Pertanika J. Soc. Sci. & Hum. 33 (3): 1287 - 1316 (2025)

PERTANIKA JOURNALS

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

Factors Influencing Community Segmentation and Participation in Ecotourism of Bali Barat National Park

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ABSTRACT

This study provides an in-depth analysis of the factors influencing local community segmentation and participation in ecotourism initiatives within Bali Barat National Park, a protected area. Using logistic regression, the analysis explores how stakeholder engagement, operational performance, strategic importance, economic incentives, community tenure, and tourism occupancy predict active involvement. The results indicate that stakeholder engagement is the most significant positive predictor, suggesting that fostering community involvement is key to enhancing participation. Operational performance, particularly in asset management and organizational flexibility, also has a notable impact, though its influence is slightly weaker. In contrast, the strategic importance assigned to ecotourism activities has no significant impact on participation decisions. Economic incentives, such as earning above the minimum wage, play a critical role, with a high odds ratio indicating a strong likelihood of increased participation among higher-income individuals. Community tenure, or the length of residency, shows a positive correlation with participation, highlighting the importance of long-term relationships in fostering engagement

ARTICLE INFO

Article history:
Received: 01 March 2024
Accepted: 10 January 2025
Published: 26 June 2025

DOI: https://doi.org/10.47836/pjssh.33.3.16

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in ecotourism. The most notable finding is the significant effect of tourist-related occupancy on participation, with the odds ratio suggesting that visible benefits from ecotourism act as a powerful incentive for community involvement. The model's predictive accuracy (70.88%) and the Nagelkerke R Square value (0.603) indicate a strong fit and reliability. These findings provide valuable insights for developing targeted ecotourism policies that align with community characteristics, aiming to maximize engagement and promote sustainable practices within protected areas.

Keywords: Community engagement, ecotourism, logistic regression, protected area management, socio-economic incentives, tourism impact

INTRODUCTION

Ecotourism in forest-protected areas represents a unique integration of environmental conservation and community development (Vipulan et al., 2023). Bali Barat National Park's forest reserve exemplifies this connection, where the conservation of terrestrial ecosystems is inextricably linked to the livelihoods and cultural identity of the local population. The park's lush, forested landscapes, rich in biodiversity and natural beauty, have increasingly attracted ecotourism initiatives aimed at preserving its ecological integrity while enhancing socio-economic benefits for the Indigenous community. This symbiotic relationship between forest conservation and community welfare forms the foundation of sustainable ecotourism. Forest-protected areas, such as Bali Barat National Park, are often biodiversity hotspots that provide critical habitat for numerous species, including some that are endemic and endangered (Pramatana et al., 2022; Sutomo, 2021). Protecting these areas is not just a matter of ecological importance; it is also vital for maintaining the ecosystem services they provide (Phelan et al., 2020), including carbon sequestration, water regulation, and soil stabilization, all of which local communities depend on. The success of ecotourism as both a conservation and development tool depends heavily on the active participation of local communities (Ali et al., 2020; Forje et al., 2021). When local communities engage with ecotourism, they often become passionate and effective stewards of their environment, blending traditional knowledge with conservation science to manage forest resources sustainably (Berkes, 2004). The level of community involvement has a significant influence on the success of conservation efforts and the equitable distribution of benefits.

Studies from Asia and Africa underscore the importance of community engagement in the success of ecotourism. For instance, research in Uganda's Bwindi Impenetrable National Park found that direct community involvement in ecotourism improved local attitudes toward conservation (Ahebwa et al., 2012; Tumusiime & Sjaastad, 2014). Similarly, a study in Taman Negara, Malaysia's oldest national park, emphasized the significance of economic benefits

alongside local traditions in shaping community participation in ecotourism (Ching et al., 2019; Fan et al., 2023). In Iran, research in Lar National Park and the Jajrud Protected Area underscores how community participation influences the sustainability of ecotourism (Sobhani et al., 2022). Conversely, in Okomu National Park, Nigeria, community hostility has arisen due to the local population being stripped of their ownership rights, highlighting the necessity of including communities in decision-making processes for ecotourism to thrive (Digun-Aweto et al., 2019). An extended social exchange theory was applied in Gunung Ciremai National Park, Indonesia, to examine how community involvement, attachment, and perceived benefits influence support for tourism development, further illustrating the complex dynamics between ecotourism and community engagement (Nugroho & Numata, 2022). These examples align with the factors influencing ecotourism participation in Bali Barat National Park, emphasizing the importance of economic benefits, cultural integration, and active community involvement.

Stakeholder engagement is critical in managing forest-protected areas. The deep connection between local communities and their forest environments suggests that high levels of stakeholder involvement can lead to better conservation outcomes and foster sustainable community development (Abukari & Mwalyosi, 2020; Kowler et al., 2020). Engagement can take various forms, including participatory decision-making and economic involvement through ecotourism businesses. Effective operational performance in ecotourism management is also essential. It ensures that ecotourism activities align with conservation goals while minimizing negative environmental impacts (Zoysa, 2022). This includes managing visitor flow to prevent overuse, maintaining trails and facilities to avoid degradation, and developing interpretive programs that enhance visitor understanding and appreciation of the forest environment (Aktymbayeva et al., 2023). Additionally, strategic planning for ecotourism must consider long-term sustainability, adapting to changing environmental conditions and evolving community needs (Ardiantiono et al., 2018; Sánchez-Prieto et al., 2021). However, local stakeholders often focus more on immediate and tangible benefits than long-term strategic planning.

Economic incentives play a critical role in encouraging community participation in forest-based ecotourism (Zoysa, 2022). When local residents gain direct economic benefits, such as jobs or business opportunities that exceed the minimum wage, they are more likely to support conservation efforts. This economic empowerment helps reduce poverty and promotes sustainable resource use (Chan et al., 2021; Ren et al., 2021). Another significant factor is community tenure, referring to the length of time families or individuals have lived in the area. Long-term residents often have a strong connection to the forest, understanding its ecological rhythms and changes, making them more inclined to participate in ecotourism and

conservation activities. Finally, the visibility of ecotourism success, reflected in high tourist occupancy rates, serves as a strong motivator for community engagement (Chan et al., 2021). When communities see that ecotourism brings visitors and generates revenue, they are more likely to view it as a positive force for development and conservation.

Despite significant progress in ecotourism research, particularly in forest-protected areas such as Bali Barat National Park, several gaps remain. While existing studies emphasize the importance of community engagement, they often lack a comprehensive analysis of the diverse factors influencing participation in specific ecological contexts (Wondirad et al., 2020; Zhang et al., 2023). The relationship between socio-economic incentives and community engagement is still underexplored, particularly in culturally diverse regions with economies heavily reliant on tourism, such as Bali (Rosalina et al., 2023). Additionally, although the operational management of ecotourism is well-documented, its direct impact on community involvement in forest conservation efforts needs further examination (Ardoin et al., 2020). Another underexplored area is the effect of visible ecotourism benefits, like tourist occupancy rates, on local community perceptions and their willingness to participate (Nguyen et al., 2021, 2023).

Qualitative methods, such as in-depth interviews and focus groups, are effective in capturing the nuanced perspectives of local communities, offering deep insights into cultural and social dynamics. For example, research has shown how indigenous values influence community involvement in ecotourism (Ngo & Pham, 2023; Palmer & Chuamuangphan, 2021; Rahman et al., 2022). However, qualitative research is often criticized for its limited generalizability across different regions due to its context-specific nature. In contrast, quantitative methods offer scalability and statistical rigor, enabling the analysis of larger populations. For example, logistic regression has been used to identify the economic and social factors driving community participation in Komodo National Park (Sianipar et al., 2024) and in efforts to transform the mining area in Antar Karet Village into a GeoEcoEduTourism site (Sutrisno et al., 2024). Yet, quantitative approaches may overlook the cultural and contextual factors that qualitative methods are better equipped to capture. Mixed-method approaches combine the strengths of both qualitative and quantitative techniques, offering a more comprehensive understanding. Surveys and interviews can balance statistical data with the personal motivations behind community participation (Suryawan et al., 2024). However, implementing mixed-methods research can be resource-intensive and challenging, particularly in less-developed regions.

This study is anchored in Social Exchange Theory, which posits that individuals are more likely to engage in activities when they perceive clear benefits that align with their values. In the context of ecotourism, local community

members are motivated to participate when they anticipate socio-economic rewards and opportunities for involvement in decision-making processes. Stakeholder Theory further supports this approach by emphasizing the importance of including diverse stakeholders in sustainable tourism management, thereby ensuring their active engagement and shared benefits (Khazaei et al., 2015; Roxas et al., 2020; Waligo et al., 2013). This study evaluates key factors such as engagement and influence on willingness to participate, performance assessment, and strategic decision-making within the adaptive capacity framework (Suryawan, Gunawan, & Lee, 2025). Through Exploratory Factor Analysis (EFA) and a comprehensive logistic regression model, the research investigates the impact of these factors on community willingness to participate in ecotourism initiatives at Bali Barat National Park. The findings provide detailed insights into the drivers of community engagement, which are essential for designing targeted and effective ecotourism strategies. This approach utilizes ecotourism as a tool that conserves the unique forest environment of Bali Barat National Park and uplifts the local community, offering a replicable model for sustainable development in protected areas worldwide.

This paper's theoretical contribution lies in integrating the adaptive capacity framework with social exchange theory and stakeholder theory to explore community participation in ecotourism within protected areas. By applying the adaptive capacity framework, the study offers a comprehensive lens to assess the socio-economic, cultural, and operational factors influencing community engagement. The inclusion of social exchange theory emphasizes how socio-economic benefits, such as income and tenure, drive the community's willingness to participate, while stakeholder theory highlights the importance of inclusive decision-making processes for fostering active involvement. This integration provides a deeper understanding of how communities adapt to and engage with ecotourism initiatives, particularly in the context of Bali Barat National Park. Moreover, the study expands the application of the adaptive capacity framework by linking it to operational factors like flexibility and asset management, demonstrating its relevance in addressing practical challenges in sustainable tourism. Through its methodological approach, which employs exploratory factor analysis (EFA) and logistic regression, the paper also provides a replicable framework for identifying key drivers of participation. By contextualizing adaptive capacity in the domain of ecotourism, this study advances theoretical discourse on community engagement and adaptation, offering valuable insights for both scholars and practitioners in the field of sustainable development.

METHOD

Study Location

Taman Nasional Bali Barat, also known as Bali Barat National Park, is a pivotal

location for this study due to its unique ecological and cultural attributes (Figure 1). Located in the western part of Bali Island, the park encompasses an expansive area of approximately 77,000 hectares, representing about 10% of the island's landmass. This national park serves as a sanctuary for biodiversity, conserving a wide array of both terrestrial and marine life. Additionally, it is a critical conservation area for bird species. The park's significance is further underscored by its role as the habitat for the iconic Bali Starling (*Leucopsar rothschildi*), an endemic bird species that has become a symbol of Bali (Ministry of Environment and Forestry of Indonesia, 2022; Suryawan et al., 2024).

In addition to its ecological significance, Bali Barat National Park is known for its rich cultural diversity. Located between the districts of Jembrana and Buleleng, the park is home to major Balinese and Javanese communities whose cultural practices and traditions are closely linked to the surrounding environment. This integration of nature and culture was a key focus of the study. The unique cultural dynamics of the area, including the community's traditional knowledge, practices, and historical connection to the land, played a crucial role in shaping the data collection process and overall findings. For instance, Menjangan Island within the park features ancient and sacred temples,

Figure 1. Study location

and local customs and regulations govern the protection of these holy sites. The selection of Bali Barat National Park as the study site was strategic, offering a distinctive setting where the park's conservation goals intertwine with the livelihoods of the local communities. The park's rich biodiversity, combined with the cultural diversity of the surrounding population, provides a unique context for exploring how local participation in ecotourism is influenced by both ecological and cultural factors. This interplay between conservation and cultural heritage makes the park an ideal location for understanding the factors that influence community involvement in sustainable ecotourism.

Hypothesis Development

In the pursuit of understanding the multifaceted dynamics of ecotourism, Figure 2 presents a structured framework for hypothesis development designed to dissect the various elements influencing individuals' willingness to participate in ecotourism initiatives. This framework delineates three principal factors, each encompassing a set of indicators that reflect diverse aspects of ecotourism engagement and its perceived value by stakeholders. Factor 1 delves into active participation and influence, highlighting the integral role of stakeholders in shaping the policies and management strategies of marine ecotourism ventures. Factor 2 scrutinizes the operational facets of ecotourism, examining how performance in key areas such as asset management and organizational learning contributes to the broader objectives of ecotourism management. Meanwhile, Factor 3 sheds light on strategic imperatives, contemplating the significance

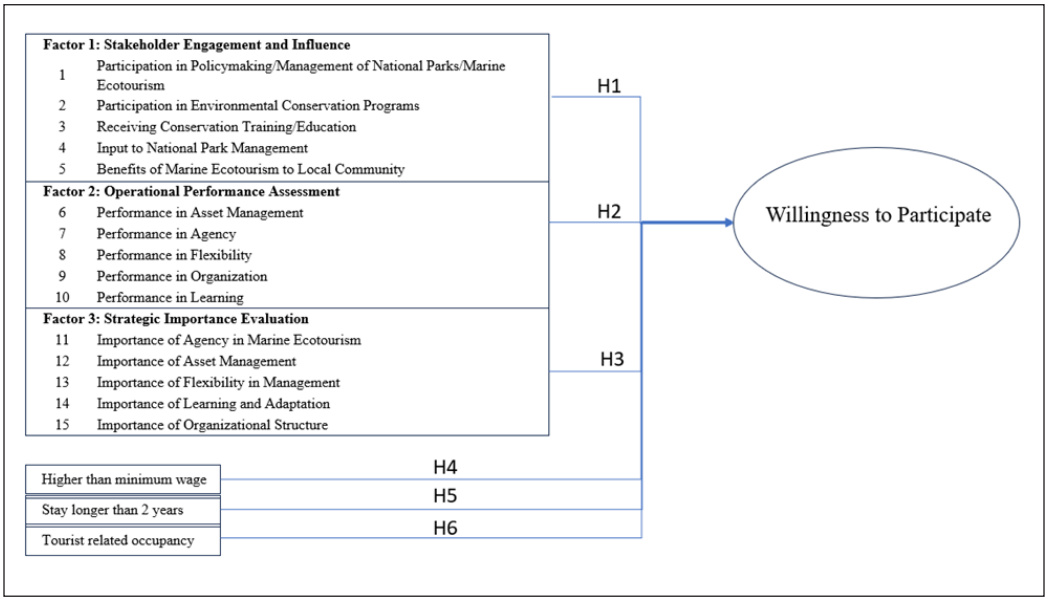

Figure 2. Hypothesis development for ecotourism initiatives

of adaptive learning and organizational structure in the success of ecotourism activities. Additionally, the framework explores supplementary hypotheses (H4, H5, and H6) that investigate the correlation between economic incentives, community tenure, and tourism-related metrics with the propensity for ecotourism participation. These hypotheses serve as pivotal threads linking theoretical underpinnings with empirical inquiry, setting the stage for a comprehensive analysis of the factors that drive individuals to invest their efforts in ecotourism practices.

H1: Stakeholder Engagement and Influence on Willingness to Participate

There is a strong positive correlation between stakeholder engagement in the policymaking and management of national parks or marine ecotourism and their willingness to participate in ecotourism initiatives. This hypothesis suggests that active involvement in conservation programs, decision-making processes, management input, and educational activities (Factor 1) increases stakeholders' commitment and likelihood of further engagement in ecotourism (Salman et al., 2021, 2023; Wondirad et al., 2020).

H2: Impact of Operational Performance Assessment on Participation

The perceived effectiveness of operational performance, covering aspects such as asset management, agency capabilities, flexibility, organizational structure, and learning (Factor 2), is expected to positively impact stakeholders' willingness to participate in ecotourism. Enhanced operational efficiency is likely to increase stakeholders' confidence, thereby encouraging active participation (Khan et al., 2021; Kuo et al., 2021).

H3: Strategic Importance Evaluation's Role in Participation Decisions

The value attributed to strategic elements, including agency in marine ecotourism, asset management, management flexibility, learning and adaptation, and organizational structure (Factor 3), is hypothesized to be positively associated with stakeholders' willingness to engage in ecotourism initiatives. The premise is that a higher recognition of strategic factors by stakeholders leads to greater engagement in ecotourism projects (Phan et al., 2023).

H4: Economic Incentives and Participation in Ecotourism

Higher-income individuals, particularly those above the minimum wage, are expected to increase their willingness to participate in ecotourism initiatives. This hypothesis highlights the importance of financial incentives in motivating active involvement in sustainable tourism practices (Roxas et al., 2020; Streimikiene et al., 2021).

H5: Community Tenure and Engagement in Ecotourism

Individuals who have lived in the community for more than two years are more likely to participate in ecotourism initiatives. This hypothesis is based on the idea that longer residency fosters stronger community ties,

resulting in a greater inclination to engage in local ecotourism activities.

H6: Tourist Occupancy as a Predictor of Participation

Higher tourist occupancy rates are predicted to have a positive relationship with the willingness to participate in ecotourism initiatives. This suggests that visible benefits from tourism, such as increased visitor numbers, can motivate local residents to support and engage in ecotourism activities (Chan et al., 2021; Guri et al., 2021; Wondirad et al., 2020).

Sampling and Data Collection Methodology

The data for this study were collected using a meticulous and culturally sensitive approach in the localities surrounding the ecotourism hotspots of Bali Barat National Park. From September to December 2023, our research team engaged with the community through face-to-face interviews, ensuring a personal touch and greater accuracy in responses. These interviews were conducted alongside the distribution of carefully designed questionnaires to households, particularly those in regions known for their direct involvement in ecotourism activities. Upholding the highest ethical standards in research, the team obtained informed consent and ensured transparency throughout the interview process. To achieve a representative sample and maintain statistical rigor, the study targeted a sample size of 522 households, calculated to ensure a 95% confidence level with a margin of error of less than 5%. We employed proportional systematic random sampling to guarantee unbiased representation from diverse local sectors within Bali Barat National Park.

Questionnaire Design

Table 1 summarizes the key components examined in this investigation into the determinants of stakeholder engagement in marine ecotourism initiatives. The interview process was designed to explore various dimensions of community involvement, operational performance, and the strategic significance of marine ecotourism within Bali Barat National Park. Integrating qualitative methods was essential for gaining deeper insights into personal experiences, cultural influences, and socio-economic barriers that quantitative approaches may not fully capture. Interviewees were asked about their participation in management and policymaking processes, with questions like: "How often do you participate in the management or policymaking processes related to national parks or marine ecotourism activities in Bali Barat National Park?" This question aimed to assess the extent of local involvement in decision-making. Additionally, participation in environmental conservation efforts was explored through questions such as: "How frequently do you engage in environmental conservation programs?" to evaluate the level of community involvement in preservation activities.

The interviews also addressed the importance of training and education by

Table 1
Item and question for the ecotourism factor for willingness to participate

No	Item	Question
1	Participation in policymaking/ management of national parks/ marine ecotourism	"How often do you usually participate in the management or policymaking processes related to the activities of national parks or marine ecotourism in Bali Barat National Park?"
2	Participation in environmental conservation programs	"How frequently do you participate in environmental conservation (maintenance) programs?"
3	Receiving conservation training/ education	"How often do you receive training or participate in educational programs related to environmental conservation (maintenance)?"
4	Input to national park management	"How frequently does the national park authority seek your advice or input on the management of the park and marine ecotourism activities in Bali Barat National Park?"
5	Benefits of marine ecotourism to the local community	"To what extent do you believe that the marine ecotourism activities in Bali Barat National Park are beneficial to your village and daily life?"
6	Performance in asset management for ecotourism	"How would you rate the performance in terms of asset management in the context of marine ecotourism in Bali Barat National Park?"
7	Performance in the agency for ecotourism	"How effectively do you think your agency or organization performs in the context of marine ecotourism in Bali Barat National Park?"
8	Performance in flexibility for ecotourism	"How would you rate the flexibility in operations or decision-making in the management of marine ecotourism in Bali Barat National Park?"
9	Performance in an organization for ecotourism	"How do you evaluate the organizational structure and effectiveness in the context of marine ecotourism in Bali Barat National Park?"
10	Performance in learning for ecotourism	"How would you assess the learning and adaptation aspects in the context of marine ecotourism in Bali Barat National Park?"
11	Importance of agency in marine ecotourism	"How important do you believe your agency or organization is in the context of marine ecotourism in Bali Barat National Park?"
12	Importance of asset management for ecotourism	"How significant do you think asset management is for the success of marine ecotourism in Bali Barat National Park?"
13	Importance of flexibility in management for ecotourism	"How crucial do you consider flexibility in operations or decision-making for the management of marine ecotourism in Bali Barat National Park?"
14	Importance of learning and adaptation for ecotourism	"How vital do you find learning and adaptation in the context of marine ecotourism in Bali Barat National Park?"
15	Importance of organizational structure for ecotourism	"How important do you perceive the organizational structure to be for the effectiveness of marine ecotourism in Bali Barat National Park?"

asking: "How often do you receive training or participate in educational programs related to environmental conservation?" This question aimed to gauge the availability of community engagement in capacity-building initiatives. Another area of focus was the relationship between the community and park authorities. Interviewees were asked how often their input was sought in park management, with questions like: "How frequently does the national park authority seek your advice or input on the management of the park and marine ecotourism activities?" to understand the level of collaboration between local stakeholders and park management. To evaluate the perceived benefits of ecotourism, questions such as: "To what extent do you believe that the marine ecotourism activities in Bali Barat National Park benefit your village and daily life?" were included to assess the socio-economic impact on the local population. The study also examined the operational performance of ecotourism management, where participants were asked to rate aspects such as asset management and operational flexibility. For example, questions like: "How would you rate the performance of asset management in the context of marine ecotourism?" and: "How would you rate the flexibility in operations or decision-making in the management of marine ecotourism?" provided valuable insights into the efficiency and adaptability of ecotourism activities to meet local needs. Lastly, questions addressing strategic importance, such as: "How important do you find learning and adaptation in the context of marine ecotourism?" were posed to gauge the community's views on the long-term sustainability of ecotourism efforts. These carefully crafted questions aimed to collect detailed, context-specific data on how the local community perceives and engages with ecotourism and how these perceptions influence their level of participation.

Data Analysis Protocols

The data analysis for this study utilized SPSS (version 24, IBM Corp.), beginning with Exploratory Factor Analysis (EFA) and followed by a reliability assessment to validate the consistency of the Likert-scale items in the survey. Logistic regression was selected as the primary analytical tool due to the binary nature of the dependent variable, "willingness to participate in ecotourism." This method was chosen for its appropriateness in examining factors that influence participation, providing a robust framework for analyzing key predictors, such as stakeholder engagement, operational performance, and economic incentives. EFA was employed to uncover latent constructs contributing to stakeholder engagement (Sianipar et al., 2024; Suryawan & Lee, 2024; Suryawan et al., 2024; Sutrisno et al., 2024). The choice of logistic regression, rather than linear regression, was deliberate, as it effectively handles categorical outcomes while EFA reduces complex variables into distinct factors, enhancing analytical clarity.

EFA played a crucial role in identifying latent constructs within the 19-item questionnaire, with stringent criteria applied to ensure robust analysis. The Kaiser-

Meyer-Olkin (KMO) measure exceeded 0.70, Bartlett's test of sphericity showed a significance level below 0.001, varimax rotation was used for clearer differentiation of components, Eigenvalues were above 1, and factor loadings exceeded 0.50. The reliability of the factors was assessed using Cronbach's alpha, with values ranging from 0.45 to 0.98 considered acceptable, and scores above 0.6 deemed satisfactory for the study's parameters (Nguyen et al., 2023; Sianipar et al., 2024). These measures ensured the internal consistency and reliability of the constructs derived from the EFA.

Once the latent constructs were identified, K-Means clustering analysis was employed to segment respondents into clusters based on their responses to the factors identified in the EFA. This clustering process was essential for providing a granular understanding of the varying attitudes among community members regarding participation in ecotourism initiatives. The elbow method was used to determine the appropriate number of clusters, ensuring that the segments were statistically validated. This approach allowed for effective differentiation of respondents and an analysis of how their engagement varied according to specific factors. Considering the binary nature of the dependent variable (willingness to engage in ecotourism management), logistic regression analysis was then used to explore the relationships between the identified factors and participation. The robustness of the logistic regression model was evaluated through several tests, including the Omnibus test for overall model significance and the Hosmer and Lemeshow test for goodness of fit. Additionally, the accuracy of the model's predictive power was reflected in the percentage of instances correctly classified. These evaluations confirmed the reliability of the logistic regression model and ensured that the results provided a meaningful understanding of the drivers behind community participation in ecotourism. Throughout the analysis, particular attention was given to how operational indicators such as asset management and organizational flexibility interact with sustainability and local cultural practices. By linking operational performance with cultural practices, we gained a deeper understanding of how ecotourism initiatives could be aligned with the community's cultural context. For instance, efficient asset management was not only a measure of operational success but also a reflection of local traditions of land stewardship, which play a key role in community perceptions of ecotourism.

RESULT

Table 2 presents the results of the Exploratory Factor Analysis (EFA) conducted to identify the key dimensions of stakeholder engagement in the ecotourism program at Bali Barat National Park. This analysis plays a crucial role in understanding the complex interactions between stakeholders and the factors influencing their participation and performance in ecotourism initiatives. By uncovering these latent constructs, the

Table 2
Exploratory factor analysis (EFA) for ecotourism program

No	Indicator	Factor Loadings	Eigenvalue	% of Variance	Cronbach's Alpha
Factor 1: Stakeholder engagement and influence			**4.635**	**25.572**	**0.923**
1	Participation in policymaking/management of national parks/marine ecotourism	0.922			
2	Participation in environmental conservation programs	0.920			
3	Receiving conservation training/education	0.885			
4	Input to national park management	0.880			
5	Benefits of marine ecotourism to the local community	0.702			
Factor 2: Operational performance assessment			**2.713**	**17.574**	**0.771**
6	Performance in asset management	0.767			
7	Performance in agency	0.757			
8	Performance in flexibility	0.703			
9	Performance in organization	0.644			
10	Performance in learning	0.635			
Factor 3: Strategic importance evaluation			**1.609**	**16.565**	**0.735**
11	Importance of agency in marine ecotourism	0.734			
12	Importance of asset management	0.729			
13	Importance of flexibility in management	0.693			
14	Importance of learning and adaptation	0.679			
15	Importance of organizational structure	0.592			

Note. Kaiser-Meyer-Olkin Measure of Sampling Adequacy =0.86, Bartlett's Test of Sphericity *p-value* <0.001

analysis aims to highlight the essential elements that contribute to the effectiveness and strategic importance of ecotourism in the region. The EFA was performed using a robust sample size, ensuring that the findings are both reliable and reflective of broader population perceptions. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity confirmed the suitability of the dataset for factor analysis.

The results in Table 2 reveal three distinct factors characterizing stakeholder engagement and perceptions within the ecotourism program at Bali Barat National Park. The first factor, 'Stakeholder Engagement and Influence,' emerged as the most significant, including elements such as participation in policymaking and involvement in environmental conservation programs. This factor had the highest eigenvalue, indicating it accounts for the largest proportion of variance among the identified factors. It also demonstrated strong internal consistency, with a Cronbach's Alpha of 0.923, signifying high

reliability. The second factor, 'Operational Performance Assessment,' encompasses indicators related to asset management performance, operational flexibility, and other key management aspects. Although this factor explains less variance compared to the first, its importance remains critical, as it reflects the operational processes essential for effective ecotourism management. The Cronbach's Alpha of 0.771 suggests a good level of internal consistency, indicating that the items within this factor are cohesive and reliable.

The third factor, 'Strategic Importance Evaluation,' includes indicators that capture the strategic value assigned to aspects such as agency in marine ecotourism and the emphasis on learning and adaptation. Although this factor accounts for the least variance among the three, it represents crucial elements for long-term strategic planning and sustainable development in ecotourism. The Cronbach's Alpha of 0.735 indicates a reasonable level of reliability for this factor.

The high factor loadings associated with 'Stakeholder Engagement and Influence' suggest that enhancing participation in conservation activities could significantly strengthen stakeholder commitment. In contrast, the insights from 'Operational Performance Assessment' highlight areas where tangible improvements in asset management and operational flexibility could enhance the efficiency of ecotourism activities. Lastly, the measures related to 'Strategic Importance Evaluation' underscore the need to boost adaptive capabilities and strategic foresight among stakeholders, which are vital for ensuring the long-term sustainability of the ecotourism program.

Table 3 presents the findings from a cluster analysis and ANOVA (Analysis of Variance) conducted to investigate the relationship between the identified factors of stakeholder engagement and their implications for ecotourism in Bali Barat National Park. This analytical approach segments stakeholders into distinct clusters based on their responses to the factors identified through exploratory factor analysis. Each cluster represents a unique stakeholder profile characterized by varying levels of engagement, operational performance assessments, and strategic importance evaluations in the context of ecotourism. The ANOVA test further examines the statistical significance of the mean differences across these clusters, providing insights into the variance that each factor contributes to the stakeholder profiles.

The first cluster, "Balanced Engagement Spectrum," exhibits a close-to-neutral association with all three factors, suggesting a moderate level of stakeholder engagement and influence, a balance in operational performance assessment, and a median view of strategic importance. This cluster may represent stakeholders who are evenly engaged across various areas of ecotourism without any particular area dominating their profile. The "Operational Excellence Focus" cluster demonstrates a positive score for Factor 1 and Factor 2, indicating a group of stakeholders who

excel particularly in the operational aspects of ecotourism. Their active engagement and strong operational performance suggest they may be key drivers in the day-to-day management of ecotourism activities, emphasizing the importance of effective asset management, agency performance, and organizational flexibility. Stakeholders in the "Strategic Development Seekers" cluster exhibit a negative association with Factor 2 and a strongly negative score for Factor 3, indicating that they recognize the need for and are actively seeking strategic development and improvements in their approach to ecotourism. Their lower scores in operational performance suggest a potential area for improvement. The "Emerging Stakeholders" cluster shows a slight positive score for Factor 2, indicating an emerging engagement in operational performance. This cluster may represent newcomers to the field or those with growth potential who have yet to fully develop their strategic approach to ecotourism. The ANOVA results indicate highly significant differences ($p < 0.001$) across the clusters for each factor, with large F-statistics suggesting a strong distinction between cluster means. This signifies that the clusters are well differentiated in terms of their engagement, operational performance, and strategic importance evaluations.

Table 4 provides an insightful segmentation of participant clusters based on demographics, socio-economic status, and willingness to participate in ecotourism initiatives in Bali Barat National Park. This segmentation enables us to discern patterns and trends within each cluster, offering a detailed understanding of the profiles that comprise the distinct stakeholder groups identified in the cluster analysis. The attributes considered include gender, age, income, and tourist-related occupancy, essential variables for understanding ecotourism dynamics and predicting willingness to participate in such initiatives. The chi-square test results accompanying each attribute offer a statistical examination of the distribution of these variables across the clusters.

The gender distribution across clusters is balanced, with no significant statistical difference ($\chi^2 = 1.387$, $p = 0.709$), indicating equal representation of male and female participants in all clusters. However, the age distribution shows significant variation ($\chi^2 = 36.118$, $p < 0.001$), suggesting that certain age groups are more dominant in specific clusters. For example, the 'Operational Excellence Focus' cluster has a higher representation of the 18–29 age group, highlighting the interest of younger participants in the operational aspects of ecotourism. Income levels also differ significantly across clusters ($\chi^2 = 51.721$, $p < 0.001$). Lower-income groups are less represented in the 'Operational Excellence Focus' cluster, implying a possible correlation between higher income levels and greater involvement in operational aspects of ecotourism. In contrast, the 'Strategic Development Seekers' and 'Emerging Stakeholders' clusters show more diverse income representation, suggesting that income levels may less influence strategic

Table 3
Cluster analysis and ANOVA test result

No	Factor	Cluster				Mean Square	F	Sig.
		Balanced Engagement Spectrum	Operational Excellence Focus	Strategic Development Seekers	Emerging Stakeholders			
1	Factor 1: Stakeholder engagement and influence	0.033	0.661	-0.972	-1.099	113.877	328.864	<0.001
2	Factor 2: Operational performance assessment	-2.137	0.260	-1.908	0.308	101.368	242.093	<0.001
3	Factor 3: Strategic importance evaluation	0.801	-0.089	-4.072	0.184	74.169	128.710	<0.001

Table 4
Segmentation of each cluster

Attribute		Balanced Engagement Spectrum (9.58%)		Operational Excellence Focus (56.13%)		Strategic Development Seekers (2.11%)		Emerging Stakeholders (32.18%)	
Gender	Male	24	4.60%	154	29.50%	4	0.77%	86	16.48%
	Female	26	4.98%	139	26.63%	7	1.34%	82	15.71%
	$\chi 2=1.387$, df=3, $p\text{-}_{value}=0.709$								
Age	18–29	21	4.02%	87	16.67%	1	0.19%	45	8.62%
	30–39	19	3.64%	106	20.31%	1	0.19%	45	8.62%
	40–49	7	1.34%	54	10.34%	4	0.77%	54	10.34%
	50-59	2	0.38%	42	8.05%	4	0.77%	17	3.26%
	≥60	1	0.19%	4	0.77%	1	0.19%	7	1.34%
	$\chi 2=36.118$, df=12, $p\text{-}_{value} < 0.001$								

Table 4 (*Continue*)

Attribute		Balanced Engagement Spectrum (9.58%)		Operational Excellence Focus (56.13%)		Strategic Development Seekers (2.11%)		Emerging Stakeholders (32.18%)	
Income	<IDR 2,500,000 (minimum wage)	17	3.26%	23	4.41%	4	0.77%	86	16.48%
	IDR 2,500,000 – IDR 5,000,00	24	4.60%	133	25.48%	2	0.38%	211	40.42%
	IDR 5.000.001 - IDR 10,000,000	9	1.72%	106	20.31%	5	0.96%	181	34.67%
	>IDR 10,000,000	0	0.00%	31	5.94%	0	0.00%	44	8.43%
	$\chi2=51.721$, df=9, $p\text{-}_{value} < 0.001$								
Occupancy	Tourist related occupancy	26	4.98%	272	52.11%	1	0.19%	61	11.69%
	$\chi2=186.837$, df=3, $p\text{-}_{value} < 0.001$								
Willingness to Participate	Willingness to participate for ecotourism initiative?	28	5.36%	270	51.72%	3	0.57%	69	13.22%
	$\chi2=152.048$, df=3, $p\text{-}_{value} < 0.001$								

development and emerging engagement in ecotourism. Tourist occupancy rates vary significantly across clusters ($\chi^2 = 186.837, p < 0.001$), with the highest occupancy observed in the 'Operational Excellence Focus' cluster. This suggests that areas with higher tourist occupancy may engage stakeholders more effectively in the day-to-day management of ecotourism activities. Notably, willingness to participate in ecotourism initiatives also varies significantly across clusters ($\chi^2 = 152.048, p < 0.001$). The highest willingness to participate is seen in the 'Operational Excellence Focus' cluster, indicating a strong link between operational engagement and the desire to further participate in ecotourism initiatives. The 'Emerging Stakeholders' cluster also demonstrates a high willingness to participate, reflecting the growing interest and potential for active involvement in ecotourism among this group.

The logistic regression model presented in Table 5 offers a comprehensive analysis of the factors influencing stakeholders' willingness to participate in ecotourism initiatives. It examines the interplay between stakeholder engagement, operational performance, strategic importance, economic incentives, community integration, and the impact of tourism activities on participation decisions. The model's predictive accuracy is demonstrated by a correct classification rate of 70.88%, which is a strong result compared to similar models in the field (Nguyen et al., 2023). The model's fit is further supported by the Cox and Snell and Nagelkerke R Square values of 0.422 and 0.603, respectively, indicating a strong model fit.

The implications of this study for ecotourism within protected areas, such as Bali Barat National Park, are multifaceted and offer valuable insights for both policymakers and practitioners in the field. The strong influence of stakeholder engagement on willingness to participate indicates that ecotourism initiatives must prioritize inclusive and participatory approaches (Sobhani et al., 2022). Involving local communities in activities and decision-making processes can foster a sense of ownership and lead to more sustainable outcomes (Coy et al., 2021). Establishing community advisory boards with local leaders and stakeholders can ensure that their perspectives are considered in ecotourism management decisions. Regular consultations, such as town hall meetings and surveys, are essential for collecting feedback and integrating community input into planning. To boost community involvement, creating local employment opportunities in ecotourism and providing training programs can equip community members with the skills needed to manage these activities. This approach not only enhances local ownership but also offers economic incentives for conservation. Additionally, integrating local cultural values through educational workshops on the cultural and environmental significance of the area can align tourism practices with community traditions, thereby increasing participation. Partnerships between local communities and private sector entities,

Table 5
Logistic model for willingness to participate in ecotourism initiatives

Variable	B	S.E.	Wald	Sig.	Exp(B)
Factor 1: Stakeholder Engagement and Influence	1.345	0.180	55.705	<0.001	3.839
Factor 2: Operational Performance Assessment	0.326	0.142	5.242	0.022	1.385
Factor 3: Strategic Importance Evaluation	-0.169	0.137	1.520	0.218	0.845
Higher than minimum wage	0.951	0.413	5.310	0.021	2.588
Stay longer than 2 years	0.535	0.117	20.903	<0.001	1.707
Tourist-related occupancy	2.477	0.325	57.948	<0.001	11.906
Constant	-0.676	0.279	5.863	0.015	0.509

Note. Percentage Correct: 70.881%; -2 Log likelihood: 343.4; Cox & Snell R Square: 0.422; Nagelkerke R Square: 0.603

such as ecotourism businesses or NGOs, can bring in resources and expertise to support sustainable development efforts. The positive association between operational performance and participation suggests that well-managed ecotourism sites are more likely to maintain stakeholder involvement. Investments in key operational areas, such as asset management, agency performance, and organizational flexibility, can enhance the overall quality of the ecotourism experience. Improved operational performance not only increases stakeholder engagement but also contributes to more effective conservation outcomes.

DISCUSSION

The empirical findings presented in this manuscript provide a nuanced understanding of community segmentation and participation in ecotourism within Bali Barat National Park, a key marine protected area. These findings offer significant contributions to theoretical frameworks, particularly through the lens of Social Exchange Theory, Stakeholder Theory, and the Theory of Planned Behavior. One key aspect is the direct relationship with social exchange theory, which posits that increased perceived benefits from ecotourism lead to greater community engagement (Nugroho & Numata, 2022; Sosa & Brenner, 2021; Tabaeeian et al., 2023). The analysis substantiates that fostering perceived benefits, such as economic gains or enhanced community well-being, could strategically enhance participation in conservation activities. This alignment with social exchange theory highlights the importance of tangible benefits in motivating community involvement and underscores the reciprocal nature of stakeholder participation in tourism (Bagadion & Capistrano, 2022; Ghaderi et al., 2023). Operational performance assessment reflects the principles of stakeholder theory by demonstrating how effectively managing stakeholder roles and operational processes can impact ecotourism outcomes. The findings suggest that the engagement levels of specific stakeholder groups are critical for the operational success of ecotourism initiatives

(de Grosbois & Fennell, 2022; Imelda et al., 2024; Suryawan et al., 2024). This factor emphasizes the need for an inclusive engagement strategy that recognizes and maximizes the contributions of diverse community segments. By optimizing operational performance, marine protected areas can better address the varying interests of stakeholders and enhance the overall efficacy of ecotourism programs (Suryawan, Rahman, et al., 2025; Zeng et al., 2022).

Strategic importance evaluation is closely tied to the theory of planned behavior, which links community attitudes and perceived control with their participation in ecotourism activities (Cao et al., 2022; Fenitra et al., 2023; Saflor et al., 2024). This factor highlights that strategic planning and acknowledgment of ecotourism's significance within community settings can influence behavioral intentions and actual participation. The theory supports the premise that if individuals recognize the strategic importance of ecotourism and feel they have control over their involvement, they are more likely to actively participate. Moreover, the data underscore the critical role of capacity building, aligning with the theory of capacity building. Enhanced skills and knowledge among community members are shown to increase engagement in ecotourism, underlining that capacity building is essential for sustainable management in marine protected areas. This finding suggests that investing in community training and education can significantly bolster the effectiveness of ecotourism initiatives by equipping local stakeholders with the necessary tools to engage meaningfully in ecotourism activities.

Numerous studies highlight the critical role of cultural diversity in shaping ecotourism practices. Indigenous knowledge systems, for instance, offer vital guidelines for sustainable resource management (Chapman & Schott, 2020; Lam et al., 2020), directly influencing community engagement in ecotourism. In Australia's protected areas, local traditions play a key role in ecotourism dynamics, where cultural heritage drives conservation efforts (Hill et al., 2020; Zeppel, 2003). Similarly, in Bali Barat National Park, cultural heritage is deeply intertwined with the local community's connection to the forest. Here, the forest is viewed not only as a resource but also as a sacred cultural landscape linked to religious beliefs and ancestral traditions. This connection fosters a strong conservation ethic, enhancing community participation in ecotourism efforts aimed at biodiversity preservation. However, cultural heritage can also impact community involvement in ecotourism. Traditional ceremonies and rituals, which often overlap with ecotourism activities (Predangga, 2021; Putra et al., 2023), help promote cultural tourism by preserving these practices while attracting visitors seeking authentic experiences. On the flip side, these cultural obligations may limit participation, as individuals may prioritize traditional roles over tourism-related opportunities (Chan et al., 2021; Pinheiro et al., 2021; Purnamawati et al., 2022).

The study integrates critical theory with sustainability measures in ecotourism, drawing parallels to the structured planning and implementation phases observed in the Bali Barat study. The application of the motivation-opportunity-ability model to heritage tourism in Malaysia identifies motivation, opportunity, and ability as key factors influencing community involvement in heritage conservation (Kunasekaran et al., 2022). This finding aligns closely with observations from Bali Barat, where operational efficiencies and community capabilities are essential for enhancing participation levels and supporting sustainable ecotourism initiatives. Research on the impacts of ecotourism in Tasik Kenyir illustrates how such developments influence the quality of life in local communities (Adam et al., 2019). These insights support the evaluations of strategic importance conducted in Bali Barat, emphasizing the need for strategic planning that considers socio-economic impacts to improve community livelihoods and participation in ecotourism projects. An examination of ecotourism's role in local community development within Indonesia provides a critical perspective on how ecotourism supports sustainable livelihoods (Jaya et al., 2024). The participation of researchers, ecotourists, policymakers, and local residents has been crucial in all aspects of community-based tourism. Finally, the categories extracted for community-based ecotourism sustainability were aligned with the standards of the Global Sustainable Tourism Council, including sustainable management, cultural sustainability, socio-economic sustainability, and environmental sustainability, culminating in a comprehensive model for sustainable community-based ecotourism (Hafezi et al., 2023).

To enhance community involvement, ecotourism initiatives in Bali Barat National Park must integrate cultural values into their operational and strategic frameworks. Aligning ecotourism with local customs ensures that it is perceived as a natural extension of the community's lifestyle rather than an external imposition. Programs that respect and incorporate local traditions are more likely to gain community support, fostering sustainability and resilience in conservation efforts. This approach is not unique to Bali Barat National Park. Comparative studies from Kinabatangan, Sabah (Chan et al., 2021), and Bwindi Impenetrable National Park in Uganda (Laudati, 2010; Lepp, 2012) demonstrate similar patterns where traditional practices significantly influence community participation in ecotourism. These examples underscore the importance of culturally sensitive approaches in protected areas, emphasizing the role of cultural engagement in enhancing community involvement. In Australia, incorporating traditional knowledge into ecotourism has led to more sustainable tourism practices in sensitive environments (Buultjens et al., 2010; Zeppel, 2003). Similarly, in the Amazon Rainforest, indigenous communities, particularly in the Ecuadorian Amazon (Buele et al., 2020), have played a central role in ecotourism

initiatives. These projects demonstrate how traditional knowledge of biodiversity can be leveraged to promote conservation through ecotourism, illustrating the vital role of cultural engagement in sustainable tourism practices worldwide.

Although this study primarily focuses on Bali Barat National Park, the inclusion of comparative insights enhances the generalizability of the results. These findings can also be applied to other protected areas in Indonesia, such as Komodo National Park, Gunung Leuser National Park, and Ujung Kulon National Park, which host rich biodiversity and Indigenous communities with deep cultural ties to their land. By integrating local cultural values into ecotourism frameworks, these parks can increase community participation and align tourism practices with traditional lifestyles. For instance, in Komodo National Park (Lasso & Dahles, 2021), incorporating the traditional knowledge of fishing communities can help sustainably manage marine resources while promoting ecotourism. Likewise, in Gunung Leuser National Park (Purwoko et al., 2022), a local understanding of the forest and its wildlife can inform ecotourism initiatives that support both conservation and cultural preservation. These comparisons place the study's findings within a broader global context, affirming the universal relevance of cultural and economic factors in shaping ecotourism participation. At the same time, regional differences highlight the need to tailor ecotourism strategies to the specific socio-cultural and ecological conditions of each location. This analysis underscores the robustness of the findings while acknowledging the necessity for localized solutions to address regional variations.

The long-term impacts of these initiatives are equally crucial. By fostering sustained community engagement and building capacity within local populations, ecotourism can ensure both ecological and economic stability. Ensuring that financial benefits and leadership roles remain within the community helps create resilient ecotourism models. Continued investment in operational improvements will enhance the sustainability of ecotourism sites, supporting conservation efforts and community involvement over the long term. Economic factors play a significant role in stakeholder participation in ecotourism. Capacity-building programs that equip local communities with skills for higher-paying roles within ecotourism projects can ensure broader financial benefits. The importance of community tenure indicates that long-term residents have a vested interest in the success of ecotourism initiatives. Programs that encourage community retention or integrate long-standing residents into leadership roles tend to achieve higher levels of success (Apelian, 2013; Selby et al., 2020). Additionally, the strong impact of tourist occupancy rates on willingness to participate suggests that visible signs of ecotourism success can motivate stakeholders. Effective marketing strategies that communicate the benefits and achievements of ecotourism can play a

crucial role in fostering local engagement (Koure et al., 2023).

The positive link between operational performance and stakeholder participation highlights the importance of efficient management in ecotourism sites. Investments in areas such as asset management, agency performance, and organizational flexibility can enhance the overall ecotourism experience, leading to higher participation rates and more effective conservation outcomes. Although this study primarily focuses on Bali Barat National Park, the comparative insights help contextualize the findings within a global framework, confirming the universal significance of cultural and economic factors in influencing ecotourism participation. Regional nuances emphasize the need for tailored ecotourism strategies that consider specific socio-cultural and ecological contexts. This comprehensive analysis strengthens the validity of the findings while recognizing the importance of localized approaches to address distinct regional challenges.

CONCLUSION

This research provides important insights into the factors driving local community segmentation and participation in ecotourism within Bali Barat National Park, with significant implications for sustainable tourism development and conservation. The logistic regression analysis reveals that stakeholder engagement is the strongest predictor of willingness to participate in ecotourism, underscoring the need for inclusive, community-centered programs. Operational performance also emerged as a significant factor, indicating that efficient and well-managed ecotourism operations are crucial for fostering community involvement. Interestingly, the strategic importance of ecotourism was not found to be a significant predictor, suggesting that while long-term planning is essential, it may not directly influence immediate decisions to participate. Economic incentives, along with the length of residency within the community, were identified as key motivators, highlighting the interconnectedness of ecotourism with broader socio-economic factors. The strong correlation between higher income levels and increased participation reinforces the importance of integrating economic benefits into ecotourism strategies, ensuring that local communities see tangible financial rewards. Additionally, the impact of tourist-related occupancy emphasizes the need for visible, direct benefits from ecotourism to encourage greater community participation.

The study acknowledges its limitations, particularly its focus on a single geographic area, which may restrict the generalizability of the findings. Future research should explore these factors in other ecotourism settings to expand the scope and applicability of the results. Moreover, non-economic influences on participation, such as cultural and social factors, are identified as important areas for further exploration. Addressing these gaps will help deepen the understanding of what drives community engagement in ecotourism across diverse contexts. By tailoring ecotourism strategies to the specific needs and drivers of local

communities, as revealed by this analysis, ecotourism in protected areas can become more inclusive, sustainable, and beneficial for all stakeholders. These insights provide clearer directions for future research and enhance the discussion on community-based ecotourism.

ACKNOWLEDGEMENT

The authors would like to express sincere gratitude to the respondents and key stakeholders who provided valuable insights and support during the fieldwork in Taman Nasional Bali Barat. This research was supported by the National Science and Technology Council (NSTC), Taiwan, through grant number 113-2621-M-259-005.

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