Table 1, the total score for strengths was 1.55, while the total for weaknesses was 1.13, resulting in an overall IFEM score of 2.68. As this value exceeds 2.5, it indicates that the strengths outweigh the weaknesses in the context of sustainable tourism development at Chua Chan Mountain. This finding highlights the destination's substantial potential for growth, provided its strengths are effectively leveraged and its weaknesses are systematically addressed.

External Factor Estimate Matrix (EFEM)

Table 2 summarizes the external opportunities and threats influencing ecotourism development. Eight opportunities were identified and assigned weights between 0.07 and 0.12, reflecting their relative importance in enhancing tourism at Chua Chan Mountain. The factor “Chua Chan Mountain has underutilized natural and cultural resources compared to regional competitors” was assigned the highest weight of 0.12, emphasizing its critical role in distinguishing the destination from competing sites. Similarly, “Favorable policies encourage local authorities to prioritize tourism development” received a high weight of 0.10, recognizing the significance of government support in fostering ecotourism initiatives. Other factors, including “Proximity to key tourist hubs like Ho Chi Minh City and Vung Tau”, “Economic and social improvements driving higher tourism demand”, and “Growing investor interest in ecotourism”, were weighted at 0.07, reflecting their supportive but less critical roles. Effectiveness scores for opportunities ranged from 2 to 4, with the highest score assigned to “Chua Chan Mountain's underutilized resources”, which received a final score of 0.48. This underscores the mountain's potential for sustainable development if its natural and cultural assets are leveraged effectively. Additionally, “Favorable policies” and “Government plans supporting ecotourism” scored 0.30 and 0.21, respectively, further emphasizing the strategic importance of policy frameworks in driving tourism growth.

Table 1. Internal Factor Estimation Matrix (IFEM)

Internal factors	Weights	Effectiveness score	Final score
Strengths	0.52		1.55
S1. Favorable geographical location with dynamic economic potential and connectivity to key economic zones (Central Highlands, South-Central Coast).	0.03	3.00	0.09
S2. Clean, unpolluted, tranquil environment distant from urban bustle.	0.06	3.00	0.18
S3. Scenic natural beauty, diverse flora and fauna, and high potential for cultural, ecotourism, and festival tourism.	0.08	4.00	0.32
S4. Rich cultural heritage and historical sites of revolutionary significance.	0.08	4.00	0.32
S5. Diverse and vibrant cultural practices and traditional festivals.	0.05	3.00	0.15
S6. Handicraft villages produce unique traditional goods attractive to tourists.	0.03	2.00	0.06
S7. Sufficient basic infrastructure, with convenient transport and shopping facilities.	0.03	2.00	0.06
S8. Stable security, safety, and sanitary conditions.	0.03	2.00	0.06
S9. Friendly, hospitable local population.	0.05	3.00	0.15
S10. Unique culinary offerings appeal to visitors.	0.03	2.00	0.06
S11. Unique tourism characteristics in the region.	0.05	2.00	0.10
Weaknesses	0.48		1.13
W1. Diverse but scattered tourism resources without complete development into cohesive tourism products.	0.06	3.00	0.18
W2. Limited diversity and appeal of tourism products without distinct local branding.	0.06	3.00	0.18
W3. Inadequate accommodations and weak infrastructure development for tourism.	0.05	2.00	0.10
W4. Insufficiently trained and low-quality workforce in the tourism sector.	0.05	2.00	0.10
W5. Ineffective promotion and marketing of the province's tourism.	0.05	3.00	0.15
W6. Persistence of begging, street vending, and superstitious activities.	0.05	2.00	0.10
W7. Weak connections among local and regional tourism sites.	0.05	2.00	0.10
W8. Inadequate restaurants and dining services, lacking hygiene and diversity.	0.05	2.00	0.10
W9. Outdated and limited information and communication systems at tourism sites.	0.03	2.00	0.06
W10. Lack of knowledge and skills in tourism activities, especially for international visitors.	0.03	2.00	0.06
Total	1.00		2.68

Note: A final score greater than 2.5 indicates a favorable internal condition. Source: Authors' analysis in 2024

Table 2. External factor estimation matrix

External factors	Weights	Effectiveness score	Final score
Opportunities	0.64		1.69
O1. Vietnam's increasing economic integration opens opportunities to attract tourism investors.	0.07	2.00	0.14
O2. Economic and social improvements in Vietnam are driving higher tourism demand.	0.07	2.00	0.14
O3. Proximity to key tourist hubs like Ho Chi Minh City and Vung Tau offers strategic connectivity.	0.07	2.00	0.14
O4. Chua Chan Mountain has underutilized natural and cultural resources compared to regional competitors.	0.12	4.00	0.48
O5. Existing government plans and frameworks support ecotourism and community development.	0.07	3.00	0.21
O6. Favorable policies encourage local authorities to prioritize tourism development.	0.10	3.00	0.30
O7. Tourism infrastructure development is a strategic priority for ecotourism.	0.07	2.00	0.14
O8. Growing investor interest in ecotourism and community-based projects.	0.07	2.00	0.14
Threats	0.36		1.00
T1. Global uncertainties, such as conflicts and pandemics, pose risks to tourism.	0.05	2.00	0.10
T2. Limited experience in developing competitive tourism strategies.	0.10	3.00	0.30
T3. Intense competition with other regional tourist destinations.	0.07	2.00	0.14
T4. Environmental risks from climate change and natural resource depletion.	0.05	2.00	0.10
T5. Weak local tourism management and limited awareness among stakeholders.	0.09	4.00	0.36
Total	1.00		2.69

Note: A final score greater than 2.5 indicates a favorable external condition. Source: Authors' analysis in 2024

Meanwhile, five threats were assigned weights ranging from 0.05 to 0.10, with scores reflecting the degree of risk they pose to tourism sustainability. The most highly weighted were "Limited experience in developing competitive tourism strategies" (0.10) and "Weak local tourism management and limited awareness among stakeholders" (0.09). These factors point to central challenges for capacity-building and stakeholder engagement fundamental

to sustainable tourism development. All the other threats, such as "Intense competition with regional tourist destinations" (0.07), "Global uncertainties, including conflicts and pandemics" (0.05), and "Environmental risks from climate change and natural resource depletion" (0.05), were given lower weights. Although these factors represent risks, their lower weights indicate they are less immediate a concern in the view of the respondents than the lack of

strategic planning and management. Effectiveness scores of Threats ranged between 2 and 4, with "Weak local tourism management" having the highest score of 0.36, reflecting its strong negative impact on tourism development. "Limited experience in developing competitive strategies" was scored 0.30, highlighting the need for further capacity and strategic work to close these gaps.

The total weighted score for opportunities was calculated as 1.69, while the total for threats was 1.00, resulting in an overall EFEM score of 2.69. Since this value exceeds 2.5, it indicates that opportunities outweigh threats, suggesting a favorable external environment for sustainable tourism development at Chua Chan Mountain. This finding highlights the significant potential to capitalize on opportunities such as policy support, investor interest, and underutilized resources, while addressing threats through targeted interventions.

Developing strategies

SWOT strategies

SWOT analysis provided a systematic way of evaluating the most significant internal and external variables impacting sustainable tourism development in Chua Chan Mountain (Table 3). By determining the relationships between them, four sets of strategies were developed: SO (Strengths-Opportunities), WO (Weaknesses-Opportunities), ST (Strengths-Threats), and WT (Weaknesses-Threats). Each strategy was particularly crafted to address the study area's specific conditions with the goal of achieving a balance in the exploitation of strengths, compensation for weaknesses, taking opportunities, and neutralizing threats. In the initial case, the pairing of strengths and opportunities (SO) prioritizes the favorable conditions of the study area, enabling the implementation of aggressive strategies for maximum potential exploitation. For instance, the strategy to "Develop ecotourism and community-based tourism to attract tourists, students, and scientific researchers" was voted as the most preferred SO strategy. This strategy utilizes Chua Chan Mountain's biodiversity and cultural richness in line with the growing demand for ecotourism. Second, the combination of weaknesses and opportunities (WO) suggests a means of overcoming internal weaknesses through the utilization of external opportunities. The most feasible WO strategy was the "Improve service quality and diversify tourist products to increase revenue and jobs for

locals." This strategy converts weaknesses such as low infrastructure and low tourist product diversity into opportunities for socio-economic development. When strengths confront threats (ST), there is an emphasis on diversification strategies that minimize the effects of external threats by leveraging existing strengths. The most suitable ST strategy identified was "Develop extensive planning for ecotourism and community-based tourism for sustainability with less environmental impacts". The strategy emphasizes the requirement for ahead planning directed towards reducing weaknesses related to environmental degradation and regional competition. Finally, the interaction between weaknesses and threats (WT) serves as a warning for potential weaknesses and indicates the requirement for defensive measures. The highest-ranked WT strategy, "Train the workforce and increase local involvement in ecotourism and community-based tourism through sustainable tourism practices", is targeted at closing capacity gaps and encouraging community involvement to reduce vulnerability to external pressures.

QSPM strategies

The QSPM scores in Table 4 vary between 2.14 and 1.76 and indicate the relative importance of each strategy in meeting sustainable tourism goals at Chua Chan Mountain. The QSPM assessment identified ST1 as the optimal strategy, with TAS 2.14. The strategy, "Implement comprehensive planning for ecotourism and community-based tourism to ensure sustainability while minimizing environmental impacts," has top priority for incorporating environmental protection and community participation in planning tourism. The second-highest-ranked strategy, WO1 (TAS = 2.12), prioritizes "Improving service quality and diversifying tourism products to boost income and employment of local people." The strategy addresses critical weaknesses, e.g., the lack of diversified tourism products, by leveraging external opportunities such as growth in market demand and conducive government policies. Similarly, third-positioned strategy SO1 (TAS=2.04) is aimed at developing ecotourism and community tourism for the sake of attracting tourists, students, and scientific researchers. It capitalizes on the strengths of Chua Chan Mountain, including its high degree of biodiversity and cultural heritage, and keeps up with the global shift towards experiential and educational tourism.

Table 3. Ecotourism development strategies based on SWOT analysis

Category	Strategies
SO Strategies	SO1. Develop ecotourism and community-based tourism to attract tourists, students, and scientific researchers.
ST strategies	ST1. Implement comprehensive planning for ecotourism and community-based tourism to ensure sustainability while minimizing environmental impacts.
	ST2. Improve the information network and services to support ecotourism and community development.
WO strategies	WO1. Enhance service quality and diversify tourism products to increase income and employment for local residents.
	WO2. Promote the image of ecotourism and community-based tourism through strategic marketing.
	WO3. Develop policies and incentives to attract investment in lodging and recreational services.
WT strategies	WT1. Train the workforce and increase local participation in ecotourism and community-based tourism using sustainable tourism approaches.
	WT2. Collaborate with tourism companies to develop intra-provincial and regional tourism routes and packages.

Table 4. Results of QSPM analysis for SWOT strategies

Strategies	Total attractiveness score
ST1	2.14
WO1	2.12
SO1	2.04
WO2	1.94
WT1	1.94
WO3	1.83
ST2	1.76
WT2	1.78

The strategies with lower TAS, including WT2 (TAS=1.78), ST2 (TAS=1.76), and WO3 (TAS=1.83), represent less immediate priorities but remain relevant for long-term planning. WT2, which focuses on “Collaborating with tourism companies to develop intra-provincial and regional tourism routes and packages,” addresses the threat of regional competition and the weakness of limited connectivity. ST2, emphasizing “Improving the information network and services to support ecotourism and community development,” aims to enhance the destination's digital presence and service accessibility. While these strategies scored lower, their implementation can provide additional support to high-priority strategies, ensuring a comprehensive approach to sustainable tourism development.

Discussion

The findings of this study demonstrate the critical importance of integrating SWOT and QSPM methodologies for formulating data-driven strategies in sustainable tourism development. By leveraging the internal strengths and external opportunities of Chua Chan Mountain, while addressing weaknesses and mitigating threats, the analysis provides actionable insights for sustainable tourism planning.

The IFEM analysis highlights the urgent need to implement initiatives that effectively utilize the cultural and natural resources of the area. However, challenges such as inadequate infrastructure, a lack of diversity in tourism products, and fragmented resource development suggest that comprehensive improvements are necessary. This finding aligns with previous studies that recommend combining existing strengths with strategies to address weaknesses for sustainable development (Reihanian et al. 2012; Ghorbani et al. 2015; Nasehi et al. 2017). Simultaneously, the EFEM analysis reveals significant potential from external environmental factors, including supportive government policies, a rising demand for ecotourism, and competitive advantages derived from local cultural and ecological resources. To effectively capitalize on these opportunities, strategies must focus on attracting investment, enhancing local management capacities, and promoting stakeholder awareness. Additionally, addressing threats such as uncontrolled development pressure, competition from other destinations, and resource depletion requires proactive and comprehensive management measures, consistent with current research evidence (Reihanian et al. 2012; Jeelani and Shah 2024).

Based on the SWOT analysis, eight priority strategies were proposed for sustainable ecotourism development in Nui Chua Chan. The SO and ST strategies emphasize the ability to leverage existing strengths in connection with market and policy opportunities. In contrast, the WO and WT strategies focus on addressing current constraints through infrastructure development, training for human resources, and increasing local community participation. Integrating these strategies into master planning will not only enhance local capacity for sustainable development but also create a replicable model for similar areas in Vietnam (Ghorbani et al. 2015; Karkehabadi and Shamsi 2017).

The QSPM methodology was employed to rank the eight priority strategies based on their TAS. The results indicated that strategy ST1 – “Formulate comprehensive planning for community-based tourism and ecotourism towards sustainability with minimal environmental impact” – received the highest score. This strategy underscores the urgent need for a comprehensive plan that balances natural resource conservation with local socio-economic development. Its top priority reflects the increasing global trend of focusing on sustainable tourism development models, consistent with the arguments put forth by Harfst et al. (2010) and Palmer and Chuamuangphan (2018). These findings are also consistent with research in Changbai Mountain, China (Fan et al. 2023) and Chongqing's Tea Mountain and Bamboo Forest (Wang et al. 2024), which emphasized that offensive strategies—particularly comprehensive planning—should be prioritized when strengths and opportunities outweigh weaknesses and threats. The analysis also indicates that WO1 – “Developing service quality and diversifying tourism products” – plays a crucial role in overcoming internal weaknesses while taking advantage of external opportunities. By enhancing visitor experiences and offering personalized and experiential products, this strategy addresses current market trends effectively. Similarly, strategy SO1 – “Developing ecotourism and community-based tourism to attract researchers and students” – effectively leverages the unique advantages of Nui Chua Chan, thereby strengthening the competitive positioning of this destination in the academic and ecotourism segments. These results are supported by studies in Sarbaz County, Iran (Raeesi et al. 2020) and the Vennaei Watershed, Iran (Naserianasl et al. 2021), which confirm that leveraging ecological strengths and ensuring community participation are essential for successful ecotourism development. Although strategies with lower scores, such as WT2 – “Collaborating with tourism enterprises to establish regional tourist itineraries” and ST2 – “Developing the tourism information system,” were not prioritized in the current period, they still play important roles in the long-term development process. These strategies directly support global sustainability efforts by advancing the objectives of Sustainable Development Goal (SDG) 11 – Sustainable Cities and Communities, and SDG 15 – Life on Land. The emphasis on local engagement, biodiversity protection, and cultural preservation contributes to national tourism policies while aligning with

the wider agenda for sustainable development in Southeast Asia. This underscores the potential of applying the QSPM-derived strategies as a practical tool for integrating community-based planning with sustainability objectives..

The analysis also highlights some significant challenges to the goal of sustainable tourism development in Nui Chua Chan. Firstly, major infrastructure constraints, particularly poor quality of accommodation and poor transport systems, continue to be barriers to attracting international tourists. This finding is consistent with studies in Hambalang Village and Tajur Village, where infrastructure problems were identified as a major constraint to tourism development (Hijarulloh et al. 2024). Similarly, Priyana and Prihartanto (2024) found that deficiencies in transport, accommodation, and cultural preservation infrastructure undermine the potential for cultural tourism development. Historical data from Vietnam from 1995-2019 also show that strategic investment in infrastructure – including transport, accommodation, and support services – has a positive impact on international tourist arrivals (Nguyen 2021). Therefore, systematic and long-term planning and investment in tourism infrastructure play an essential role in enhancing the visitor experience as well as promoting the tourism development potential of Chua Chan Mountain. Overcoming current limitations through targeted and clearly oriented investments is expected to create a breakthrough in enhancing the competitiveness of the area on the national and international ecotourism map. Second, inadequate engagement by local communities in tourism activity also underscores the need for heightened capacity-building efforts. Previous work on Community-Based Tourism (CBT) emphasizes empowering local communities through participation in tourism planning, decision-making, and benefit-sharing (Fennell 2008). Capacity building is particularly appropriate to rural area sustainable tourism development, as it provides social inclusion, economic empowerment, and cultural preservation (Aref and Redzuan 2009; Biju 2023). Positive correlation exists among community welfare, community involvement, and building capacity, as evident in the research of Rodrigues et al. (2014) and Provia et al. (2017). Nevertheless, certain problems, such as funding constraints, unequal power distribution, and concerns about the long-term sustainability of these activities, persist (Biju 2023). For the mitigation of these inhibitions, effective governance systems and capacity-building programs with a strategic framework are needed (Biju 2023). Therefore, CBT comes across as a highly efficient method of attaining sustainability and enhancing welfare in the local setting (Sánchez-Cañizares and Castillo-Canalejo 2014; Provia et al. 2017; Biju 2023). Active community involvement in tourism operations is the focus of this model, where locals can benefit from the socio-economic and cultural advantages of tourism. In addition, the dynamic community capacity needs to develop further in order to adapt to developing phases of tourism and altering business environments (Rasid et al. 2012). Through facilitation of coordination among stakeholders and ensuring regular capacity development, CBT can be a catalyst for sustainable tourism in Chua Chan Mountain. Field

interviews revealed that local stakeholders share diverse yet complementary perspectives on the challenges and opportunities of ecotourism development. A local business owner observed, "*The natural scenery here is spectacular, but services are not yet diversified enough to attract longer stays.*" A local resident emphasized, "*We are willing to participate in ecotourism if we receive proper training and support from authorities.*" Similarly, a tourism officer remarked, "*Chua Chan Mountain has significant potential, but better coordination among departments is needed to improve.*" These qualitative insights reinforce the quantitative prioritization results obtained through the QSPM analysis and highlight key dimensions of sustainable destination management—service diversification, community empowerment, and institutional coordination. Collectively, these findings suggest that the long-term success of ecotourism development at Chua Chan Mountain depends not only on strategic planning but also on empowering local communities, enhancing service quality, and fostering effective multi-stakeholder collaboration.

The threat of environmental degradation, combined with the increasingly evident impacts of climate change and the depletion of natural resources, creates an urgent need to integrate conservation objectives into tourism development planning. The application of strategies such as ST1 – "Implement comprehensive planning for ecotourism and community-based tourism to ensure sustainability while minimizing environmental impacts" – and WT1 – "Train the workforce and increase local participation in ecotourism and community-based tourism using sustainable tourism approaches" – are considered appropriate interventions to respond to these challenges. According to the World Tourism Organization (UNWTO 2018), these measures reflect global best practice in ensuring a balance between tourism development and maintaining ecological sustainability. These results have important practical value for policy makers, tourism developers, and conservation professionals. The prioritization of sustainability-oriented strategies highlights the urgent need to design policy mechanisms that support environmentally friendly investment, while promoting multi-stakeholder collaboration among stakeholders and strengthening the role of communities in the tourism value chain. One effective approach is to align local policies with the orientation of the national tourism development strategy, thereby increasing the international integration and competitiveness of local tourism initiatives. In addition, the application of the QSPM method in the strategic planning process has shown high portability and practical value. This model can be replicated and applied in other ecotourism destinations in the development stage. With a foundation that combines the rigor of quantitative analysis with the depth of qualitative understanding, QSPM not only improves the effectiveness of planning but also enhances the transparency and acceptability of stakeholders to the proposed strategies. Thus, this study provides important implications for local governance and conservation policy. However, certain limitations should be acknowledged, particularly the reliance on a single case

study and the subjective weighting of factors in the QSPM analysis. Future research could address these limitations by comparing multiple ecotourism destinations across Vietnam, incorporating complementary methods such as AHP, and employing longitudinal designs to capture dynamic changes in stakeholder perceptions and the long-term effectiveness of strategic interventions.

In conclusion, this study employed the SWOT and QSPM frameworks to systematically evaluate internal and external factors influencing sustainable tourism development at Chua Chan Mountain, Dong Nai Province, Vietnam. The analysis revealed that the site possesses substantial ecotourism potential, driven by its rich biodiversity, cultural heritage, and accessibility to major urban centers. The Internal Factor Evaluation Matrix (IFEM) score of 2.68 and the External Factor Evaluation Matrix (EFEM) score of 2.69 indicate that strengths and opportunities outweigh weaknesses and threats, suggesting a moderately favorable environment for ecotourism growth. Through QSPM prioritization, the top-ranked strategy—comprehensive ecotourism and community-based tourism planning (TAS=2.14)—emphasizes integrated planning that balances environmental protection, community participation, and economic benefits. Complementary strategies, such as improving service quality, diversifying tourism products, and strengthening institutional coordination, further support sustainable destination management. The study is limited to a single site and relies on expert judgment, which may introduce subjectivity. External factors such as climate change, policy shifts, and post-pandemic recovery were not fully considered, and the cross-sectional design limits temporal analysis. Future research should compare multiple ecotourism sites using methods like AHP, TOPSIS or Delphi for more objective weighting, apply longitudinal and GIS-based analyses, and examine digital innovation and green financing to strengthen community-based and resilient tourism development.

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