

SIMULTANEOUS ANALYSIS OF THE FEASIBILITY AND PRIORITY OF TOURIST ATTRACTIONS: A CASE STUDY OF ECOTOURISM DEVELOPMENT IN TANAH LAUT REGENCY, INDONESIA

MELDAYANOOR^{1,2}, GUSTI MUHAMMAD HATTA^{1,3}, ACHMAD SYAMSU HIDAYAT^{1,4} AND AGUNG NUGROHO^{1,5*}

¹Doctoral Program of Agricultural Sciences, Lambung Mangkurat University, Banjarbaru, South Kalimantan 70714, Indonesia. ²Department of Agroindustry, Tanah Laut State Polytechnic, Pelaihari, South Kalimantan 70815, Indonesia. ³Department of Forestry Science, Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, South Kalimantan 70714, Indonesia. ⁴Department of Fisheries Agribusiness, Faculty of Fishery, Lambung Mangkurat University, Banjarbaru, South Kalimantan 70714, Indonesia. ⁵Department of Agro-Industrial Technology, Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru, South Kalimantan 70714, Indonesia.

*Corresponding author: anugroho@ulm.ac.id

Submitted final draft: 22 November 2022 Accepted: 17 December 2022

<http://doi.org/10.46754/jssm.2023.02.006>

Abstract: Ecotourism is vital in reducing negative environmental impacts and helping sustainable development. Developing ecotourism destinations require comprehensive studies, including the feasibility and priority of the tourist attractions. Many studies concentrate on ecotourism development; however, only a few reports deal with feasibility and priority, particularly biodiversity. Tanah Laut, a regency in the southeast part of Borneo Island has excellent ecotourism potential. This study aims to assess the feasibility and priority of seven ecotourism attractions through simultaneous methods consisting of the Analysis of Natural Tourist Attractions (ANTA) and the Exponential Comparison Method (ECM) for their feasibility and priority, consecutively. 10 criteria were involved in the ECM analysis: Natural and environment, human resources, market potential, transportation and communication, infrastructure, institutional support, security, tourism support, social and culture, and physical condition. The ANTA analysis showed that the seven ecotourism attractions in Tanah Laut Regency satisfy the minimum feasibility criteria to be developed as ecotourism objects. Furthermore, Mount Birah was elected the most priority due to its natural, human resources and market potential. This study suggests that simultaneous methods of ANTA and ECM could be used as adequate tools in a decision-support system for ecotourism development.

Keywords: Exponential comparison, natural tourism, south Kalimantan, strategic location, sustainability.

Abbreviation: Multi-Criteria Decision Making (MCDM), Exponential Comparison Method (ECM), Analysis of Natural Tourist Attractions (ANTA), Tourist Attractions (TA).

Introduction

Ecotourism is becoming a leading sector that merges social, economic and environmental aspects. Economically, it can provide direct benefits and job opportunities (Cobbinah *et al.*, 2017) through local product marketing (Anup, 2016) and work as tour guides (Adom, 2019). The natural and environmental resource potential can aid biodiversity conservation (Regmi & Walter, 2016). Ecotourism can promote conservation and provide beneficial

socio-economic engagement for residents (Ma *et al.*, 2019). Ecotourism emphasizes providing tourists with opportunities to learn and develop positive attitudes towards sustainability (Walker & Moscardo, 2014).

An assessment of the feasibility of the attraction should support the success of ecotourism. According to Hermawan *et al.* (2019), attractiveness is the dominant factor that positively influences tourist loyalty through the intervention of the satisfaction variable.

The critical factors are proximity (distance), infrastructure, the geography of various entities, organizations, tourism markets and the complexity between urban and rural areas (Mtapuri & Giampiccoli, 2020). Mgonja *et al.* (2015) explained that despite the localized and relatively limited diversity of natural and cultural resources such as inadequate accessibility, infrastructure, marketing and promotion, tourists can still be interested in social, economic and environmental sustainability and seek local experiences and opportunities to give back to the visited community (Gál, 2018).

Several approaches have been used in the tourist attractions assessment, including Multi-Criteria Decision Making (MCDM), Fuzzy, Analytical Hierarchy Process (AHP) and Geographical Information System (GIS) or a combination of them. Jhariya *et al.* (2016) study identified different tourism locations using GIS and MCDM. A study by Ghamgosar *et al.* (2011) used MCDM analysis as a tool to identify ecotourism potential in an area. Dashti *et al.* (2013) identified the sites on Qeshm Island using a multi-criteria and fuzzy approach. Mahdavi *et al.* (2015) used a fuzzy MCDM to determine the location of ecotourism in Khorram Abad, Iran. Meanwhile, Gigović *et al.* (2016) estimated land suitability maps in Dunavski ključ, Serbia using fuzzy. Mahdavi and Niknejad (2014) used MCDM and GIS in determining suitable locations in Iran. Ronizi *et al.* (2020) used the Fuzzy-OWA method and GIS to determine the best ecotourism locations in the east and centre of Fars province, Iran. Yuwono *et al.* (2021) use a combination of spatial MCDM and descriptive analysis of GIS and AHP for site suitability evaluation, which can produce location maps in ecotourism development based on environmental aspects, livelihoods, community interests and tourism potential.

Tanah Laut is a regency in South Kalimantan Province, Indonesia, geographically bordered by wetlands, mountains and the sea. It is advantaged with an area designation of 592.26 hectares consisting of natural tourism

parks, beaches, protected and urban forests, mountain tourism, waterfalls, caves, tourism, culture, religious tourist and historical sites. Its geographical position is also easy to reach because it is relatively close to the provincial capital and is a crossing area for the socio-economic activities of the community. Due to its geographical position, attractive landscape, natural biodiversity and unique culture, Tanah Laut has good potential to be developed as an ecotourism destination in South Borneo. There is no work focused on the development of ecotourism in Tanah Laut Regency.

Many studies concentrate on ecotourism development; however, only a few reports deal with the feasibility and priority studies, particularly on biodiversity and climate. Therefore, this study aims to assess the feasibility and priority of seven ecotourism attractions in Tanah Laut Regency through simultaneous methods consisting of the Analysis of Natural Tourist Attractions (ANTA) and the Exponential Comparison Method (ECM) for their feasibility and priority, consecutively. 10 criteria were involved in the ECM analysis: Natural and environment, human resources, market potential, transportation and communication, infrastructure, institutional support, security, tourism support, social and culture, and physical condition.

Data and Method

Data Collection

The study was conducted in seven ecotourism sites in Tanah Laut Regency (Figure 1). The areas and the tourist attractions are Pelaihari District – Panjaratan Village (River), Bajuin District – Sungai Bakar Village (Waterfall), Bati-Bati District – Benua Raya Village (Swamp Buffalo), Takisung District – Pagatan Besar Village (Mangrove), Jorong District – Sabuhur Village (Wildlife Reserve), Panyipatan District – Tanjung Dewa Village (Datu Island) and Kandangan Lama Village (Mount Birah). It lasted from July 2020 to June 2021.

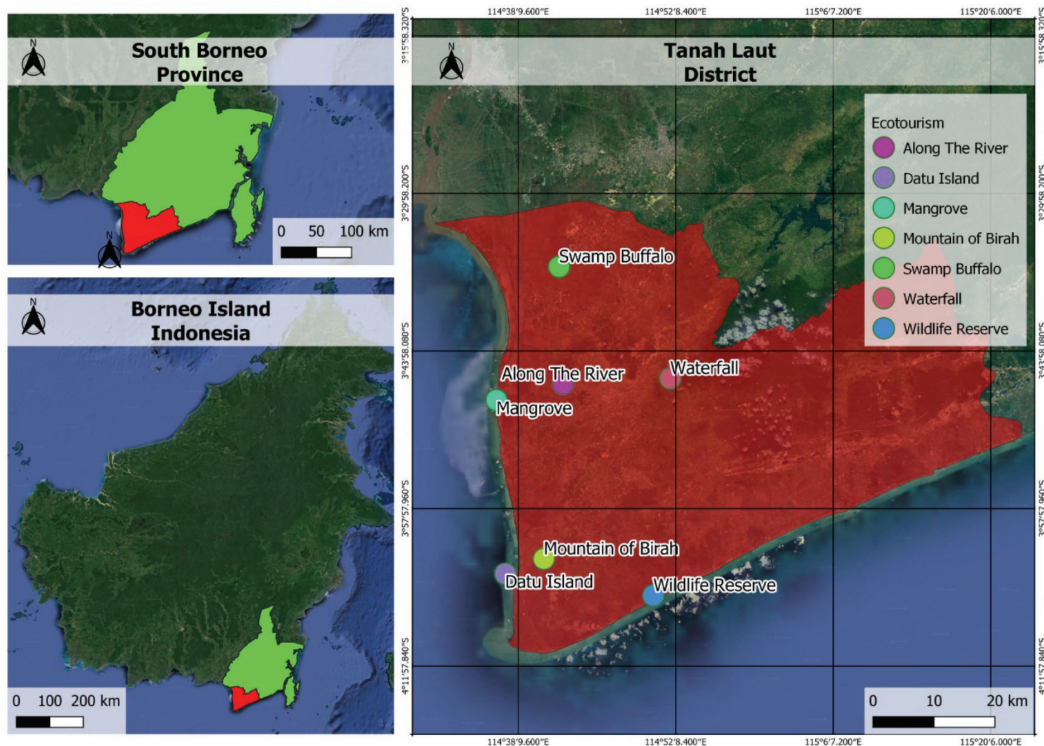


Figure 1: Geographical position of the studied ecotourism sites in Tanah Laut Regency

The study was conducted through a literature review, observation and field surveys. The literature was collected to study and review the current research articles on multi-criteria decision-making and analysis of tourist attractions in ecotourism development. Furthermore, field observations and surveys were carried out to study the existing conditions of the location and the objects of ecotourism attractions. The data were collected and analyzed using two simultaneous methods, Analysis of Natural Tourist Attractions (ANTA) and Exponential Comparison Method (ECM), respectively, for their feasibility and priority. Table 1 shows the elements of ANTA and ECM methods, including analysis aspects, data collection techniques and criteria.

Feasibility Analysis Method

Feasibility analysis of tourism attractions was conducted using the Guidelines for Analysis of Natural Tourist Attractions (ANTA) published by the Indonesian Ministry of Forestry (2003). The total score for one assessment criterion was calculated using Equation 1.

$$S = N \times B \quad (1)$$

S : Score/value of a criterion

N : Number of values of the elements in the criteria

B : Weighted value

After the calculation, a feasibility index in per cent was obtained. Moreover, the feasibility index of ecotourism attractions was as follows:

1. Feasibility rate > 66.6% : Fasible to develop
2. Feasibility rate 33.3% - 66.6% : Not yet feasible to develop
3. Feasibility rate < 33.3% : Not feasible to develop

Table 1: Details of analysis methods used in the study

Data Analysis	Criteria	Data Collection Technique	Analysis Method
Feasibility Analysis of Tourist Attractions	Attractiveness, market potential, accessibility, conditions around the area, management and services, climate, accommodation, supporting facilities and infrastructure, availability of clean water, relations with surrounding objects, security, area carrying capacity, visitor management, marketing and market share.	– Literature review – Observation – Field survey data	Analysis of Natural Tourist Attractions (ANTA)
Priority Analysis of Tourist Attractions	Natural and environmental resource potential, human resource potential, market potential, availability of transportation and communication facilities, infrastructure availability, institutional support, security, other tourism and product supports, social, economic and cultural conditions and physical condition of the area.	– Literature review – Observation – Field survey data – Interviews – Questionnaire	Exponential Comparison Method (ECM)

Priority Analysis Method

The analysis of priority tourist attractions with a multi-criteria decision-making system was conducted using the ECM method. The method quantified the opinion of one or more people on a particular scale with three expert respondents consisting of academics, bureaucrats and the local government official through interviews and questionnaires. The ECM was performed through six steps:

- (1) Determining alternative decisions
- (2) Developing decision criteria
- (3) Determining the weight of each criterion by expert respondents
- (4) Conducting strategic location assessment on each criterion
- (5) Calculating the value of each strategic location using Equation 2

$$\text{Total value (TN}_i\text{)} = \sum_{j=1}^m (\text{RK}_{ij})^{\text{TKK}_j} \quad (2)$$

TN_i : Total alternative value of -i

RK_{ij} : Degree of the relative importance of -j criterion in decision choice i

TKK_j : Degree of the importance of decision criteria j; $\text{TKK}_j > 0$; round

n : Number of decision choices

m : Number of decision criteria

- (6) Determining the priority of ecotourism strategic location decisions

Results and Discussions

Feasibility Analysis of Ecotourism Attractions

Feasibility analysis of ecotourism attractions was conducted using the ANTA method. The analysis was performed by considering several aspects, including interest-oriented conservation areas, education, community roles, sustainability and recreation functions such as comfort, relaxation and health. There were 15 criteria used in the analysis: Tourist attraction, market potential, accessibility,

circumstance, management and service, climate, accommodation, supporting facilities, clean water availability, relation to the nearby tourist attraction, security, carrying capacity, visitor

setting, marketing, and market share. The results of the assessment of ecotourism attractiveness in Tanah Laut Regency based on 15 criteria and the weights on each criterion are shown in Table 2.

Table 2: Assessment results of natural tourist attractions

Criteria	Weight	Total Value	Value (N x b)						
			Index (%)						
			TA Classification						
			1	2	3	4	5	6	7
Tourist attraction	6	1,440	1,350	1,320	1,350	1,020	1,350	1,080	1,260
			93.75	91.67	93.75	80.95	93.75	85.71	87.50
			High	High	High	High	High	High	High
Market potential	5	950	305	330	305	305	305	330	330
			32.11	34.74	32.11	32.11	32.11	34.74	34.74
			Low	Low	Low	Low	Low	Low	Low
Accessibility	5	900	900	900	900	775	775	775	775
			100	100	100	86.11	86.11	86.11	86.11
			High	High	High	High	High	High	High
Conditions around the area	5	1,200	1,025	1,050	825	1,025	1,075	1,050	1,100
			85.42	87.50	68.75	85.42	89.58	87.50	91.67
			High	High	Moderate	High	High	High	High
Management and service	4	360	300	300	280	300	300	300	300
			83.33	83.33	77.78	83.33	83.33	83.33	83.33
			High	High	High	High	High	High	High
Climate	4	480	260	260	260	260	260	260	260
			54.17	54.17	54.17	54.17	54.17	54.17	54.17
			Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Accommodations	3	90	30	30	0	30	0	30	30
			33.33	33.33	0.00	33.33	0.00	33.33	33.33
			Low	Low	Low	Low	Low	Low	Low
Supporting facilities and infrastructures	3	180	165	180	165	180	165	180	180
			91.67	100	91.67	100	91.67	100	100
			High	High	High	High	High	High	High
Availability of clean water	6	900	870	870	870	870	870	870	870
			96.67	96.67	96.67	96.67	96.67	96.67	96.67
			High	High	High	High	High	High	High
Relation to nearby tourist attractions	1	100	80	70	90	70	80	80	80
			80.00	70.00	90.00	70.00	80.00	80.00	80.00
			High	High	High	High	High	High	High
Security	5	600	525	500	525	525	550	525	550
			87.50	83.33	87.50	87.50	91.67	87.50	91.67
			High	High	High	High	High	High	High

Area's carrying capacity	3	450	315	360	315	330	435	330	360
			70.00	80.00	70.00	73.33	96.67	73.33	80.00
			Moderate	High	Moderate	Moderate	High	Moderate	High
Visitor settings	3	90	60	75	60	90	75	90	90
			66.67	83.33	66.67	100	83.33	100	100
			Moderate	High	Moderate	High	High	High	High
Marketing	4	120	60	120	60	120	60	120	120
			50.00	100	50.00	100	50.00	100	100
			Moderate	High	Moderate	High	Moderate	High	High
Market share	3	270	225	240	225	255	255	255	240
			83.33	88.89	83.33	94.44	94.44	94.44	88.89
			High	High	High	High	High	High	High
Total Index (%)			1,107	1,186	1,062	1,177	1,123	1,196	1,208
Average Index (%)			73.86	79.13	70.83	78.49	74.90	79.79	80.54

Description: (1) Panjaratan River, (2) Waterfall, (3) Swamp Buffalo, (4) Mangrove, (5) Wildlife Reserve, (6) Datu Island, (7) Mount Birah, TA: Tourist Attractions

Table 3: Eligibility level of ecotourism attractions

No.	District	Village	Tourist Attraction (TA)	Index (%)	TA Classification	Notes
1	Panyipatan	Kandangan Lama	Mount Birah	80.54	High	Worth developing
2	Panyipatan	Tanjung Dewa	Datu Island	79.79	High	Worth developing
3	Bajuin	Sungai Bakar	Waterfall	79.13	High	Worth developing
4	Takisung	Pagatan Besar	Mangrove	78.49	High	Worth developing
5	Jorong	Sabuhur	Wildlife Reserve	74.90	High	Worth developing
6	Pelaihari	Panjaratan	River	73.86	High	Worth developing
7	Bati-Bati	Benua Raya	Swamp Buffalo	70.83	High	Worth developing

Description: Feasibility level > 66.6%: Feasible to be developed, Feasibility level 33.3% - 66.6%: Not yet feasible to be developed, Feasibility rate < 33.3%: Not feasible to be developed

Based on the feasibility level in Table 3, all ecotourism sites are feasible to develop because they have a more than 66.6% as the ANTA's feasibility minimum index. The location is influenced by several factors such as attractions, market potential, accessibility, conditions around the area, management and services, climate, accommodation, supporting facilities

and infrastructure, availability of clean water, relations with surrounding tourism objects, security, regional carrying capacity, visitor management, marketing, and share market.

Yuwono *et al.* (2021) used a combination of spatial multi-criteria decisions and descriptive analysis, which produced location

maps in ecotourism development based on environmental aspects, livelihoods, community interests and tourism potential. Ecotourism development based on landscape evaluation and mapping depends on site suitability classes for development and landscape characteristics such as environmental aspects, livelihoods and community interests, tourism potential and market opportunities. The potential for nature-based tourist attractions and community livelihoods closely related to nature are the driving factors as a landscape that has the primary function of developing ecotourism.

The power pull of tourist attractions depends on several factors such as natural beauty, uniqueness, prominent types of natural resources, the integrity of natural resources, sensitivity to natural resources, tourism activities and regional security. An attraction should have specific characteristics to attract visitors (Ginting & Siregar, 2018). It is a permanent resource that can be natural or manufactured to attract tourists to visit an area. Market potential includes population density and level of tourism needs. According to Yuwono *et al.* (2021), in the planning of ecotourism development in Bulue Village, Soppeng Regency, there is potential for livelihood and nature-based attractions, tourism market opportunities, increasing access to tourist attractions and community empowerment.

Accessibility includes the distance travelled to the location, travel duration and the frequency of vehicles passing at the ecotourism location. According to Mahdavi *et al.* (2015), road access is essential in selecting a suitable area for recreational purposes. Despite the area's ecotourism potential, there are few opportunities for recreational planning in the absence of road access. Conditions suitable for developing ecotourism areas include spatial suitability, unemployment rate, community livelihoods, visitor movement space, education, soil fertility level, natural resources and community response to the development of tourist attractions. Evaluation of site suitability is essential for ecotourism development planning in a landscape-adaptive protected areas.

Management and service include language skills and visitor services. Meanwhile, climatic factors include the influence of climate on the length of visit, air temperature, number of dry months and humidity. Accommodation is a place to stay/hotel within a radius of 15 km from the object's location. According to Hastuti and Assriyani (2021), seven best practices have been applied by hoteliers such as the use of environmentally friendly building materials, energy-saving culture, availability of green open spaces and water bodies, recruitment of residents for work, purchasing from local suppliers, economic cooperation in the service sector with local communities, adoption of local culture in interior and exterior design.

Supporting facilities and infrastructure include accommodation, restaurants, tourist facilities, public transportation facilities, roads, bridges, parking lots, electricity networks, telephones, drinking water, drainage and other infrastructure facilities. The availability of clean water considers the distance to the location, discharge, feasibility of consumption and availability. According to Hastuti and Assriyani (2021), the challenges of groundwater management problems require stronger support and action from the government. One is by repairing the pipes of the Regional Drinking Water Company to avoid the crisis of groundwater decline.

Relationships with the surroundings include distance and the number of attractions. The factors for security are visitor safety, the anticipation of fire, illegal logging and encroachment (land use). The area's carrying capacity includes the soil's sensitivity to erosion, the slope of the land, the types of activities and the use of the area for ecotourism. According to Yuwono *et al.* (2021), the power support area is a more vulnerable protector than the other. Utilization of neglected area score vulnerability could damage the environment (water, soil, air, flora and fauna) and aspects of culture (decreased score wisdom local) and destroy the beauty of nature.

Visitor settings provide convenience to tourists and marketing includes the price, product, place and promotion. Furthermore, market share covers visitors' areas of origin, education and livelihoods. According to Drumm *et al.* (2004), there should be a thorough evaluation of both the product and market to identify the best method to manage and develop ecotourism.

Priority Analysis of Ecotourism Attractions

The ecotourism potential in Tanah Laut Regency has unique attractions that cannot be compared between one location and another. All locations have natural beauty, uniqueness and different tourism activities and their advantages. According to Blom and Nilsson (2021), tourist sites can evolve from unorganized to organized attractions over time. Ownership, administration, entrepreneurs, tourists and locals can comprehend tourism exploration for destinations to develop professionally.

Ecotourism in Tanah Laut Regency is growing with unique, diverse types of tourism objects and a very strategic location because it is close to the capital city of South Kalimantan Province. Several choices of locations can provide various kinds of attractions, views, natural beauty and experiences. The stages of assessment and decision-making of strategic ecotourism locations using ECM were as follows:

(1) Alternative strategic location

The selection of seven alternative ecotourism strategic locations (Table 4) was based on the discussions with the

Regional Tourism Office and the results of consideration of locations with the potential to match the types and characteristics of ecotourism, fulfil conservation, socio-cultural, economic and environmental aspects. The alternative locations have a high level of community participation.

(2) Strategic location criteria

The criteria for determining strategic location were natural and environmental resource potential, human resource potential, market potential, transportation and communication facilities, infrastructure availability, institutional support, security, other tourism and product supports, social, economic and cultural conditions and the physical condition of the area.

(3) The weighting of criteria according to expert respondents

The weighting was conducted by three respondents' experts consisting of 1 academician and 2 local government officials by providing choices rated 1 to 5. The results are shown in Table 5. The strategic location criteria were weighted by the respondent's expert, supported by experience, knowledge and data from observation, field survey findings and secondary sources. According to Hora (2004), the criteria were chosen due to the level of academic/researcher/practitioner, position as a policy maker and the number of experts that has to be odd, with a minimum and maximum of 3 and 9 people. The results found that the potential

Table 4: Alternative ecotourism strategic locations in Tanah Laut Regency

No.	District	Village	Tourist Attraction
1	Pelaihari	Panjaratan	River
2	Bajuin	Sungai Bakar	Waterfall
3	Bati-Bati	Benua Raya	Swamp Buffalo
4	Takisung	Pagatan Besar	Mangrove
5	Jorong	Sabuhur	Wildlife Reserve
6	Panyipatan	Tanjung Dewa	Datu Island
7	Panyipatan	Kandangan Lama	Mount Birah

of natural and environmental resources, as well as human resources, received the highest weight (very important) as the primary and key criterion in assessing the strategic location of ecotourism. Natural and environmental resources’ potential is the object while human resources are the subject.

(4) Strategic location assessment on each criterion

The results of the assessment of the strategic location by expert respondents are presented in Figure 2.

Table 5: Weight of each criterion

No.	Criteria	Weight
1.	Natural and environmental resources potential	5
2.	Human resource potential	5
3.	Market potential	4
4.	Availability of transportation and communication facilities	4
5.	Infrastructure availability	4
6.	Institutional support	4
7.	Security	4
8.	Other tourism and product support	3
9.	Social, cultural and economic conditions	3
10.	Physical condition of the area	4

Description: 1=not important, 2=quite important, 3=quite important, 4=important, 5=very important

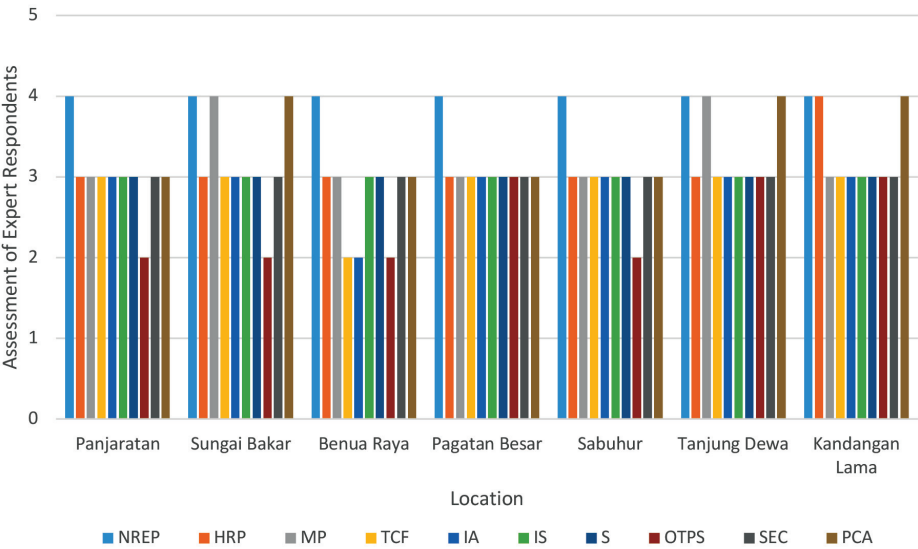


Figure 2: Assessment result of strategic location on each criterion

Note: NREP = Natural Resources and Environment Potential, HRP = Human Resources Potential, MP = Market Potential, TCF = Transportation and Communication Facilities, IA = Infrastructure Availability, IS = Institutional Support, S = Security, OTPS = Other Tourism and Product Supports, SEC = Social and Economic Condition, PCA = Physical Condition of the Area

(5) Calculation of the value of strategic locations on each criterion

Based on the calculation of the value of strategic ecotourism locations (Table 6), the assessment and calculation of all locations on the criteria of potential natural resources and the environment showed a value of 4 (very good). This was because all ecotourism locations have good natural resources and environmental potential, various attractions and different conservation areas such as swamps, riverbanks, waterfalls, caves, mangroves, mountains and religious tourism.

The potential of natural resources and the environment is defined as anything derived from nature and the environment that

can be exploited to satisfy human needs and enhance their welfare. According to Mgonja *et al.* (2015), the abundance and diversity of natural and cultural resources can be strategically formulated to provide ecotourism benefits to local communities, increase participation and explain better profit-sharing mechanisms.

The assessment and calculation of all locations for human resource potential showed a value of 3 (good), except for the Mount of Birah, which showed a value of 4 (very good). The location involves business actors, farmer groups/community groups, managers and village officials supporting ecotourism management. Human resource potential can be employed in the system as

Table 6: Value of strategic ecotourism locations

No.	Criteria	Weight	Strategic Location						
			1	2	3	4	5	6	7
1	Natural and environmental resources potential	5	1,024	1,024	1,024	1,024	1,024	1,024	1,024
2	Human resource potential	5	243	243	243	243	243	243	1,024
3	Market potential	4	81	256	81	81	81	256	81
4	Availability of transportation and communication facilities	4	81	81	16	81	81	81	81
5	Infrastructure availability	4	81	81	16	81	81	81	81
6	Institutional support	4	81	81	81	81	81	81	81
7	Security	4	81	81	81	81	81	81	81
8	Other tourism and product support	3	8	8	8	27	8	27	27
9	Socio-economic conditions	3	27	27	27	27	27	27	27
10	Physical condition of the area	4	81	256	81	81	81	256	256
ECM Total Score			1,788	2,138	1,658	1,807	1,788	2,157	2,763

Description: (1) Panjaratan, (2) Sungai Bakar, (3) Benua Raya, (4) Pagatan Besar, (5) Sabuhhur, (6) Tanjung Dewa, (7) Kandangan Lama

a supporter, thinker, planner and director to achieve ecotourism development goals by involving various parties, including business actors, community groups, ecotourism managers, local governments, financial institutions, cooperatives, universities and researchers, as well as other supporting institutions.

Furthermore, assessment and calculations on other criteria are essential to analyze the priority of strategic ecotourism locations, including market potential, availability, infrastructure availability, institutional support, security, support from other tourism objects and products, social and economic conditions and the physical condition of the area.

The population density and the level of tourism need influence the market potential. All marketable locations have the potential to be developed. Depending on their interests and aspirations, tourists have varying demands and experiences in ecotourism activities during their visit. The availability of transportation and communication facilities is an important criterion to enable tourists to reach the location. All ecotourism locations are accessible by road and have reliable communication networks. According to Nahuelhual *et al.* (2013), road access is essential in selecting a suitable area for recreational purposes. Even though ecotourism has great promise in the region, recreation plans cannot be established without road access.

Infrastructure availability is a set of supporting facilities in the development of ecotourism. The required infrastructure includes production support facilities, marketing networks, clean water, sanitation, electricity and roads. Institutional support is the role of all institutions cooperating and establishing good relationships with the government, private sector, cooperatives, tourism awareness groups, farmer groups/

other communities, NGOs and other stakeholders. According to Mahdavi *et al.* (2015), successful ecotourism management cannot be achieved without the cooperation and support of local communities. Moreover, the community needs to be empowered and involved in making important decisions to develop ecotourism.

Security is the absence of numerous threats and disruptions to the safety of a location. This criterion needs to be supported by the level of awareness and the role of local communities in maintaining and ensuring a sense of security from crimes and other social conflicts. The availability of different objects and products will increase the satisfaction and experience of tourists.

Social and economic conditions indicate a higher level of community welfare and the greater the interest and desire to support ecotourism development, the better for new business opportunities. According to Mulyadi (2019), ecotourism has a substantial impact on improving community economies, local policies and livelihoods. The physical condition of the area is influenced by several elements, such as the spatial layout of the object area, space for visitors, the level of soil fertility, cleanliness and other physical conditions that can interfere with comfort.

(6) Strategic location priority

Each ecotourism location has a variety of attractions and advantages to determine the order of priority. By using the ECM method, the order of priority of the various alternatives owned by the decision-maker was determined by producing highly contrasting alternative values (Figure 3). The application of ECM is expected to answer research problems, namely determining the priority order of strategic locations for ecotourism development in Tanah Laut Regency with contrasting values to produce the right strategy.

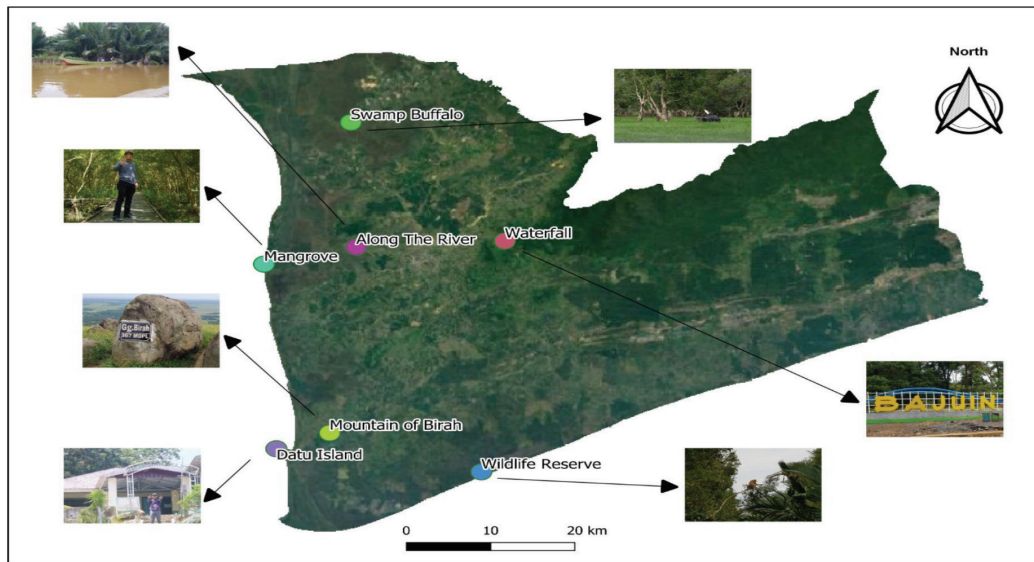


Figure 3: Priority map of ecotourism strategic locations in Tanah Laut District

Note: Priority 1=Mount Birah (ECM 2.763), Priority 2=Datu Island (ECM 2.157), Priority 3=Waterfalls (ECM 2.138), Priority 4=Mangrove (ECM 1,807), Priority 5=River (ECM 1.788), Priority 5=Wildlife Reserve (ECM 1,788), Priority 6=Swamp Buffalo (ECM 1,658)

According to Mahdavi *et al.* (2015), determining ecotourism sites by prioritizing ecotourism projects in suitable locations and presenting a conservation plan that prevents adverse effects on the quality of sensitive ecosystems will be necessary and assists the sustainable development of ecotourism in the area. Successful ecotourism management will not be achieved without the cooperation and support of local communities. In addition, local communities must be empowered and involved in making essential decisions for ecotourism development.

Conclusion

This study suggests that simultaneous methods of ANTA and ECM could be used as adequate decision-supporting tools in ecotourism development, especially for a package of feasibility and priority analysis. Regarding the feasibility of tourist attractions in Tanah Laut Regency, the ANTA method showed more than 66.6% of the feasibility index, indicating that all of the seven studied ecotourism attractions are feasible to develop. Concurrently, the multi-

criteria ECM analysis resulted in Mount Birah as the first strategic priority among the seven attractions. Nevertheless, the output quality of the methods is very dependent on the quality of the expert respondents. Therefore, selecting the appropriate respondents who can deliver accurate information is crucial. Further studies are still required to examine the accuracy and reliability of the combined methods in other cases. As decision-supporting tools, the suggested methods could assist many parties involved in ecotourism development, including the government, private sectors, business managers, investors and related stakeholders, in evaluating the potential for ecotourism development.

Acknowledgements

The authors would like to thank the promoter team of Prof. Gusti Muhammad Hatta, Prof. Agung Nugroho and Dr. Achmad Syamsu Hidayat for critical comments on the manuscript and assistance during the research process. This research was funded by the Ministry of Education, Culture, Research and Technology

of the Republic of Indonesia through a Doctoral Dissertation Research Grant. This research is part of the dissertation submitted to fulfil the requirements for a Doctoral Dissertation Research grant and the requirements for obtaining a Doctorate degree at Lambung Mangkurat University.

References

- Adom, D. (2019). The place and voice of local people, culture and traditions: A catalyst for ecotourism development in rural communities in Ghana. *Scientific African*, 6(11), 1-12. <https://doi.org/10.1016/j.sciaf.2019.e00184>
- Anup, K. C. (2016). Ecotourism and its role in Nepal's sustainable development. In L. Butowski (Ed.), *Tourism - From Empirical Research to Practical Application*. <http://dx.doi.org/10.5772/62308>
- Blom, T., & Nilsson, M. (2021). Båstnäs car graveyard: A place that seems to live in its own "bubble of time and space". *European Journal of Tourism Research*, 27(2), 1-15.
- Cobbinah, P. B., Amenuvor, D., Black, R., & Peprah, C. (2017). Ecotourism in the Kakum conservation area, Ghana: Local politics, practices and outcome. *Journal of Outdoor Recreation and Tourism*, 20(2), 34-44. <https://doi.org/10.1016/j.jort.2017.09.003>
- Dashti, S., Monavari, S. M., Hosseini, S. M., Riazi, B., & Momeni, M. (2013). Application of GIS, AHP, Fuzzy and WLC in island ecotourism development (Case study of Qeshm Island, Iran). *Life Science Journal*, 10(1), 1274-1282.
- Drumm, A., Moore, A., Soles, A., Patterson, C., & Terborgh, J. E. (2004). The Business of Ecotourism Development and Management. In A. Singer (Ed.), *Ecotourism Development: A Manual for Conservation Planners and Managers* (2nd ed.). Arlington, Virginia: The Nature Conservancy.
- Gál, T. (2018). Ecological tourism as key to sustainable tourism development in Transylvania. *Enlightening Tourism: A Pathmaking Journal*, 8(1), 26-46. <https://doi.org/10.33776/et.v8i1.3267>
- Ghamgosar, M., Haghyghy, M., Mehrdoust, F., & Arshad, N. (2011). Multicriteria decision making based on Analytical Hierarchy Process (AHP) in GIS for tourism. *Middle East Journal of Scientific Research*, 10(4), 501-507. [http://www.idosi.org/mejsr/mejsr10\(4\)11/14.pdf](http://www.idosi.org/mejsr/mejsr10(4)11/14.pdf)
- Gigović, L., Pamučar, D., Lukić, D., & Marković, S. (2016). GIS-Fuzzy DEMATEL MCDA model for site evaluation for ecotourism development: A case study of the "Dunavski ključ" region, Serbia. *Land Use Policy*, 58(2), 348-365. <http://dx.doi.org/10.1016/j.landusepol.2016.07.030>
- Ginting, N., & Siregar, N. (2018). Geotrail development to connect the dots in Muara Caldera Toba, Indonesia. *IOP Conference Series: Earth and Environmental Sciences*, 126(1), 012169. <https://iopscience.iop.org/article/10.1088/1755-1315/126/1/012169/pdf>
- Hastuti, H. & Assriyani, A. (2021). Sustainable Tourism Implementation and challenges faced by hoteliers through tourism practices in Prawirotaman tourism village, Yogyakarta special region province. *Journal of Sustainability Science and Management*, 16(1), 141-157. <http://doi.org/10.46754/jssm.2021.01.013>
- Hermawan, H., Wijayanti, A., & Nugroho, D. S. (2019). Loyalty on ecotourism analyzed using the factors of tourist attraction, safety and amenities, with satisfaction as an intervening variable. *African Journal of Hospitality, Tourism and Leisure*, 8(5), 1-19.
- Hora, S. C. (2004). Probability judgments for continuous quantities: Linear combination and calibration. *Management Science*, 50(5), 597-604.

- Indonesian Ministry of Forestry. (2003). *Guidelines for Analysis of Natural Tourism Attractiveness (ANTA)*. Directorate General of Forest Protection and Nature Conservation, Ministry of Forestry, Republic of Indonesia.
- Jhariya, D. C., Kumar, T., Gobinath, M., Diwan, P., & Kishore, N. (2016). Assessment of groundwater potential zone using remote sensing, GIS and multi-criteria decision analysis techniques. *Journal of the Geological Society of India*, 88(2), 481-492. <https://doi.org/10.1007/s12594-016-0511-9>
- Ma, B., Yin, R., Zheng, J., Wen, Y., & Hou, Y. (2019). Estimating the social and ecological impact of community-based ecotourism in giant panda habitats. *Journal of Environmental Management*, 250(3), 109506. <https://doi.org/10.1016/j.jenvman.2019.109506>
- Mahdavi, A., & Niknejad, M. (2014). Site suitability evaluation for ecotourism using MCDM methods and GIS: Case study-Lorestan Province, Iran. *Journal of Biodiversity and Environmental Science*, 4(6), 425-437.
- Mahdavi, A., Niknejad, M., & Karami, O. (2015). A fuzzy multi-criteria decision method for ecotourism development. *Journal of Caspian Environmental Science*, 13(3), 221-236.
- Mgonja, J. T., Sirima, A., & Mkumbo, P. J. (2015). A review of ecotourism in Tanzania: Magnitude, challenges and prospects for sustainability. *Journal of Ecotourism*, 14(2), 264-277. <https://doi.org/10.1080/14724049.2015.1114623>
- Mtapuri, O., & Giampiccoli, A. (2020). Beyond rural contexts: Community-based tourism for a better life in the city. *Advances in Hospitality and Tourism Research*, 8(2), 419-439. <https://doi.org/10.30519/ahtr.690184>
- Mulyadi, A. (2019). Modeling of tourists, local population, natural and cultural resources toward ecotourism product (Case study in Seagrass Trikora Conservation Area). *Society and Business Review*, 15(1), 1-20. <https://doi.org/10.1108/SBR-08-2018-0088>
- Nahuelhual, L., Carmona, A., Lozada, P., Jaramillo, A., & Aguayo, M. (2013). Mapping recreation and ecotourism as a cultural ecosystem service: An application at the local level in Southern Chile. *Applied Geography*, 40(1), 71-82.
- Regmi, K. D., & Walter, P. G. (2016). Conceptualising host learning in community-based ecotourism homestays. *Journal of Ecotourism*, 15(1), 51-63. <https://doi.org/10.1080/14724049.2015.1118108>
- Ronizi, S. R. A., Mokarram, M., & Negahban, S. (2020). Utilizing a multi-criteria decision to determine the best locations for the ecotourism in the east and central of Fars province, Iran. *Land Use Policy*, 99(12), 105095. <https://doi.org/10.1016/j.landusepol.2020.105095>
- Walker, K., & Moscardo, G. (2014). Encouraging sustainability beyond the tourist experience: Ecotourism, interpretation and values. *Journal of Sustainable Tourism*, 22(8), 1175-1196. <https://doi.org/10.1080/09669582.2014.918134>
- Yuwono, E., Maulany, R. I., & Barkey, R. A. (2021). Site suitability evaluation for ecotourism development: A case study in Bulue village, Soppeng district, Indonesia. *Journal of Sustainability Science and Management*, 16(1), 129-140. <http://doi.org/10.46754/jssm.2021.01.012>