



Analysis of Tourist Perceptions of Ecotourism Facilities in Surabaya Mangrove Forest

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Abstract: Mangrove ecotourism has been increasingly developed as both a tourist destination and a conservation medium; however, understanding of visitor perceptions toward available facilities remains limited. This study aims to identify tourist evaluations of mangrove forest ecotourism in Surabaya by examining four dimensions: accessibility, attractions, supporting infrastructure, and additional services. A survey was conducted with 100 respondents at Wonorejo, Medokan, and Gunung Anyar mangrove sites, and the data were analyzed using WarpPLS 8.0 to test the validity and reliability of the instruments. The results indicated that all indicators were consistent, and overall tourist assessments tended to be positive. The main strengths were the well-preserved environment, integration of local culture, and staff hospitality, while entertainment attractions were perceived as less developed. These findings highlight the importance for managers to maintain the existing strengths while improving weaker aspects in order to provide a more comprehensive visitor experience. An integrated enhancement of facilities is considered essential to strengthen visitor satisfaction and improve destination competitiveness. From an academic perspective, this study contributes as a reference for future research on mangrove ecotourism and tourism development studies.

Keywords: Accessibility; Additional Services; Attractions; Mangrove Forest Ecotourism Facilities; Tourist Perceptions; WarpPLS 8.0.

Introduction

Ecotourism, as a form of nature-based tourism, has increasingly gained attention in the development of urban destinations (Silva et al., 2023). This trend is driven by growing public awareness of the importance of environmental protection alongside the demand for more authentic travel experiences connected to nature (Liu et al., 2024). One of the ecotourism models that has developed in Surabaya is mangrove forest tourism, which serves both as a recreational attraction and a conservation tool for coastal ecosystems, including maintaining water quality, preventing shoreline erosion, and providing habitats for diverse flora and fauna (Rachmawati et al., 2023). The presence of supporting facilities such as boardwalks, observation towers, and

information centers further enhances visitor comfort and creates an educational experience (Khasawneh and Khassawneh, 2024).

Surabaya hosts several popular mangrove ecotourism destinations, including Wonorejo, Medokan, and Gunung Anyar. These sites not only offer natural beauty and biodiversity but are also equipped with facilities such as recreational areas, environmental education centers, and trekking routes that allow visitors to gain varied experiences tailored for tourism, research, or learning purposes (Fakdawer, 2023). This multifunctional role positions mangrove ecotourism as more than a recreational space; it also serves as a medium for conservation and environmental education (Abidin et al., 2021). However, although previous studies on mangrove ecotourism exist, research

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specifically examining tourist perceptions of facilities in Surabaya remains limited (Dewi and Abidin, 2021). Addressing this gap is important since facility quality significantly contributes to visitor experience and satisfaction (Khanyile et al., 2024). Therefore, this study seeks to analyze tourist perceptions of mangrove ecotourism facilities in Surabaya, focusing on four main aspects: accessibility, attractions, supporting infrastructure, and additional services.

According to the Surabaya City Government (2023), the total number of tourist visits in 2023 reached 17,425,476, consisting of 16,139,571 domestic tourists and 1,285,905 international visitors. Within this figure, mangrove ecotourism accounted for a relatively small portion, yet still demonstrated its relevance in the city's tourism landscape. For example, Wonorejo Mangrove Forest attracted around 174,000 visitors, while Medokan Mangrove Botanical Garden and Gunung Anyar Mangrove Ecotourism each received approximately 87,000 visits. Compared to the overall number of tourist arrivals, these figures are modest but indicate the existence of a specific market segment seeking nature- and ecology-based experiences amidst the dominance of urban and artificial attractions. This is consistent with global tourism trends that increasingly emphasize sustainability, conservation, and authentic experiences.

The significance of mangrove ecotourism lies not only in visitor numbers but also in its long-term potential. Mangrove areas function as platforms for environmental education, coastal ecosystem conservation, and healthy recreational spaces for urban residents. Improved infrastructure and accessibility have further increased the attractiveness of these areas, creating opportunities to expand their contribution to Surabaya's tourism sector. Beyond their recreational value, mangrove sites provide essential ecological functions such as maintaining water quality, preventing coastal erosion, and offering habitats for various species of flora and fauna. Thus, although their current share in the city's overall tourism industry remains limited, mangrove ecotourism holds the potential to become a key pillar in advancing sustainable tourism development in Surabaya (Pengemanan et al., 2022).

Method

This study employed a quantitative survey method to systematically collect data from respondents (Creswell, 2014). Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) with WarpPLS software, following the guidelines of Hair et al. (2020) to evaluate both the measurement model (validity and reliability) and the structural model. Four main constructs were tested:

Accessibility (X1) (McLachlin et al., 1994), Attraction (X2) (Alves et al., 2025), Facilities (X3) (Parasuraman et al., 1991), and Additional Services (X4) (Aisyah et al., 2025). This approach was selected to obtain an accurate understanding of visitor perceptions and satisfaction with mangrove ecotourism facilities.

The research sites were determined using purposive sampling, focusing on three mangrove ecotourism areas in Surabaya: Mangrove Wonorejo, Mangrove Botanical Garden Medokan, and Mangrove Ecotourism Gunung Anyar. The selection was based on their popularity, the number of tourist visits, and their representation of existing facilities and attractions (Sugiyono, 2020). A total of 100 respondents were surveyed through purposive sampling, targeting visitors who were present at the research sites during the survey. This procedure ensured that the data were collected directly from the target population, making the study transparent and replicable.

Respondent selection was guided by specific criteria rather than randomization, allowing researchers to gather relevant information directly aligned with research objectives (Gezahegn et al., 2024). This method provided deeper contextual insights (Angessa et al., 2022), with requirements such as being present at the site during the survey, willingness to participate by completing the questionnaire, and prior experience using the facilities or joining the available attractions (Sahahiri et al., 2023). Respondents meeting these conditions were considered capable of providing accurate answers due to their firsthand experience (Adriwati et al., 2025), consistent with Fink (2013) view that participant suitability improves data validity and representativeness.

Data were collected using a structured questionnaire with a five-point Likert scale, ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), developed around the four main variables of mangrove ecotourism quality (Singgalen et al., 2022). Indicators for Accessibility included directional signs, public transportation, and road, bridge, and lighting conditions (McLachlin et al., 1994). Attraction variables encompassed cultural performances, natural scenery, events, and entertainment centers (Alves et al., 2025). Facilities included accommodation, restaurants, souvenir shops, security, toilets, worship facilities, parking areas, and tourism-related information (Parasuraman et al., 1991). Additional Services covered brochures and pamphlets, supporting infrastructure, staff hospitality, and ticketing or tour package management (Aisyah et al., 2025). The collected data were analyzed with WarpPLS using PLS-SEM to evaluate construct validity and examine the relationships among latent variables related to visitor perceptions Hair et al. (2020).

Table 2. Categories and Aspects of Tourist Perceptions of Mangrove Forest Facilities

Research Variable (Category)	Indicator (Aspect)	Code	Scale
<i>Access (Accessibility) - X₁</i> (McLachlin <i>et al.</i> , 1994)	Signs pointing to recreational areas	X _{1.1}	5-point Likert scale: a) 5: Strongly agree b) 4: Agree c) 3: Somewhat Agree d) 4: Disagree e) 5: Strongly Disagree
	The availability of public transportation to vacation destinations	X _{1.2}	
	Condition of roads/bridges/lighting leading to tourist attractions	X _{1.3}	
<i>Attraction - X₂</i> (Alves <i>et al.</i> , 2025)	Performance and presentation of local culture	X _{2.1}	5-point Likert scale: a) 5: Strongly agree b) 4: Agree c) 3: Somewhat Agree d) 4: Disagree e) 5: Strongly Disagree
	Natural conditions surrounding tourism	X _{2.2}	
	Event presentation	X _{2.3}	
	Attractiveness of entertainment centers	X _{2.4}	
<i>Amenities (Facilities) - X₃</i> (Parasuraman <i>et al.</i> , 1991)	Availability of accommodation (Hotels, Homestays, Guest Houses)	X _{3.1}	5-point Likert scale: a) 5: Strongly agree b) 4: Agree c) 3: Somewhat Agree d) 4: Disagree e) 5: Strongly Disagree
	Condition of restaurants, cafes, food stalls, and eateries	X _{3.2}	
	Availability of shopping centers, souvenir shops, and ATMs	X _{3.3}	
	Availability of tourist information	X _{3.4}	
	Safety of tourist attractions	X _{3.5}	
	Availability and condition of toilets	X _{3.6}	
	Availability and condition of places of worship/prayer rooms	X _{3.7}	
	Availability and condition of vehicle parking	X _{3.8}	
	Information about location, rates, and schedules	X _{3.9}	
	Marketing (<i>tourism information</i> , brochures, pamphlets)	X _{4.1}	
	Physical development (street lighting, statues, decorations)	X _{4.2}	
<i>Ancillary Service / Hospitality - X₄</i> (Aisyah <i>et al.</i> , 2025)	Hospitality of tour guides/tourism staff	X _{4.3}	5-point Likert scale: a) 5: Strongly agree b) 4: Agree c) 3: Somewhat Agree d) 4: Disagree e) 5: Strongly Disagree
	Ticketing and tour packages	X _{4.4}	

Result and Discussion

This study was conducted on 100 tourist respondents who had visited three mangrove ecotourism areas in Surabaya, namely Wonorejo Mangrove Ecotourism, Medokan Mangrove Botanical Garden, and Gunung Anyar Mangrove Ecotourism. The main objective of this study was to analyze tourists' perceptions of the available facilities, focusing on four main constructs, namely accessibility (X1), attractions (X2), facilities (X3), and additional services (X4), as well as their relationship with tourist perceptions (Y). The following table presents the evaluation of the measurement model.

The results of the measurement model analysis confirmed that all constructs met the required criteria of reliability and validity. Each construct, including accessibility, attractions, facilities, and additional services, showed loading values above the minimum threshold of 0.7, while the composite reliability and Cronbach's alpha coefficients also exceeded 0.7, which indicates strong internal consistency (Mohd Dzin and Lay, 2021). The average variance extracted (AVE) for each construct was above 0.5, demonstrating that the indicators sufficiently captured the variance of their respective latent variables (Cheung *et al.*, 2024). These findings validate the use of the four constructs to represent tourist perceptions of mangrove ecotourism in Surabaya.

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The evaluation of discriminant validity also supported the distinctiveness of each construct. The Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT) confirmed that correlations between constructs were lower than the square root of their AVE values and HTMT ratios remained below the recommended cutoff of 0.85 (Henseler *et al.*, 2015). These results emphasized that accessibility, attractions, facilities, and additional services functioned as separate yet interrelated dimensions in shaping tourist perceptions. This outcome is consistent with previous research that highlighted the multidimensional nature of tourism service quality (Parasuraman *et al.*, 1991; Singgalen *et al.*, 2022).

Construct Validity and Reliability

Table 3. Evaluation of the Measurement Model (Outer Model)

Construct	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability (CR)	AVE
<i>Access (Accessibility) - X₁</i>	Directional sign to recreational area - X _{1.1}	0.831	0.814	0.890	0.729
	Availability of public transportation to vacation destinations - X _{1.2}	0.870			
	Road/bridge/lighting conditions leading to tourist attractions - X _{1.3}	0.859			
<i>Attraction - X₂</i>	Local cultural performances and presentations - X _{2.1}	0.867	0.892	0.921	0.699
	Natural conditions surrounding tourism - X _{2.2}	0.838			
	Event appearance - X _{2.3}	0.846			
	Attractiveness of entertainment centers - X _{2.4}	0.863			
	Availability of educational or interactive activities - X _{2.5}	0.762			
<i>Amenities - X₃</i>	Availability of lodging - X _{3.1}	0.823	0.941	0.950	0.680
	Condition of restaurants, cafes, food stalls - X _{3.2}	0.797			
	Availability of shopping areas, souvenir kiosks, ATMs - X _{3.3}	0.853			
	Availability of tourist information - X _{3.4}	0.811			
	Safety of tourist attractions - X _{3.5}	0.804			
	Availability & condition of toilets - X _{3.6}	0.798			
	Availability & condition of places of worship/mosques - X _{3.7}	0.879			
	Availability & condition of parking - X _{3.8}	0.814			
	Location information, rates, schedule - X _{3.9}	0.840			
<i>Ancillary Service / Hospitality - X₄</i>	Marketing (brochures, pamphlets) - X _{4.1}	0.870	0.866	0.909	0.714
	Physical development (lights, statues, decorations) - X _{4.2}	0.861			
	Friendliness of tour guides/staff - X _{4.3}	0.816			
	Ticketing & tour packages - X _{4.4}	0.831			

Source: Primary data (2025) processed

Data analysis in this study employed WarpPLS, a software based on Partial Least Squares Structural Equation Modeling (PLS-SEM) that simultaneously evaluates the measurement model and the structural model (Sakaria et al., 2023). This approach allowed the researchers to assess construct validity and reliability, estimate relationships between latent variables, and examine the overall model fit. The results included outer loadings, Cronbach’s alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) for each indicator and construct, as well as path coefficients and R² values for the structural model (Thang et al., 2025). By using this method, the contribution of each construct to the formation of tourist perceptions could be identified systematically and accurately (Hlee et al., 2018).

Table 3 displays the instrument testing results focusing on four primary constructs: Accessibility (X₁), Attractions (X₂), Facilities (X₃), and Additional Services (X₄). The assessment involved 100 tourist respondents who visited three mangrove ecotourism sites in Surabaya, namely Wonorejo, Medokan, and Gunung Anyar. The objective of this evaluation was to ensure

that each indicator reliably represented its respective construct, thereby producing data that could serve as a solid and accurate foundation for further analysis (Hair, Howard, et al., 2020).

Furthermore, to assess how well the indicators represented each construct, the outer loading values were examined. Outer loading reflects the strength of the relationship between each indicator and its corresponding latent construct (Purwanto & Sudargini, 2021). Interestingly, all indicators recorded values above 0.7, which indicates that they strongly represented their respective constructs. This result confirms that the research instrument was carefully designed, allowing each item to effectively capture the essence of the intended concept (Rahi, 2017).

Subsequently, Cronbach’s Alpha was employed to evaluate the internal consistency of the indicators. The results showed values ranging from 0.814 to 0.941, indicating good to excellent reliability. This suggests that the indicators within each construct were mutually supportive and produced stable outcomes. In addition, Composite Reliability (CR) was calculated as a

complementary measure of reliability, with all constructs scoring above 0.890. These findings confirm that the instrument is trustworthy and that the constructs are consistently measured (Zmnako and Chalabi, 2019).

Furthermore, Average Variance Extracted (AVE) was employed to assess the extent to which the variance of the indicators could be explained by their respective constructs. The AVE values in this study ranged from 0.680 to 0.729, which exceeded the minimum threshold of 0.50, thereby confirming the convergent validity of the constructs. This indicates that the majority of the variance in the indicators was effectively captured by the constructs being measured, with relatively low levels of error (Dzin and Lay, 2021).

Overall, the evaluation results indicate that all constructs and indicators met the required criteria of validity and reliability, confirming that the research instrument was well-tested and capable of accurately representing the latent constructs (El-Den et al., 2020). Each indicator consistently reflected the aspect it was designed to measure, while the measurement model demonstrated stability and dependability as a foundation for analyzing the relationships among variables (Wang et al., 2020). This approach enabled the researchers to systematically evaluate the contribution of each construct to tourists' perceptions and to interpret the findings in a more comprehensive manner (Sahahiri et al., 2023). Consequently, the data obtained are valid and reliable, providing a robust basis for drawing credible and accountable conclusions, while also enhancing the quality of the research findings in developing mangrove ecotourism facilities and understanding tourist behavior. Furthermore, the validated instrument and model offer a useful reference for future studies in tourism and ecotourism management (Lee and Jan, 2018).

Structural Model Analysis

The evaluation of construct validity and reliability through the outer model was followed by an assessment of the individual contribution of each construct to tourists' perceptions. This analysis aimed to determine the extent to which Accessibility, Attractions, Facilities, and Additional Services influenced the overall experiences and perceptions of visitors at the three mangrove ecotourism areas in Surabaya, in line with the theoretical framework applied in this study.

The analysis revealed that Accessibility (X1) made a positive contribution to tourists' perceptions. This dimension covered aspects such as directional signage, transportation modes, and the condition of roads, bridges, and lighting leading to the tourism sites. These findings are consistent with McLachlin et al. (1994), who highlighted the importance of accessibility in shaping

visitor satisfaction and perceptions of a destination. This result is further supported by Jamei et al., (2022) who emphasized that accessibility not only determines how easily tourists can reach a site but also influences their perceptions of comfort, safety, and the overall quality of the travel experience.

Attractions (X2) also demonstrated a positive contribution in shaping tourist perceptions, encompassing elements such as local cultural performances, natural conditions, events, entertainment centers, and educational or interactive activities. This result supports the findings of Alves et al. (2025), who emphasized that diverse and appealing attractions significantly influence visitor experiences and perceptions of a destination. The result is further reinforced by Reyes and Dael (2023) who stated that the quality of attractions is a key factor in building tourist satisfaction and loyalty, as the diversity and appeal of activities enhance the overall visiting experience while strengthening the image of the destination.

Facilities (X3), including the availability of accommodations, restaurants, souvenir shops, tourism information, security, toilets, places of worship, parking areas, as well as information on locations and fees, also contributed positively to tourist perceptions. This finding is consistent with Parasuraman et al. (1991), who stated that the availability and quality of facilities are among the main factors determining visitor comfort and satisfaction. The result is further supported by Shen et al., (2021), who found that adequate facilities, both in terms of physical infrastructure and supporting services, enhance the tourist experience and play an important role in creating a positive impression of a destination.

Additional Services (X4), which include marketing, physical development, tour guide hospitality, and ticketing or tour package services, also contributed positively to tourist perceptions. This result is consistent with Aisyah et al. (2025), who demonstrated that the quality of ancillary services can enhance visitor experiences and influence their overall perceptions. This explanation is further supported by Achmad et al., (2023), who emphasized that additional services, particularly those related to information reliability, staff friendliness, and the availability of supporting facilities, play a crucial role in creating added value that directly impacts tourist satisfaction.

Each construct in this study, namely Accessibility, Attractions, Facilities, and Additional Services, was found to contribute positively to tourist perceptions in the three mangrove ecotourism areas of Surabaya. These findings indicate that improvements in accessibility, transportation convenience, facility comfort, attraction diversity, and the quality of ancillary services significantly influence the overall visitor experience (Anh et al., 2022). This means that each measured aspect

not only supports the physical comfort of tourists but also shapes their perceptions of the value and quality of mangrove ecotourism as a whole. This is consistent with Rasoolimanesh et al. (2022), who emphasized that visitor satisfaction largely depends on the combination of adequate access, attractions, and services, highlighting the strategic role of each construct in shaping the tourist experience.

The findings of this study provide valuable guidance for ecotourism managers in improving the quality of facilities, attractions, additional services, and accessibility with the aim of strengthening overall tourist satisfaction and experience. Careful attention to each construct allows managers to design more effective service strategies, introduce innovations in the delivery of attractions, and enhance visitor comfort and safety pengunjung (Shen et al., 2021). This integrated approach not only creates a more memorable tourism experience but also helps mangrove ecotourism destinations attract more visitors in a sustainable manner, strengthen their reputation in the public eye, and improve competitiveness with other tourism destinations (Titisari et al., 2022). Moreover, these findings can serve as a foundation for long-term development planning, including staff training, facility improvements, and attraction diversification, enabling destinations to adapt to the evolving needs and expectations of tourists (Hartman, 2023).

Furthermore, this study highlights the importance of local community involvement in destination management. The community is not merely a beneficiary but also a key actor capable of creating added value in ecotourism activities (Chan et al., 2021). Their participation can take various forms, ranging from providing mangrove-based culinary products and developing handicrafts to offering guiding services that showcase local wisdom. Such involvement not only strengthens cultural identity but also fosters a sense of ownership that motivates communities to preserve the environment (Donald and Staats, 2022). Tourists who gain authentic experiences through genuine social interactions and exposure to embedded cultural values are likely to achieve greater satisfaction (Loang, 2024). From a social perspective, community engagement also enhances social cohesion and expands employment opportunities for younger generations. Raising awareness among local residents about the importance of mangrove conservation is crucial for maintaining ecological balance, while collaboration between

managers, communities, and tourists can help realize inclusive and sustainable tourism (Manalo, 2023).

Beyond service aspects and community participation, this study has provided significant implications for policymakers, particularly national and local governments, which hold authority in shaping the future direction of ecotourism development. The government has played a strategic role in establishing consistent regulations that prioritize environmental conservation, ranging from policies on coastal land use to incentives for businesses that have applied environmentally friendly principles. In addition, investment in infrastructure that has been designed to adapt to climate change, such as low emission access routes, high standard waste management systems, and public facilities that support visitor comfort without causing ecosystem degradation, has become crucial to implement (Rahman and Thill, 2024).

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Promotional efforts should have expanded beyond the local scale to national and international levels through digital media, cross-country cooperation, and global tourism networks. (Kropinova, 2021). Well integrated policies have provided legal certainty as well as a solid foundation for ecotourism managers to design long term strategies, for example through intensive training programs for conservation based tour guides, financial support and access to capital for small and micro enterprises operating around mangrove areas, and the adoption of environmentally friendly technologies to support sustainable operations (Sukran et al., 2025). Economically, ecotourism has the potential to create jobs, raise regional income, and support the growth of small and medium enterprises in the tourism supply chain.

Descriptive Statistics of Research Indicators

Table 4. Descriptive Statistical Analysis for Research Indicators

Item		Minimum	Maximum	Mean	Std. Deviation
X ₁	Accessibility X ₁				
X1.1	Signs pointing to recreational areas	1	5	3.840	0.788
X1.2	Availability of public transportation to vacation destinations	1	5	3,790	0.808
X1.3	Road/bridge/lighting conditions leading to tourist attractions	1	5	3.790	0.795
X ₂	Attraction X ₂				
X2.1	Local cultural performances and presentations	1	5	3,810	0.775
X2.2	Natural conditions around tourism	1	5	3,840	0.721
X2.3	Event appearance	1	5	3,740	0.760
X2.4	Attractiveness of entertainment centers	1	5	3,740	0.774
X2.5	Availability of educational or interactive activities	1	5	3.780	0.811
X ₃	Amenities X ₃				
X3.1	Availability of accommodation (<i>Hotels, Homestays, Guest Houses</i>)	1	5	3,750	0.845
X3.2	Condition of restaurants, cafes, food stalls, and eateries	1	5	3,770	0.863
X3.3	Availability of shopping areas, <i>souvenir</i> kiosks, and ATMs	1	5	3,780	0.848
X3.4	Availability of tourism information	1	5	3,810	0.849
X3.5	Tourist site safety	1	5	3,830	0.779
X3.6	Toilet availability and condition	1	5	3,730	0.863
X3.7	Availability and condition of places of worship/mosques	1	5	3,770	0.815
X3.8	Vehicle availability and parking conditions	1	5	3,780	0.836
X3.9	Information about location, rates, and schedule	1	5	3,780	0.824
X ₄	Ancillary Service / Hospitality (Additional Services) X ₍₄₎				
X4.1	Marketing	1	5	3,790	0.769
X4.2	Physical development	1	5	3,760	0.866
X4.3	Friendliness of tour guides/staff	1	5	3.840	0.813
X4.4	<i>Ticketing</i> and tour packages	1	5	3,750	0.757

Source: Processed primary data (2025)

The results of descriptive analysis were used to understand tourists' perceptions of mangrove ecotourism facilities, which were grouped into four main constructs, namely accessibility (X₁), attractions (X₂), facilities (X₃), and additional services (X₄). Table X shows the minimum, maximum, *mean*, and standard deviation values for each indicator.

Accessibility (X₁)

The results show that the accessibility of mangrove ecotourism is considered quite good, including directions, public transportation, and the condition of roads, bridges, and lighting. This supports McLachlin *et al* (1994), which states that ease of access is an important factor in increasing tourist comfort and interest in visiting. Furthermore, these findings align with the research on the Septiani & Wulandari (2020), which found that adequate accessibility significantly increases visitor satisfaction in mangrove forests. Thus, good access not only facilitates visitor mobility but also plays a role in shaping positive perceptions of the tourism experience. Similar conclusions were also highlighted by Effendi *et al.* (2022), who emphasized that well-maintained infrastructure around mangrove tourism sites enhances tourist loyalty. In addition, Constantin *et*

al. (2022) explained that access convenience directly influences tourists willingness to revisit ecotourism destinations. Supporting this, Wan (2024) noted that clear signage and reliable transportation modes are critical elements that contribute to overall positive visitor perceptions. Thus, good access not only facilitates visitor mobility but also plays a role in shaping positive perceptions of the tourism experience.

Attraction (X₂)

Attractions, especially the natural surroundings and local cultural performances, are the main factors that influence tourist perceptions. These findings are in line with the theory of Medeiros *et al* (2025), which emphasizes the importance of integrating nature and culture to enhance the tourist experience. Furthermore, these results are in line with the research by Murtini *et al.* (2018) on the development strategy of the Wonorejo mangrove area as an ecotourism site in Surabaya, which shows that natural and cultural attractions are the main determinants of tourist interest. Other attraction indicators, such as events and entertainment centers, still have lower scores, indicating an opportunity to develop more creative entertainment programs and interactive activities. A similar point is highlighted by Aleksa *et al*

(2023), who state that unique cultural performances strengthen the identity of a destination and increase its competitiveness. In addition, research by Kadyrbekova et al. (2024) found that natural beauty combined with community participation in cultural attractions significantly improves visitor satisfaction. Supporting this, Sitorus et al. (2024) argued that maximizing local events and traditions within ecotourism areas not only enriches tourist experiences but also creates sustainable cultural value. Other attraction indicators, such as events and entertainment centers, still have lower scores, indicating an opportunity to develop more creative entertainment programs and interactive activities.

Amenities (X₃)

The supporting facilities component, including lodging, restaurants, tourist information, security, toilets, and places of worship, received fairly high ratings. This supports the theory of Parasuraman *et al.* (1991), which states that the quality of facilities is one of the main determinants of tourist satisfaction. This finding is also in line with the research on the Rachmawati et al. (2023), which emphasizes that complete facilities that meet visitor needs increase comfort and enhance the tourism experience in mangrove ecotourism areas. Thus, the provision of adequate facilities is an important factor in supporting the tourist experience. Similarly, Ariesta et al. (2020) highlight that the availability of clean and accessible public facilities strongly influences tourists' intention to revisit. In addition, Saragi et al. (2023) explains that well-maintained facilities not only improve visitor comfort but also strengthen the image of a tourist destination. Supporting this, Akram et al. (2023) argue that integrated facility management, including hygiene and safety, plays a crucial role in creating positive tourist perceptions. Thus, the provision of adequate facilities is an important factor in supporting the tourist experience.

Ancillary Service (X₄)

The friendliness of tour guides and tourism staff has been shown to have a significant influence on tourists' positive perceptions, while *ticketing* and tour packages support a smooth visit experience. This is in line with the theory of Aisyah et al. (2025), which emphasizes the importance of friendly attitudes and professionalism among staff in increasing visitor satisfaction. Also, Maelanicha et al. (2025) found that staff hospitality is a key factor in shaping memorable tourist experiences. Moreover, Sumartono et al. (2024) emphasized that clear ticketing systems and flexible tour packages increase convenience and trust. In addition, Yasir et al. (2021) argued that professional and communicative staff encourage repeat visits. Furthermore, Cheman et al. (2024) noted that integrating

friendly service with good facilities creates a holistic positive impression. Therefore, improving additional services is an important focus for ecotourism managers. Based on the descriptive analysis, tourists' perceptions of Surabaya mangrove ecotourism are quite good in accessibility, attractions, facilities, and additional services, which together build comfort and satisfaction.

Conclusion

The analysis and evaluation of the model indicated that the research instrument applied to assess tourists' perceptions of mangrove ecotourism facilities in Surabaya fulfilled the statistical requirements of validity and reliability. The four main constructs, namely Accessibility (X₁), Attraction (X₂), Facilities (X₃), and Ancillary Services (X₄), collectively demonstrated a positive contribution in shaping tourists' overall perceptions. These findings suggest that tourists generally hold favorable views, with elements such as natural conditions, the presentation of local culture, and the hospitality of guides and staff emerging as the most highly appreciated strengths. From a managerial perspective, the results highlight the importance of maintaining quality in these key aspects while improving areas with further development potential, such as the organization of events and programs. As this study was limited to three sites in Surabaya, namely Wonorejo Mangrove Ecotourism, Medokan Mangrove Botanical Garden, and Gunung Anyar Mangrove Ecotourism, future research is recommended to replicate the study across broader geographic settings to enhance the generalizability of the findings..

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Author Contributions

R.K.: Developing ideas, data collection, analyzing, writing, reviewing, responding to reviewers' comments; S.H., S.T.W., H.H.: analyzing data, overseeing reviewing scripts, and writing.

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Conflicts of Interest

The authors declare no conflict of interest.

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