Designing Recommendations Based on Visitor Satisfaction using Correlation, Regression and Importance-Performance Analysis at Tanjung Piai National Park

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Abstract

Tanjung Piai National Park is a park located at the southernmost point of mainland Asia in Johor, Malaysia. It possesses significant ecological and cultural value through its unique mangrove ecosystems, biodiversity, and geographical landmark status; however, despite these assets, the park has struggled with persistently stagnant visitor numbers, a narrow demographic base, and deteriorating physical infrastructure, all of which threaten its long-term viability as both a conservation site and an ecotourism destination. Previous studies have primarily focused on ecological and community-based aspects of the park. This study aims to measure visitor satisfaction across five ecotourism dimensions, based on a previous study by Anh Toai Le which are Destination Attraction, Ecotourism Services, Staff Quality, Price Fairness, and Infrastructure in order to measure and evaluate how each dimension influences visitors' willingness-to-visit, and produce a prioritized, data-driven set of management recommendations. A quantitative survey-based methodology was employed, distributing Likert-scale structured questionnaires both online and on-site to a total of 527 unique respondents, with data analyzed through Pearson correlation analysis, multiple linear regression, and Importance–Performance Analysis (IPA). The results revealed that Destination Attraction ($\beta = 0.398$) and Infrastructure ($\beta = 0.339$) are the strongest predictors of willingness-to-visit, collectively with all five dimensions explaining approximately 59.2% of the variance in revisit intention ($R^2 = 0.592$); the IPA matrix further identified Ecotourism Services as the sole dimension in the "Concentrate Here" quadrant, exhibiting a 0.70-point gap between visitor importance ratings (4.20) and actual performance ratings (3.50). Based on these findings, it is recommended that management prioritize the immediate improvement of interpretive signage, educational materials, and guided tour quality to close the Ecotourism Services gap, while sustaining scheduled maintenance of boardwalks, safety railings, and the Southernmost Tip landmark to preserve current strengths; future research should also employ more rigorous sampling strategies, incorporate international visitor perspectives, and adopt longitudinal designs to track the effectiveness of implemented improvements over time.

Keywords*: Tanjung Piai National Park; visitor satisfaction; ecotourism; Importance–Performance Analysis; regression analysis; willingness-to-visit; sustainable tourism*

1. Introduction

Tanjung Piai National Park, established in 1997 and located at the southernmost tip of mainland Asia in Johor, Malaysia, represents a protected area of considerable ecological and cultural significance. National parks are broadly defined as designated areas connected with the protection and conservation of nature, characterized by a complex hierarchy of protected areas as defined by the International Union for Conservation of Nature, encompassing wilderness areas and protected landscapes (Nielsen, 2011). These areas are created to protect rare and endangered plant and animal species, their environments, landscapes, and cultural heritage, with strict legislation

limiting various human activities in these areas and their neighboring buffer zones to ensure conservation (Olko, 2011). Tanjung Piai specifically protects vital intertidal mangroves and mudflats, offers cross-border vistas of both Singapore and Indonesia, and harbors mangrove tree species not found elsewhere, making it a destination of both national and regional importance within Malaysia's protected area network.

Figure 1 Tanjung Piai National Park (Source: thestar.com)

The park covers 325 hectares and was gazetted under the Johor State Park Corporation Enactment 1989 to protect its unique coastal ecosystem. Its ecological importance is further underscored by its designation as a Ramsar Site on January 31, 2003, recognizing its value as a wetland of international importance. The park also conserves threatened species such as the Pig-tailed Macaque, Mangrove Pitta, and the globally vulnerable Lesser Adjutant.

Despite its appeal, the park faces a persistent paradox in that its visitor numbers remain stagnant, its demographic base is narrow, and its physical infrastructure such as boardwalks, railings, and observation platforms continues to deteriorate. Prior academic work, including that by Subramania et al. (2025), has contributed valuable frameworks around biodiversity conservation and community-based ecotourism, but these contributions do not provide empirical, visitor-centered data on how satisfaction with infrastructure, safety, and accessibility relates to visit intention. This represents a simultaneous knowledge gap, practical gap, and methodological gap, as previous studies have relied on qualitative or conceptual approaches rather than quantitative survey-based instruments.

Visitor satisfaction is one of the most widely studied constructs in tourism research, as it reflects the extent to which a visitor's expectations are met or exceeded by their actual experience. It is considered a key determinant of loyalty behaviours such as revisit intention and recommendation (Alegre and Garau, 2010). In ecotourism contexts, satisfaction is particularly important because it not only influences loyalty but also shapes visitors' willingness to support conservation and sustainable practices (Lee, 2013). Multiple studies have identified that destination attraction, ecotourism services, staff quality, price, and infrastructure are consistently highlighted as strong predictors of satisfaction (Le et al., 2025).

Word of mouth (WOM) has been shown to be one of the most powerful drivers of destination choice, particularly in contexts where potential visitors face uncertainty about quality and safety. WOM operates as a trust-based mechanism that reduces perceived risk and increases confidence in visiting a destination (Lai et al., 2018). In tourism, satisfied visitors often act as advocates, spreading positive WOM that influences new visitors' decisions to travel (Litvin et al., 2008). For destinations like Tanjung Piai, where many visitors come accompanied by someone who has visited before, WOM is especially critical in attracting new audiences.

To address this gap, this study adopts a quantitative survey-based approach, distributing structured Likert-scale questionnaires both online and on-site to measure visitor satisfaction across five dimensions: Destination Attraction, Ecotourism Services, Staff Quality, Price Fairness, and Infrastructure. Data are analyzed using descriptive statistics, correlation analysis, multiple linear regression, and Importance-

Performance Analysis (IPA), with the aim of producing a prioritized and data-driven foundation for park management decisions regarding visitor retention and long-term sustainable ecotourism development at Tanjung Piai National Park. The specific research objectives are: (1) to identify factors that may influence the willingness-to-visit; (2) to identify how much weight each factor has in influencing visitor's revisit intention; and (3) to prioritize each factor and formulate recommendations for park management based on quantitative analysis results.

2. Research Methodology

The research methodology was structured as a sequential, problem-driven process beginning with the identification of a core issue: the persistently small number of visitors at Tanjung Piai National Park. To understand the root cause, the study traced the problem backward by asking why visitor numbers remained low, arriving at the conclusion that visitors were not sufficiently satisfied with their experience. Drawing on Litvin et al. (2008), the study recognized that satisfied visitors often act as advocates who influence the decisions of new visitors to travel, establishing a direct link between satisfaction measurement and visitor growth. The question of which factors to measure was then resolved by anchoring the study to established literature, with destination attraction, ecotourism services, staff quality, price, and infrastructure identified as strong predictors of satisfaction (Le et al., 2025). The methodology flowchart is shown in Figure 2.

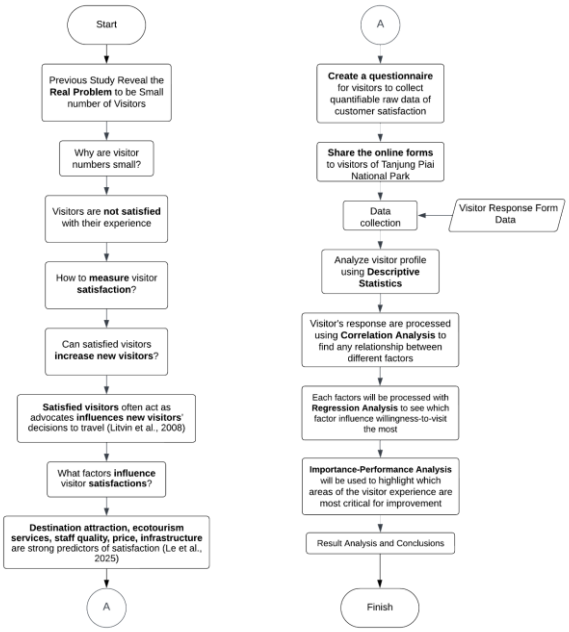


Figure 2 Methodology Flowchart

2.1 Ecotourism Factors

Five ecotourism dimensions were identified based on the literature (Le et al., 2025) as the consistent major predictors of visitor satisfaction. Destination Attraction refers to natural beauty, biodiversity, and geographical uniqueness such as the "Southernmost Tip of Mainland Asia" landmark. Ecotourism Services refers to guided tours, conservation activities, interpretive signage, and educational programs. Staff Quality encompasses staff professionalism, friendliness, language skills, and responsiveness. Price Fairness refers to perceived value-for-money for ticket fees and souvenirs. Infrastructure refers to the condition of boardwalks, restrooms, landmarks, and safety railings.

2.2 Data Collection

The primary source of data was an online questionnaire delivered to visitors of Tanjung Piai National Park following the completion of their visit. The survey instrument was structured around five key dimensions of visitor satisfaction supplemented by items measuring

visitor priorities and willingness-to-visit. Survey questions were designed to be answered using a Likert scale of 1 through 5. A convenience sampling approach was employed, targeting visitors who were willing to participate after their park experience. Data collection was conducted between July and November 2025. The target number of respondents was 520, derived by multiplying the number of questions (26) by a factor of 20, following the rule-of-thumb sampling approach. A total of 527 valid responses were ultimately collected, capturing a diverse range of visitor profiles in terms of nationality, age group, and visit frequency. The respondent pool included visitors from multiple ASEAN countries, primarily Malaysia, Indonesia, Brunei, Vietnam, and the Philippines, alongside international tourists from Australia, Japan, the United States, and various European nations.

To complement the quantitative survey, a semi-structured interview was conducted with Cik Yasin, the warden of Tanjung Piai National Park, to capture management perspectives and stakeholder considerations. The interview was conducted online on 3 December 2025.

2.3 Analytical Methods

The collected data were processed through four analytical methods applied in sequence. First, descriptive statistics were used to analyze the visitor profile and summarize satisfaction levels across each dimension. Second, Pearson correlation analysis was applied to identify meaningful relationships between the different satisfaction factors and willingness-to-visit. Third, multiple linear regression was conducted to determine which factors most strongly influenced willingness-to-visit, with willingness-to-visit as the dependent variable and the five satisfaction dimensions as independent predictors. Fourth, Importance-Performance Analysis (IPA) was applied to visually map each dimension according to how much visitors valued it against how well the park was currently delivering it, following the framework established by Martilla and James (1977). In the IPA matrix, importance scores were derived from regression results (standardized beta coefficients), while performance scores were taken from mean satisfaction scores reported by respondents.

3. Results and Discussion

3.1 Validity and Reliability Testing

Prior to full-scale analysis, the survey instrument underwent validity and reliability testing on a pilot sample of 50 respondents. For validity testing, Pearson correlation analysis was used, with a threshold of 0.279 at the 5% significance level. The results showed that all 21 questions across the six satisfaction dimensions passed this test, with correlation coefficients ranging from 0.695 to 0.893, well above the minimum cutoff. The validity testing results for the Destination Attraction dimension are shown in Table 1.

Table 1 Destination Attraction Validity Testing Results

Correlations

		da.1	da.2	da.3	total_da
da.1	Pearson Correlation	1	.428**	.468**	.788**
	Sig. (2-tailed)		.002	.001	.000
	N	50	50	50	50
da.2	Pearson Correlation	.428**	1	.547**	.803**
	Sig. (2-tailed)	.002		.000	.000
	N	50	50	50	50
da.3	Pearson Correlation	.468**	.547**	1	.834**
	Sig. (2-tailed)	.001	.000		.000
	N	50	50	50	50
total_da	Pearson Correlation	**.788****	**.803****	**.834****	1
	Sig. (2-tailed)	**.000**	**.000**	**.000**	
	N	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

Internal consistency reliability was evaluated using Cronbach's Alpha coefficient. The results yielded satisfactory reliability across all six dimensions as presented in Table 2.

Table 2 Reliability Testing Results

Variable	Cronbach's Alpha	N of Items	Cut-off Point	Result
DA	0.735	3	0.600	Reliable
ES	0.827	3	0.600	Reliable
SQ	0.778	3	0.600	Reliable
PF	0.854	3	0.600	Reliable

INF	0.866	4	0.600	Reliable
WTV	0.902	5	0.600	Reliable

3.2 Correlation Analysis Results

Based on the Pearson correlation analysis conducted on the 527 valid responses, all five performance dimensions demonstrate statistically significant positive relationships with visitors' willingness-to-visit (WTV) at the 0.01 level. The correlation analysis results are shown in Table 3.

Table 3 Correlation Analysis Results (SPSS)

Correlations

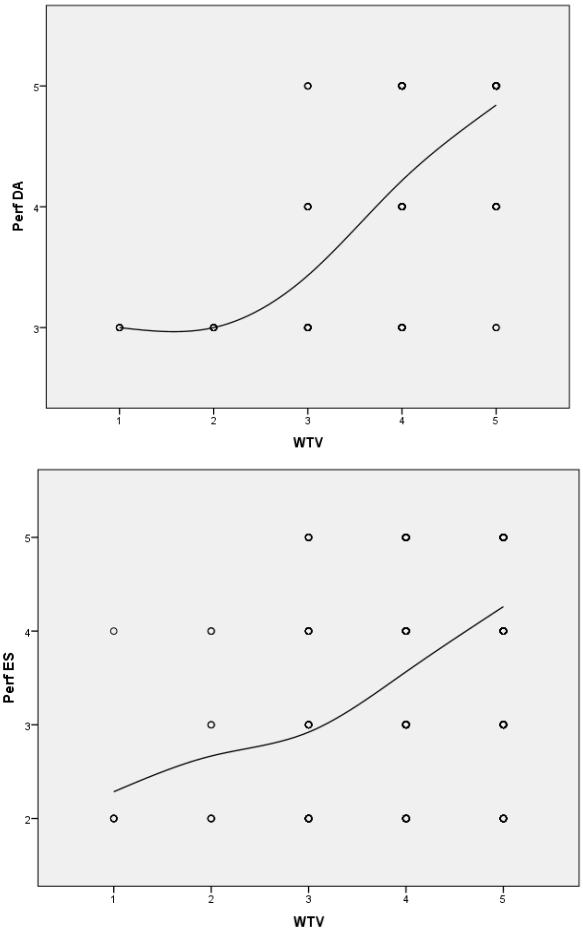
		Perf DA	Perf ES	Perf SQ	Perf PF	Perf Inf	WTV
Perf DA	Pearson Correlation	1	.243**	.232**	.202**	.403**	.624**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	527	527	527	527	527	527
Perf ES	Pearson Correlation	.243**	1	.105*	.079	.270**	.423**
	Sig. (2-tailed)	.000		.016	.069	.000	.000
	N	527	527	527	527	527	527
Perf SQ	Pearson Correlation	.232**	.105*	1	.975**	.191**	.326**
	Sig. (2-tailed)	.000	.016		.000	.000	.000
	N	527	527	527	527	527	527
Perf PF	Pearson Correlation	.202**	.079	.975**	1	.149**	.284**
	Sig. (2-tailed)	.000	.069	.000		.001	.000
	N	527	527	527	527	527	527
Perf Inf	Pearson Correlation	.403**	.270**	.191**	.149**	1	.590**
	Sig. (2-tailed)	.000	.000	.000	.001		.000
	N	527	527	527	527	527	527
WTV	Pearson Correlation	.624**	.423**	.326**	.284**	.590**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	527	527	527	527	527	527

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Destination Attraction exhibits the strongest correlation with WTV at 0.624, indicating that the appeal of the park's natural features, particularly the southernmost tip landmark and mangrove scenery, serves as the primary driver of return visitation. This is closely followed by Infrastructure, which registers a robust correlation coefficient of 0.590, underscoring the critical role that physical facilities, boardwalk conditions, restroom cleanliness, and safety railings play in converting first-time visitors into repeat guests. Ecotourism Services correlates with WTV at 0.423, suggesting that interpretive signage, guided tours, and educational materials significantly enhance visit intention. Staff Quality demonstrates a correlation of 0.326 with WTV, while Price Fairness shows the weakest yet still significant association at 0.284. These findings are consistent with prior ecotourism research confirming that tangible physical and scenic attributes tend to be stronger predictors of revisit intention than service-oriented dimensions (Le et al., 2025; Kim et al., 2023).

The scatter plots shown in Figure 3 visually confirm the positive directional relationships identified in the correlation analysis, with fitted trend lines illustrating how performance ratings across the five dimensions align with willingness-to-visit scores.



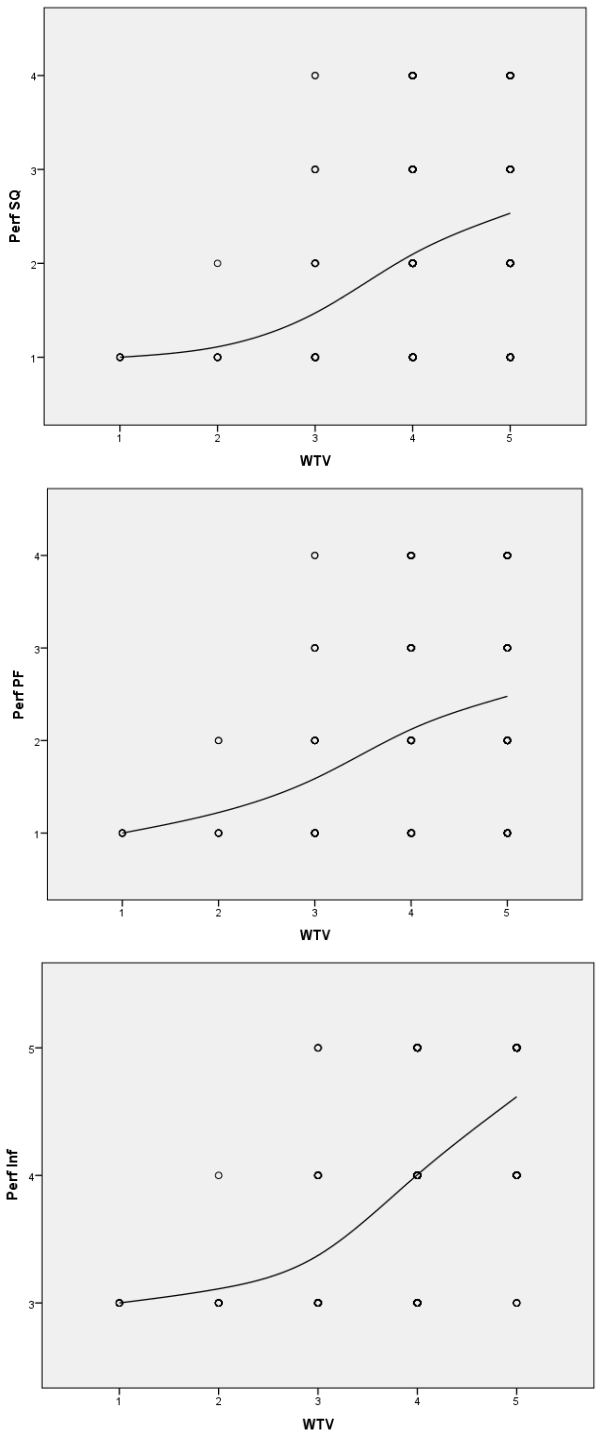


Figure 3 Ecotourism Factors' Performance and WTV Scatter Plots

3.3 Regression Analysis Results

While correlation analysis establishes the bivariate relationships between individual satisfaction dimensions and willingness-to-visit, it cannot isolate the unique contribution of each factor when considered simultaneously. Multiple linear regression analysis was therefore employed, with willingness-to-visit as the dependent variable and the five ecotourism dimensions as independent predictors.

Table 4 Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.769[a]	.592	.588	.526	.592	151.069	5	521	.000

a. Predictors: (Constant), Perf Inf, Perf PF, Perf ES, Perf DA, Perf SQ

b. Dependent Variable: WTV

The model summary in Table 4 shows a multiple correlation coefficient (R) of 0.768, indicating a strong linear relationship between the combined predictors and WTV. The coefficient of determination (R2) of 0.592 means that approximately 59.2% of the variance in visitors' willingness-to-visit is explained by these five satisfaction dimensions. The Adjusted R2 of 0.588 confirms that the model maintains good explanatory power without overfitting.

Table 5 ANOVA Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	208.661	5	41.732	151.069	.000[b]
	Residual	143.924	521	.276		
	Total	352.584	526			

a. Dependent Variable: WTV

b. Predictors: (Constant), Perf Inf, Perf PF, Perf ES, Perf DA, Perf SQ

The ANOVA results in Table 5 confirm that the regression model is statistically significant. The F-statistic of 151.069 (df = 5, 521) with a significance value of $p < 0.001$ indicates that the linear combination of satisfaction dimensions significantly predicts WTV, validating the model for use in the Tanjung Piai context.

Table 6 Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	.164	.160		1.029	.304			
	Perf DA	.407	.032	.398	12.660	.000	.624	.485	.354
	Perf ES	.152	.021	.217	7.364	.000	.423	.307	.206
	Perf SQ	.189	.091	.270	2.091	.037	.326	.091	.059
	Perf PF	-.090	.090	-.128	-.997	.319	.284	-.044	-.028
	Perf Inf	.369	.034	.339	10.715	.000	.590	.425	.300

a. Dependent Variable: WTV

The coefficients table in Table 6 reveals a clear hierarchy of influence. Destination Attraction emerges as the strongest predictor,

with a standardized beta of 0.398 and $p < 0.001$. Infrastructure follows at 0.339, then Staff Quality at 0.270, and Ecotourism Services at 0.217. All four dimensions show positive, statistically significant relationships with willingness-to-visit while holding other variables constant. Price Fairness is the exception, showing a negative standardized coefficient of -0.128 with $p = 0.319$, suggesting it functions as a threshold factor rather than a motivator; managers should interpret this with caution due to potential multicollinearity effects.

These findings identify Destination Attraction as the most powerful driver of repeat visitation, confirming that the park's geographical uniqueness and natural attractiveness carry the greatest leverage for visitor loyalty. Infrastructure follows closely, reinforcing that the physical condition of boardwalks, safety railings, and restroom facilities plays a critical role in shaping revisit decisions. These results are aligned with studies in biosphere reserves and national parks where accessibility, staff quality, and infrastructure frequently emerge as significant predictors of satisfaction and loyalty (Nguyen et al., 2025; Aniramu et al., 2025).

3.4 Importance-Performance Analysis Results

Importance-Performance Analysis was constructed by plotting each attribute using the mean satisfaction score (performance) on the x-axis and the regression-derived importance score (standardized beta coefficient) on the y-axis, following best practice as outlined by Martilla and James (1977) and applied in empirical ecotourism studies across South and Southeast Asia (Ibrahim et al., 2020; Bhalla and Bhattacharya, 2021). The IPA matrix is shown in Figure 4.

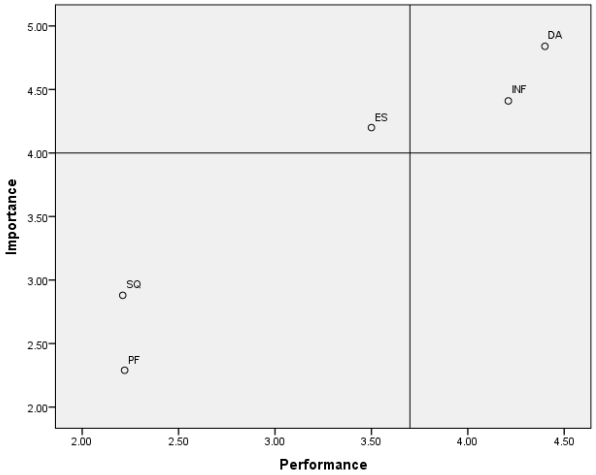


Figure 4 IPA Matrix

The IPA matrix splits at roughly 3.75 performance and 4.0 importance. Destination Attraction and Infrastructure sit in the "Keep Up the Good Work" quadrant. Both importance scores exceed 4.4 with performance above 4.2. These are the park's strong suits; steady maintenance is sufficient to preserve these advantages.

Ecotourism Services falls into the "Concentrate Here" quadrant. Visitors rate importance at 4.20 but performance at just 3.50, leaving a 0.70-point gap that represents the largest shortfall in the study and the clearest signal of where the park is losing repeat guests. Management should focus immediate resources on closing this gap by replacing outdated interpretive signage, adding more interactive educational boards along the boardwalk, and improving guided tour content and availability.

Staff Quality and Price Fairness both land in the "Low Priority" quadrant, with importance scores near 2.88 and 2.29 respectively, and performance ratings that align with those modest expectations. The regression results reinforce that Price Fairness functions as a basic threshold rather than a motivator, and that staff interactions act as supporting elements rather than primary reasons to return. These areas should maintain baseline standards without diverting significant budget toward new programs or price changes.

3.5 Management Recommendations

Drawing from the IPA matrix results, correlation coefficients, regression beta values, and respondent open feedback gathered in this study, the following tactical recommendations are structured by ecotourism factor and divided into three temporal horizons: Short-Term (0–6 months), Medium-Term (6–18 months), and Long-Term (18 months and beyond). Each plan is grounded in empirical evidence from studies employing comparable methodologies or operating in analogous ecotourism contexts, ensuring that the recommendations are not only contextually appropriate but also supported by tested precedent.

3.5.1 Ecotourism Services (IPA Quadrant: Concentrate Here)

Ecotourism Services is the only factor placed in the "Concentrate Here" quadrant of the IPA matrix, with an importance score of 4.20 but a performance rating of only 3.50, yielding the study's largest satisfaction gap of 0.70 points. The regression analysis assigns it a standardised beta coefficient of 0.217, confirming it exerts meaningful enough independent influence on willingness-to-visit even after controlling for the four other dimensions. Visitor responses indicated particular dissatisfaction with the clarity of informational signage, the scarcity of guided tours, and the limited depth of educational materials throughout the boardwalk. Because this factor sits in the urgent quadrant and directly suppresses revisit intention, it demands the most concentrated and immediate allocation of management resources.

- Short-Term (0–6 Months): Interpretive Signage Audit and Replacement

Within the first six months, management should conduct a complete audit of all existing information boards and signage along the boardwalk and replace or retrofit a minimum of eight panels with bilingual (Bahasa Malaysia and English) boards that adhere to the Thematic, Organised, Relevant, and Enjoyable (TORE) interpretation framework. A quasi-experimental study at Lantebung Mangrove Ecotourism in Makassar, Indonesia, applying the same TORE framework to 202 visitors found that properly designed interpretation media produced a statistically significant improvement in visitor knowledge of mangrove ecosystem services, though content relevance and enjoyability dimensions required active redesign to meet visitor expectations (Verawati & Idrus, 2023). Consistent with this finding, each replacement panel at Tanjung Piai should anchor its content to a single thematic message (e.g., mangrove root functions, endemic birdlife, the ecological significance of the Southernmost Tip) rather than presenting generic taxonomic lists. At least three QR-code enabled panels should be installed at the jetty entrance, mid-boardwalk, and the Southernmost Tip monument, linking visitors to short video clips hosted on the park's existing social media infrastructure. A study on interpretive media effectiveness across six formats in a national park in Sydney, Australia, found that image-rich signage consistently outperformed text-dense pamphlets in visitor satisfaction, word-of-mouth scores, and holding power at tour stops, recommending that park managers prioritise visual-dominant formats for trail-side interpretation (Wolf et al., 2013). These short-term sign replacements require no new construction permits and can be completed within a single procurement cycle.

- Medium-Term (6–18 Months): Structured Guided Tour Programme and University Partnership

Between months six and eighteen, the park should formalise a scheduled guided tour programme running every weekend morning, delivered in partnership with Universiti Teknologi Malaysia or relevant conservation NGOs to ensure interpretive quality without incurring full-time staffing costs. A large-scale evaluation of interpretive programmes across ten national parks in South Korea, collecting data from 802 participants, found that visitors who participated in ranger- or interpreter-led programmes reported significantly higher post-

visit satisfaction and stronger revisit intention compared to self-guided visitors, with the key driver being the transformative quality of face-to-face ecological explanation (Sim et al., 2018). This precedent directly supports the investment in guided programming at Tanjung Piai, where 97 percent of visitors rated their experience as good or excellent, yet the Ecotourism Services dimension remains the park's weakest performer, indicating that the experiential floor is high but the interpretive ceiling has not been reached. The guided tour format should incorporate active engagement activities such as mangrove propagule identification, tidal zone observation, and bird call recognition, which align with the educational expectations of the predominantly bachelor's-degree-educated visitor demographic identified in this study. Additionally, research conducted at Gunung Ledang Johor National Legendary Park — a national park in comparable geographic and governance context to Tanjung Piai — found that inadequate interpretive media, including the absence of trained guides and an interpretation centre, was the primary driver of ecotourist dissatisfaction, and recommended that park management integrate environmental knowledge delivery into a formal strategic plan (Wahab & Ya'cob, 2019). The Gunung Ledang study's IPA-informed findings mirror this study's own matrix results and validate the guided tour recommendation as the appropriate medium-term intervention.

- Long-Term (18+ Months): Visitor Interpretation Centre and Digital Engagement Ecosystem

In the long term, the park should pursue the development of a dedicated Visitor Interpretation Centre at the main entrance, designed to serve as an educational gateway before visitors enter the boardwalk. A study applying IPA to visitor satisfaction at protected areas within the Indian Himalayan Region found that the construction of an interpretation centre substantially improved visitor knowledge, environmental sensitivity, and satisfaction ratings in the Ecotourism Services dimension, and recommended that park authorities treat the centre as the primary delivery mechanism for conservation messaging (Bhalla & Bhattacharya, 2021). Given Tanjung Piai's positioning as the southernmost tip of mainland Asia, the centre can leverage this unique geographical identity as a narrative anchor, linking the park's mangrove biodiversity to its continental significance. In parallel, a mobile application or digital audio tour should be developed, enabling self-paced multilingual interpretation for the linguistically diverse visitor base identified in this study, which includes visitors from Malaysia, Indonesia, the Philippines, Vietnam, and Brunei. Research in Southeast Asian mangrove ecotourism specifically identifies integrated education and awareness campaigns alongside digital monitoring tools as essential for sustaining long-term conservation and visitor engagement outcomes (Blanton, et al., 2024). Collectively, these long-term investments would transform Tanjung Piai's Ecotourism Services dimension from its current "Concentrate Here" status into the "Keep Up the Good Work" quadrant within three to five years, closing the 0.70-point satisfaction gap identified in this study.

3.5.2 Destination Attraction (IPA Quadrant: Keep Up the Good Work)

Destination Attraction is the single strongest driver of willingness-to-visit in this study, with a Pearson correlation of 0.624 and the highest standardized beta coefficient of 0.398 in the regression model. In the IPA matrix, it resides in the "Keep Up the Good Work" quadrant with an importance score exceeding 4.4 and a performance score above 4.2, confirming that the park's scenic attributes, particularly the Southernmost Tip of Mainland Asia landmark and the mangrove forest scenery are both highly valued and currently well-delivered. Because this factor is the primary catalyst of repeat visitation, management strategies must focus on active protection and strategic enhancement rather than complacency.

- Short-Term (0–6 Months): Landmark Maintenance and Conservation Enforcement

Within the first six months, management should establish a monthly physical inspection protocol for the Southernmost Tip monument, all viewing platforms, and the landmark signage structures, documenting any weathering, graffiti, or structural degradation and actioning repairs within two weeks of identification. A study on mangrove ecotourism destination image and revisit intention at Gunung Anyar Mangrove Ecotourism in Indonesia found that destination image had a strong and statistically significant direct effect on both visitor satisfaction and revisit intention, while facilities mediated the relationship, confirming that the physical condition and visual appeal of landmark features are central to whether visitors return (Heryono & Abidin, 2025). For Tanjung Piai, whose correlation data shows Destination Attraction as the factor most linearly connected to a visitor's decision to return, any visible deterioration of the landmark threatens to undermine the very attribute that drives the park's highest loyalty scores. Simultaneously, park rangers should be deployed to enforce existing regulations prohibiting littering, off-trail walking, and any activity that disturbs the mangrove root systems visible from the boardwalk, as ecosystem degradation directly reduces the scenic value that visitors rate as most important.

- Medium-Term (6–18 Months): Birdwatching and Wildlife Experience Enhancement

Between months six and eighteen, management should introduce structured birdwatching opportunities as a supplementary attraction that capitalises on the mangrove ecosystem's existing wildlife without requiring habitat modification. A mangrove ecotourism study at Lantebung, Indonesia, found that 62 percent of tourists preferred a hybrid model of information boards combined with guided interpretation, and noted that birdwatching activities significantly enhanced visitor engagement with the mangrove environment as an educational experience (Verawati & Idrus, 2023). In a Southeast Asian regional review, Blanton et al. (2024) specifically identified bird and wildlife observation as among the primary mangrove ecotourism attractions, and noted that destinations which formalised these offerings through guided eco-tours saw growth in visit frequency and destination loyalty. For Tanjung Piai, where the survey confirms that mangrove scenery forms the emotional core of the visitor experience, formalising birdwatching through fixed observation platforms, species identification boards, and timed morning tours would deepen the quality of the attraction without compromising conservation integrity. This aligns with the finding by Constantin et al. (2022) in Romanian ecotourism destinations that diversifying nature-based activity offerings, particularly for the 19 to 30 and 31 to 50 age groups who together make up 76 percent of Tanjung Piai's visitor base, was a key mechanism for increasing year-round visitation and stabilising demographic reach.

- Long-Term (18+ Months): Mangrove Restoration as Attraction and Conservation Infrastructure

In the long term, the park should improve their existing mangrove restoration and planting programme that actively involves visitors in planting activities, positioning conservation participation as a premium attraction rather than a peripheral activity. This recommendation is further supported by research on mangrove ecotourism in Southeast Asia, which documents that community-based conservation and restoration initiatives at sites in Malaysia, Indonesia, and the Philippines attracted international funding and public-private partnerships precisely because restoration activities generated destination differentiation that mass tourism could not replicate (Blanton et al., 2024). For Tanjung Piai, a restoration-as-attraction model would reinforce the park's "Southernmost Tip" identity with an additional narrative of active environmental stewardship, creating a more compelling and emotionally

resonant reason for visitors to return and to bring others.

3.5.3 Infrastructure (IPA Quadrant: Keep Up the Good Work)

Infrastructure holds the second-highest correlation with willingness-to-visit (r = 0.590) and the second-largest regression coefficient (beta = 0.339) among all five factors, placing it immediately behind Destination Attraction as a driver of repeat visitation. In the IPA matrix, Infrastructure sits in the "Keep Up the Good Work" quadrant alongside Destination Attraction, with performance ratings above 4.2 on boardwalk conditions, landmark structures, restroom cleanliness, and safety railings. However, the strong statistical relationship between Infrastructure performance and willingness-to-visit means that any degradation in this dimension would rapidly shift visitor loyalty. Management must therefore treat Infrastructure maintenance as a non-negotiable operational commitment rather than a discretionary budget line.

- Short-Term (0–6 Months): Anti-Slip Treatment and Restroom Standardisation

In the short term, management should apply anti-slip surface treatments such as rubber grip strips or textured paint to all identified high-risk boardwalk sections before the onset of the next monsoon season. A study on multifunctional boardwalk design for sustainable coastal tourism in Turkey's Güzelcehisar area specifically found that safety-focused boardwalk features, including textured non-slip surfaces and observation decks with protective railings, improved visitor safety ratings and overall satisfaction scores by 68 percent compared to unmodified trail sections (Cengiz et al., 2022). This is directly applicable to Tanjung Piai, where boardwalk conditions are a top-scoring driver of revisit intention (r = 0.590) and where wet-weather slipperiness was the most commonly implied infrastructure concern during data collection. Concurrently, the park should implement a daily restroom inspection checklist, with cleaning completed at minimum three times per day during peak hours, and prominently display cleanliness certification cards at restroom entrances. Research on visitor satisfaction at Canadian national parks found that restroom cleanliness operated as a basic expectation attribute — one whose absence generates disproportionately severe negative feedback and whose presence, when reliably maintained, converts satisfied visitors into advocates (Zolfaghari & Choi, 2023).

- Medium-Term (6–18 Months): Structural Inspection Programme and Shaded Rest Infrastructure

Between six and eighteen months, management should establish a bi-annual structural engineering inspection of all boardwalk planks, supporting pillars, railings, and observation platforms, with a formal defect register maintained and actioned within defined response timelines. The importance of proactive, scheduled infrastructure maintenance in national parks is well-documented in the management literature: a visitor impact management study at Eravikulam National Park in India found that visitor satisfaction with infrastructure was most strongly influenced not by the perceived quality of facilities at the time of survey but by visitor confidence that maintenance was being actively managed, suggesting that visible maintenance signage and timely repair action are themselves satisfaction drivers (Velmurugan et al., 2021). In parallel, two additional covered rest shelters should be installed at the midpoint and the three-quarter mark of the main boardwalk, providing shaded seating that addresses the heat and humidity of the tropical coastal environment. The park should also install at least four additional waste disposal stations with clearly labelled segregation bins along the boardwalk, supporting the park's environmental image and reducing the incidental litter that can degrade scenic value.

- Long-Term (18+ Months): Climate-Resilient Boardwalk Redevelopment

In the long term, PERHILITAN and park management should develop a capital investment proposal for the phased

redevelopment of the existing boardwalk using composite materials that are resistant to the tidal inundation, salt exposure, and biological weathering typical of mangrove coastal environments. Research on national park infrastructure management under climate change conditions found that coastal boardwalk trails are among the most vulnerable park assets to sea-level rise and tidal surges, with several parks in the United States reporting permanent submersion of trail sections and the need to reconstruct or reroute infrastructure entirely (Keener, et al., 2025). Tanjung Piai, situated at the intersection of the South China Sea and the Strait of Malacca at the tip of mainland Asia, faces precisely these environmental pressures. The boardwalk redevelopment proposal should be accompanied by an environmental impact assessment and submitted to PERHILITAN for phased federal funding consideration. This long-term investment would not only protect the park's highest-performing IPA dimension but also future-proof the physical infrastructure that underpins the visitor experience on which 59.2 percent of willingness-to-visit variance is currently explained.

3.5.4 Staff Quality (IPA Quadrant: Low Priority)

Staff Quality occupies the Low Priority quadrant in the IPA matrix, with an importance score of approximately 2.88 and performance near 2.2, indicating that visitors assign relatively low importance to staff interactions as a standalone dimension of the ecotourism experience. However, the regression analysis reveals that Staff Quality holds a statistically significant beta coefficient of 0.270, making it the third-strongest independent predictor of willingness-to-visit when controlling for all other factors. This apparent contradiction is resolved by recognising that staff quality functions as an amplifier of other dimensions: competent, knowledgeable staff can significantly enhance the perceived quality of Ecotourism Services and Destination Attraction, even when visitors do not consciously identify staff as a primary satisfaction driver. Management should therefore maintain and incrementally improve staff quality without diverting significant resources away from the higher-priority ecotourism services and infrastructure dimensions.

- Short-Term (0–6 Months): Customer Hospitality and Safety Protocol Refresher Training

In the short term, management should conduct a one-day refresher workshop for all frontline staff covering visitor hospitality standards, emergency response protocols, and basic multilingual greeting phrases in Bahasa Malaysia, English, Mandarin, and Indonesian. A conceptual model linking SERVQUAL dimensions to revisit intention in ecotourism destinations in Malaysia found that the responsiveness and assurance sub-dimensions of service quality were significant predictors of visitor satisfaction and behavioural loyalty, suggesting that even modest improvements in staff responsiveness can produce measurable gains in revisit scores (Rusdin & Rashid, 2018). This short-term training intervention requires minimal financial outlay and can be facilitated internally by the park's senior ranger or in partnership with Johor Tourism's hospitality training programmes. Staff should also be briefed on the study's findings, specifically that 51.42 percent of respondents are repeat visitors who discovered the park through word-of-mouth, reinforcing to staff that their daily interactions with visitors directly fuel the informal recommendation network that drives the park's most cost-effective marketing channel.

- Medium-Term (6–18 Months): Ecological Knowledge Training and Interpretive Competency Development

Between months six and eighteen, management should invest in developing ecological interpretation competency among at least two to three park rangers, equipping them to lead the structured guided tours recommended under Section 5.7.1. Research at ten South Korean national parks found that the

interpretive quality of guide delivery, specifically the ability to connect ecological facts to personally meaningful narratives was the single most significant predictor of post-programme visitor satisfaction, surpassing physical attraction quality and facility conditions as satisfaction drivers during the guided experience (Sim et al., 2018). For Tanjung Piai, where the visitor demographic is predominantly young, degree-educated, and discovery-driven, the ability of park staff to engage in substantive ecological dialogue represents an untapped quality differentiator. This training should be formalised through a certification programme offered by Universiti Teknologi Malaysia's environmental science or ecotourism faculty, creating a credentialled cadre of ranger-interpreters who can anchor both the guided tour programme and visitor inquiries throughout the park.

- Long-Term (18+ Months): Community-Based Ranger Programme and Visitor Impact Management

In the long term, the park should develop a community-based ranger programme that recruits and trains local Bugis community members as supplementary guides and visitor experience stewards, drawing on the cultural heritage knowledge that distinguishes Tanjung Piai within the broader Malaysian national parks network. A visitor impact management study at Eravikulam National Park in India found that integrating visitor education and community-based ranger activities within a formal Visitor Impact Management (VIM) framework significantly improved visitor satisfaction scores across service and environmental impact dimensions, while simultaneously building local community support for conservation governance (Velmurugan et al., 2021). This precedent is particularly relevant to Tanjung Piai, where previous research by Subramania et al. (2025) identified community engagement as a core pillar of the park's ethno-ecotourism potential but found that it remained underutilised in current operational practice. By integrating community members into the staff quality dimension as cultural interpreters and ecological guides, the park can simultaneously address the service gap identified in the IPA analysis and fulfil its broader mandate of sustainable community-based ecotourism, aligning with the governance objectives of PERHILITAN's national park management framework.

3.5.5 Price Fairness (IPA Quadrant: Low Priority)

Price Fairness is the only factor in this study that produced a negative standardised regression coefficient (beta = –0.128, p = 0.319), indicating that it functions as a threshold variable rather than a motivational driver of revisit intention. Its placement in the Low Priority IPA quadrant, with an importance score of 2.29 and performance near 2.2, reinforces that once visitors perceive pricing as acceptable, further improvements in price satisfaction do not meaningfully increase their likelihood of returning. Management recommendations for this dimension focus on value communication and souvenir quality improvements rather than price reductions, as the empirical evidence strongly suggests that visitor loyalty at Tanjung Piai is driven by experiential rather than economic factors.

- Short-Term (0–6 Months): Value Communication and Transparent Pricing Signage

In the short term, management should install clear, bilingual pricing boards at the ticket counter and souvenir stalls, explicitly communicating that entrance fees directly support mangrove conservation and PERHILITAN's national park management costs. Research applying Willingness to Pay analysis at the Mekar Beach Mangrove Forest in Indonesia found that a key factor suppressing visitor perceived price fairness was the absence of visible linkage between the fees paid and the conservation outcomes funded, and recommended that mangrove ecotourism operators actively communicate the conservation value proposition embedded in

ticket pricing as a strategy to improve perceived fairness and willingness to pay (Iswarani et al., 2025). This recommendation is particularly relevant given that this study's respondents showed strong environmental awareness in selecting a mangrove ecotourism destination, suggesting they are a receptive audience for conservation-value messaging. Transparent communication of how entrance revenue is allocated can shift price perception from a cost-of-entry evaluation to a conservation contribution framing, improving fairness ratings without any actual price adjustment.

- Medium-Term (6–18 Months): Souvenir Range Upgrade and Local Artisan Partnership

Between months six and eighteen, management should audit the current souvenir product range and replace generic, low-differentiation merchandise with locally produced, destination-specific items that carry the "Southernmost Tip" identity and mangrove conservation narrative. Survey items measuring souvenir pricing and attractiveness both fell within the Price Fairness dimension and recorded some of the study's lowest performance scores, indicating that the current souvenir offering does not justify its price point in visitors' evaluation. Research on perceived value and tourist satisfaction at coastal destinations in Peru found that the economic-functional dimension of perceived value was a significant predictor of destination loyalty, and recommended that tourism operators focus on value-enhancing product design rather than price discounting as the primary lever for improving the price-quality equation (Regalado-Pezúa et al., 2023). For Tanjung Piai, this translates to partnering with local Bugis craftspeople and environmental educators to develop a signature souvenir line, such as handcrafted mangrove wood items, illustrated field guides to the park's birdlife, or conservation certificates that provides visitors with tangible memorabilia commensurate with the price paid.

- Long-Term (18+ Months): Tiered Pricing Model and Conservation Contribution Mechanism

In the long term, the park should explore a tiered pricing model that distinguishes between domestic and international visitor entry fees, and introduces an optional conservation surcharge through which visitors can voluntarily contribute to mangrove restoration funding. Research on Willingness to Pay for mangrove conservation at Bale Mangrove Ecotourism in Indonesia found that travel costs, environmental awareness, and visitor age were all positively associated with higher willingness to contribute financially to conservation, with an average WTP of IDR 8,595 per visit (approximately USD 0.55), suggesting that the majority of ecotourists actively support the concept of paying slightly more when the contribution purpose is clearly communicated (Purnama et al., 2025). A broader cross-national review on WTP in tourism and sustainability confirmed that ecotourists in marine and coastal protected areas showed particularly strong acceptance of nominal conservation fees when they were framed as voluntary contributions rather than mandatory levies, and noted a preference for WTP directed toward mangroves, coral reefs, and beach protection (Ezeh & Dube, 2024). This long-term pricing reform would position Price Fairness not as the park's weakest dimension but as an active channel for conservation funding, transforming the visitor payment experience from a transactional gate into a meaningful act of environmental contribution.

4. Conclusion

This study measured visitor satisfaction across five ecotourism dimensions at Tanjung Piai National Park using a quantitative survey-based approach with 527 respondents. The study identified that five key factors collectively explain approximately 59.2% of the variance in willingness-to-visit ($R2 = 0.592$), confirming that these dimensions provide a

robust framework for understanding visitor loyalty behavior.

Regression analysis results show that Destination Attraction (beta = 0.398) and Infrastructure (beta = 0.339) are the most significant drivers of revisit intention, followed by Staff Quality (beta = 0.270) and Ecotourism Services (beta = 0.217). The IPA matrix identifies Ecotourism Services as the single priority area for improvement, as it is the only dimension in the "Concentrate Here" quadrant with a 0.70-point satisfaction gap between visitor importance and actual performance.

Recommendations focus on bridging the Ecotourism Services gap by modernizing interpretive signage and educational programs. Management should also prioritize the maintenance of the "Southernmost Tip" landmark and existing infrastructure to sustain current performance levels. These data-driven actions are designed to improve visitor retention and support the park's long-term sustainability as both a conservation site and ecotourism destination.

Future research should utilize more rigorous sampling methods to move beyond the limitations of convenience sampling. Expanding the survey to include a larger proportion of international tourists would allow for more detailed stratification of visitor needs. Additionally, researchers should consider a longitudinal study design to evaluate the efficacy of management improvements over time. Future investigations could also integrate external factors such as biodiversity health or local community engagement to create a more holistic model. These additions would help ensure that Tanjung Piai National Park balances visitor satisfaction with its core conservation objectives.

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