Architectural and Infrastructure Intervention Priorities for Community Based Ecotourism Villages Using A 4a Moora Model: North Sulawesi, Indonesia

Leidy Magrid Rompas [a*], Tamas Misik[b]

[a]Architecture Study Program, Faculty of Engineering, Sam Ratulangi University – Indonesia
leidymagrid@unsrat.ac.id
[b] Institute of Sustainable Development, Corvinus University of Budapest, 1093 Budapest, Hungary;
tamas.mizik@uni-corvinus.hu

*Corresponding author: leidymagrid@unsrat.ac.id
Manuscript received: 19 Nov. 2025. Revision accepted: 19 Jan. 2026

Abstract. Public programs supporting community-based ecotourism frequently face the problem of allocating limited budgets across multiple candidate villages that differ in attraction quality, service readiness, accessibility, and community capacity. This study develops a transparent decision support approach to prioritize government assistance for five community-based ecotourism villages in North Sulawesi Province, Indonesia, assessed during September to October 2025. The 4A destination framework was operationalized into 12 criteria representing Attraction, Amenity, Access, and Activity, and criterion weights were elicited through expert judgment averaging from an eight-member multistakeholder panel. The Multi Objective Optimization on the basis of Ratio Analysis method was applied to normalize the decision matrix, incorporate weights, and compute optimization scores. The resulting priority ranking was Budo (A3) with a MOORA score of 0.4036, Kakaskasen II (A4) with 0.3928, Bahoi (A1) with 0.3744, Pulisan (A2) with 0.3279, and Poopo (A5) with 0.2564. Dimension level interpretation indicates that Budo's leading position is driven by strong amenity readiness and the most favorable access contribution, while Kakaskasen II performs strongly through activity diversity and homestay capacity but requires strengthened environmental management. Bahoi emerges as a conservation-oriented option constrained mainly by access and connectivity, whereas Pulisan and Poopo are primarily limited by minimum service readiness and travel time. A sensitivity checks on the travel time weight shows stable ranks under plausible weight shifts, supporting the robustness of the prioritization. The study contributes an auditable ranking tool and criterion level development levers to guide staged, evidence-based allocation of government support for community-based ecotourism.

Keywords: accessibility, community-based ecotourism, decision support system, moora, tourism village

INTRODUCTION

Ecotourism is widely promoted as a pathway to generate local income while maintaining ecological integrity, yet research consistently shows that outcomes depend on governance quality, benefit sharing, and the capacity to manage tourism pressures on sensitive ecosystems. Empirical evidence from protected area contexts highlights that participation and benefit sharing are among the most decisive governance indicators shaping sustainability outcomes (Forje & Tchamba, 2022). At the same time, studies of community driven tourism in coastal and nature based settings emphasize that community engagement can strengthen environmental stewardship and resilience, but practical constraints such as infrastructure gaps and waste issues can undermine visitor experience and ecological functions (van Onselen et al., 2025).

Within this context, community-based ecotourism is often framed as a development approach that can deliver social and economic gains while supporting conservation, particularly in rural regions. Evidence from Southeast Asian settings suggests that community based ecotourism can contribute to social transformation by improving livelihoods and reinforcing socio cultural and environmental values, although unmanaged negative impacts can reduce long term sustainability (Kunjuraman et al., 2022). Participation dynamics are not automatic; recent work on community preferences indicates that willingness to engage is shaped by perceived benefits, governance arrangements, and local conditions that affect how ecotourism is experienced and managed on the ground (Pineda et al., 2023).

However, community tourism does not always follow a linear success narrative. Longitudinal insights show that high participation and empowerment alone do not guarantee sustainable outcomes, and that institutional design and incentive structures can produce

paradoxical results across otherwise similar villages (Liu et al., 2025). In parallel, emerging research indicates that community based tourism can be strengthened through creative tourism strategies that support inclusive development goals, but these approaches require clear prioritization and coordinated implementation capacity (Suriyankietkaew et al., 2025). Equity considerations are also increasingly emphasized, including evidence that community based tourism initiatives can promote inclusivity for marginalized groups when participation barriers are addressed within local tourism systems (Nikjoo et al., 2025).

A recurrent policy problem follows from these realities: governments must allocate limited development assistance across multiple candidate tourism villages that differ in attraction strength, service readiness, accessibility, and local institutional capacity. Collaborative governance research in rural tourism further suggests that multi actor involvement and perceived value can shape how tourism initiatives perform, which reinforces the need for structured decision processes that are transparent to diverse stakeholders (Reina-Usuga et al., 2024). In practice, prioritization based on a single indicator such as popularity or proximity to growth centers can be misleading, because destinations with high ecological appeal may still be constrained by minimum service conditions and safety readiness.

Decision Support Systems based on multi criteria decision making are well suited to such prioritization problems because they formalize trade offs among conflicting objectives and provide an auditable justification for rankings. Recent tourism applications show that integrated multi criteria approaches can support destination evaluation and guide policy and investment decisions in rural tourism contexts (Trang Le et al., 2025). Similarly, ecotourism suitability research using multi criteria decision analysis demonstrates the value of systematic evaluation to reduce ad hoc decision making in environmentally fragile settings (Withanage et al., 2024).

To operationalize destination potential at the village scale, this study uses the 4A destination lens, attraction, amenity, access, and activity, which has been combined with analytic hierarchy approaches to evaluate tourism attractiveness and interpret key destination determinants (Ksissou et al., 2024). In ecotourism planning, multi criteria frameworks are also frequently used to evaluate site suitability by integrating environmental, infrastructure, and cultural indicators, reinforcing the relevance of multi dimensional evaluation for ecotourism development decisions (Kolcha et al., 2025).

This paper integrates the 4A indicator structure with MOORA, a method increasingly reviewed as a practical multi objective ranking approach and frequently used in both single and hybrid decision frameworks (Singh et al., 2024). MOORA is particularly attractive for policy applications because it handles benefit and cost criteria through normalization and produces interpretable optimization scores (Chakraborty et al., 2023). Recent tourism oriented applications of Multi MOORA also illustrate its feasibility for ranking problems in tourism and regional development contexts (Akgöz & Karagöz, 2024).

Accordingly, this study develops and applies a 4A based MOORA Decision Support System to prioritize community-based ecotourism village development in North Sulawesi, Indonesia. The contribution is a transparent ranking model that supports evidence based allocation of government assistance while also offering criterion level diagnostics that can guide staged interventions aligned with sustainable, low impact tourism development.

MATERIALS AND METHODS

Study area and research design

This study was conducted in North Sulawesi Province, Indonesia. Data collection and expert assessment were carried out from September to October 2025, covering the compilation of village performance indicators, travel time estimates from the main gateway (Manado and

86

its airport corridor), and structured scoring using an agreed rubric. The study employed a decision support design using multicriteria decision making to rank community-based ecotourism villages using the 4A framework. This approach is consistent with tourism research that uses indicator based evaluation and multicriteria techniques to support planning and decision making(Blancas et al., 2023).

The workflow consisted of defining the decision goal and alternatives, operationalizing the 4A framework into measurable criteria, eliciting weights from a multistakeholder expert panel, constructing the decision matrix, and applying MOORA to compute optimization scores and rankings. Related ecotourism assessment studies also emphasize the value of structured multicriteria frameworks for guiding development decisions in environmentally sensitive contexts.

Alternatives and expert panel

Five village alternatives were assessed: Bahoi (A1), Pulisan (A2), Budo (A3), Kakaskasen II (A4), and Poopo (A5). The decision makers consisted of an eight-member expert panel (two representatives from the Provincial Tourism Office, two tourism academics from UNSRAT, two Pokdarwis representatives, and two local travel agents).

Before presenting the criteria and computation procedures, Table 1 lists the alternatives and their ecotourism typology to clarify how different ecological and settlement contexts can shape performance across attraction, amenity, access, and activity dimensions.

Table 1. Village alternatives assessed in the decision model

Code	Village	Administrative location	Dominant ecotourism typology
A1	Bahoi	Likupang Barat, North Minahasa	Coastal mangrove and environmental education
A2	Pulisan	Likupang Timur, North Minahasa	Coastal beach and savanna tourism
A3	Budo	Wori, North Minahasa	Coastal viewpoint and tourism cluster proximity
A4	Kakaskasen II	Tomohon Utara, Tomohon City	Highland agro ecotourism and cultural experiences
A5	Poopo	Ranoyapo, South Minahasa	Inland river adventure and conservation values

Table 1 is used to interpret ranking results by linking each alternative to its dominant tourism setting, which commonly drives trade offs between ecological value and operational readiness.

Criteria development and operational definitions

The 4A framework was operationalized into 12 criteria, reflecting attraction quality, amenity readiness, access performance, and activity governance. The use of the 4A lens in tourism evaluation is supported by recent work that combines destination dimensions such as attraction, accessibility, and amenities with structured decision methods to explain tourism attractiveness determinants (Ksissou et al., 2024). Criteria were specified as either benefit or cost attributes, consistent with multi criteria ecotourism and site suitability studies where travel effort or distance is treated as a constraint (Kolcha et al., 2025).

Before describing scoring and aggregation, Table 2 documents the operational definition, scale, and attribute type for each criterion to ensure replicability.

Table 2. Criteria operationalization, measurement scale, and attribute type

Code	Criterion	4A dimension	Type	Measurement scale
C1	Attraction uniqueness	Attraction	Benefit	Expert score 1 to 5
C2	Environmental quality	Attraction	Benefit	Expert score 1 to 5
C3	Homestay readiness	Amenity	Benefit	Count of ready units
C4	Sanitation and toilets	Amenity	Benefit	Expert score 1 to 5
C5	Waste management	Amenity	Benefit	Expert score 1 to 5
C6	Mobile signal and internet	Amenity	Benefit	Expert score 1 to 5
C7	Travel time from main gateway	Access	Cost	Minutes
C8	Road quality	Access	Benefit	Expert score 1 to 5
C9	Wayfinding and signage	Access	Benefit	Expert score 1 to 5
C10	Activity variety	Activity	Benefit	Count of activities
C11	Pokdarwis role and activeness	Activity	Benefit	Expert score 1 to 5
C12	Safety management readiness	Activity	Benefit	Expert score 1 to 5

Table 2 clarifies how conceptual destination dimensions were translated into measurable indicators suitable for MOORA computation, including the explicit handling of travel time as a cost attribute.

Data collection and scoring procedure

Data inputs were compiled through structured expert assessment and rapid field-based appraisal. Count based indicators (C3, C10) were recorded as agreed values by the panel, while score based indicators (C1, C2, C4, C5, C6, C8, C9, C11, C12) used a shared 1 to 5 rubric-anchored to observable readiness and management conditions. The use of structured indicator scoring aligns with tourism evaluation practice where several readiness variables are not fully captured by a single objective statistic, particularly in rural and community managed settings.

Weight elicitation

Criterion weights were obtained using expert judgment averaging and normalized to sum to 1. Weighting reflects policy priorities and is widely applied in tourism multi criteria models to align evaluation with sustainability and development objectives. The broader MCDM literature also documents the frequent use of hybrid structures that separate weighting from ranking to improve interpretability and decision transparency.

MOORA implementation

Let $X = [x_{ij}]$ be the decision matrix where i indexes villages and j indexes criteria. Vector normalization was performed as:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}$$

Weighted normalized values were computed as $v_{ij} = w_j r_{ij}$. The optimization score was calculated by summing weighted normalized benefit criteria and subtracting weighted normalized cost criteria:

$$Y_i = \sum_{j \in B} v_{ij} - \sum_{j \in C} v_{ij}$$

Where B is the set of benefit criteria and C is the set of cost criteria (C7 only). This formulation is consistent with recent MOORA focused reviews describing its normalization and

benefit cost aggregation logic. MOORA has also been recently synthesized as a practical method with broad application and frequent hybridization in decision support contexts.

Reporting transparency

To support reproducibility, the study reports the raw decision matrix, the final weights, and the resulting optimization scores. Recent tourism and regional development applications of Multi MOORA emphasize the importance of transparent indicator reporting for interpretability and stakeholder communication.

RESULTS AND DISCUSSION

The analysis is anchored in the raw decision matrix and the final MOORA scores so that the prioritization logic remains transparent and auditable.

Raw performance profile of village alternatives

To establish an interpretable baseline before optimization, Table 3 presents the raw decision matrix X in a format that places village alternatives as columns and the 12 criteria as rows. This layout allows direct comparison of each village's strengths and constraints across the 4A dimensions prior to normalization and weighting.

Table 3. Raw decision matrix X

Criterion	A1 Bahoi	A2 Pulisan	A3 Budo	A4 Kakaskasen II	A5 Poopo
C1 Attraction uniqueness (1–5)	4	5	4	5	5
C2 Environmental quality (1–5)	5	4	4	3	5
C3 Homestay readiness (units)	10	15	12	20	5
C4 Sanitation and toilets (1–5)	4	3	5	4	2
C5 Waste management (1–5)	5	3	4	3	2
C6 Mobile signal and internet (1–5)	3	4	5	5	2
C7 Travel time (minutes, cost)	90	120	45	60	150
C8 Road quality (1–5)	4	5	5	5	3
C9 Wayfinding and signage (1–5)	3	4	5	4	2
C10 Activity variety (count)	4	3	3	5	2
C11 Pokdarwis activeness (1–5)	5	4	5	4	4
C12 Safety management readiness (1–5)	4	3	4	3	4

Table 3 shows several systematic trade offs that later shape the MOORA ranking. Poopo (A5) and Pulisan (A2) exhibit strong attraction-related indicators (C1 and C2), but Poopo faces pronounced readiness constraints in sanitation, waste management, and connectivity (C4 to C6) combined with the longest travel time (C7). In contrast, Budo (A3) displays a consistently high readiness profile for amenity and access criteria (C4, C6, C8, C9) and the shortest travel time, indicating strong feasibility for near-term scaling. Kakaskasen II (A4) stands out for homestay capacity and activity variety (C3 and C10), but has a lower environmental quality score (C2), suggesting that growth pressures may already be influencing ecological and cleanliness conditions.

MOORA optimization scores and priority ranking

After constructing the decision matrix, MOORA was applied using vector normalization, multiplication by expert-derived weights, and aggregation of benefit criteria minus the cost criterion (C7). Table 4 reports the resulting optimization value Y_i and the final priority ranking.

89

Table 4. MOORA optimization scores and priority ranking

Rank	Code	Village	Y_i
1	A3	Budo	0.4036
2	A4	Kakaskasen II	0.3928
3	A1	Bahoi	0.3744
4	A2	Pulisan	0.3279
5	A5	Poopo	0.2564

Table 4 provides the main decision output for public resource allocation. Budo (A3) ranks first with $Y_i = 0.4036$, followed closely by Kakaskasen II (A4) with $Y_i = 0.3928$. The score gap between the top two alternatives is small (approximately 0.0108), indicating that both are strong candidates but achieve high performance through different pathways. Bahoi (A1) ranks third, reflecting strong community governance and environmental performance that are partially offset by access and connectivity constraints. Pulisan (A2) ranks fourth due to service-readiness gaps despite strong attraction and road quality. Poopo (A5) ranks fifth, reflecting a "high attraction but low readiness" pattern where access time and basic services limit short-term scalability under the study's policy objective.

Explaining the ranking through 4A contributions

To interpret the mechanisms behind the MOORA outcomes, the weighted normalized results were aggregated into the four 4A dimensions. Attraction is represented by C1 and C2, Amenity by C3 to C6, Access by C8 and C9 minus the cost attribute C7, and Activity by C10 to C12. Table 5 reports the dimension-level contributions to the total Y_i.

Table 5. Dimension-level (4A) contributions to the MOORA score

Village	Attraction	Amenity	Access	Activity	Y_i
A3 Budo	0.0999	0.1313	0.0349	0.1375	0.4036
A4 Kakaskasen II	0.104	0.1263	0.0222	0.1403	0.3928
A1 Bahoi	0.1104	0.1159	-0.0021	0.1501	0.3744
A2 Pulisan	0.1144	0.1027	-0.0044	0.1151	0.3279
A5 Poopo	0.1249	0.0564	-0.0397	0.1148	0.2564

Table 5 clarifies why the highest attraction score does not necessarily translate into the highest overall priority under a development-assistance objective. Poopo (A5) has the strongest Attraction contribution, yet it is heavily penalized by a strongly negative Access component and the lowest Amenity contribution. Budo (A3) leads primarily because it combines strong Amenity readiness with the most favorable Access component, driven by short travel time and strong wayfinding and road quality. Kakaskasen II (A4) achieves the strongest Activity contribution and robust Amenity performance, but its overall score remains slightly lower than Budo due to weaker environmental quality and a longer travel time. Bahoi (A1) exhibits the strongest Activity contribution and high Attraction, but its Access term is slightly negative, indicating that improvements in connectivity and travel efficiency would most directly increase its competitiveness without undermining its conservation-led identity.

Village-level discussion and development implications

Budo (A3) achieves the highest overall priority because it is operationally ready for near-term scaling. Its strong sanitation, connectivity, and access performance indicate that modest investments in low-impact visitor facilities can yield immediate improvements in visitor comfort and carrying-capacity management. In an architecture and ecotourism framing, these interventions include environmentally sensitive sanitation systems, improved wayfinding, and small interpretive structures that formalize the visitor experience while protecting sensitive

90

areas.

Kakaskasen II (A4) ranks second due to strong homestay readiness and the highest activity variety, aligning well with a community-based experience model rooted in highland agro-ecotourism and cultural activities. However, its weaker environmental quality score suggests that future support should prioritize environmental governance and service systems that prevent ecological degradation as visitation grows. This includes strengthening waste management, enhancing landscape maintenance, and improving the environmental performance of tourism-supporting facilities so that activity expansion does not erode destination authenticity.

Bahoi (A1) ranks third as a conservation-led coastal destination with strong Pokdarwis activeness and excellent environmental quality. Its ranking is constrained mainly by travel time and moderate internet performance, indicating that targeted enabling improvements can raise competitiveness without shifting its core identity. In practical terms, this village is well positioned for assistance focused on interpretation and conservation compliance systems, coupled with selective upgrades to connectivity and basic amenities that support guided education-based tourism.

Pulisan (A2) ranks fourth. Although it has strong attraction and excellent road quality, its amenity readiness, activity intensity, and safety preparedness are comparatively moderate. This indicates that public assistance should focus on raising minimum service standards before promoting large increases in visitation, especially given its strategic position near a growth hub. Improvements in sanitation, waste management, and visitor information systems are particularly relevant because they both increase readiness and mitigate negative externalities from rapid tourism growth.

Poopo (A5) ranks fifth, not because its ecological value is low, but because its current readiness profile is insufficient for near-term scaling under a policy objective emphasizing efficient allocation. Long travel time, weak connectivity, and low scores in sanitation and waste management generate substantial constraints. A phased strategy is therefore more appropriate: enabling infrastructure and minimum service standards first, followed by structured community activity development and risk management so that improved accessibility does not undermine conservation value.

Diagnostic interpretation: high-impact improvement levers

Beyond ranking, decision support is most useful when it identifies which interventions are likely to raise a village's score most efficiently. Table 6 reports, for each village, the top three high-impact improvement levers based on the largest weighted gaps relative to the best-performing village on each criterion, treating travel time as a cost attribute.

Table 6. Highest-impact improvement levers by village

Village	Priority improvement levers
A3 Budo	Activity variety (C10), Attraction uniqueness (C1), Homestay readiness (C3)
A4 Kakaskasen II	Environmental quality (C2), Waste management (C5), Safety management readiness (C12)
A1 Bahoi	Travel time (C7), Homestay readiness (C3), Attraction uniqueness (C1)
A2 Pulisan	Travel time (C7), Activity variety (C10), Sanitation and toilets (C4)
A5 Poopo	Travel time (C7), Activity variety (C10), Sanitation and toilets (C4)

Table 6 shifts the interpretation from "who ranks higher" to "what should be improved first." For Budo (A3), marginal gains depend more on enriching experiences and expanding community-based activities than on basic infrastructure, because its readiness is already strong. For Kakaskasen II (A4), environmental quality and waste management emerge as the most critical levers to ensure sustainable scaling. For Bahoi (A1), Pulisan (A2), and Poopo (A5),

91

travel time appears as a dominant constraint, but the feasible policy response differs. In some cases, practical reductions in travel friction may come from route clarity, transport coordination, and wayfinding rather than major road investments. For Poopo (A5), however, the combined deficits in access and basic services suggest that enabling infrastructure must precede aggressive promotion.

Robustness check for the cost criterion weight

Because travel time is a cost attribute and often influential in tourism feasibility, a simple robustness check was performed by decreasing and increasing the weight of C7 by 20 percent and renormalizing all weights to sum to one. Table 7 reports the optimization scores and ranks under these scenarios.

Table 7. Sensitivity of ranking to changes in the travel time weight (C7)

Village	Base Y_i (Rank)	C7 weight decreased 20% Y_i (Rank)	C7 weight increased 20% Y_i (Rank)
A1 Bahoi	0.3744 (3)	0.3902 (3)	0.3592 (3)
A2 Pulisan	0.3279 (4)	0.3454 (4)	0.3110 (4)
A3 Budo	0.4036 (1)	0.4160 (1)	0.3918 (1)
A4 Kakaskasen II	0.3928 (2)	0.4063 (2)	0.3799 (2)
A5 Poopo	0.2564 (5)	0.2753 (5)	0.2383 (5)

Table 7 indicates that the overall ranking is stable under a plausible variation in the travel time weight, which strengthens confidence that the priority order is not an artifact of a single assumption about access importance. While optimization values change as expected, the relative ordering of alternatives remains unchanged, suggesting that the observed performance differences are structurally supported by multiple criteria, not only by travel time.

CONCLUSION

This study demonstrates that integrating the 4A destination framework with the MOORA method can produce a transparent and operational decision support tool for prioritizing community-based ecotourism assistance in North Sulawesi. Using 12 criteria and expert informed weights, the model generated a clear priority order with quantified optimization scores: Budo (A3) 0.4036, Kakaskasen II (A4) 0.3928, Bahoi (A1) 0.3744, Pulisan (A2) 0.3279, and Poopo (A5) 0.2564. The results indicate that near term investment should focus on villages with high readiness and favorable access conditions, as these are more likely to convert assistance into rapid and measurable improvements in visitor experience and local economic benefits.

Beyond ranking, the findings provide actionable diagnostic insights. Budo's top position is explained by strong amenity readiness combined with the most favorable access contribution, suggesting that marginal gains should focus on enriching activity portfolios and strengthening interpretive experience design. Kakaskasen II ranks second due to its strong activity diversity and homestay capacity, but its relatively lower environmental quality indicates the need for strengthened waste management and environmental governance to sustain growth. Bahoi ranks third as a conservation led destination supported by strong community organization, where targeted improvements in connectivity and access efficiency could improve competitiveness without compromising its ecological orientation. Pulisan's lower rank highlights that basic sanitation and waste systems should precede major promotion in growth corridor settings, while Poopo's ranking shows that enabling infrastructure and minimum service standards must be established before scaling demand, despite its high ecological value. Overall, the proposed approach supports evidence-based allocation by linking funding priorities directly to

92

measurable performance gaps across the 4A dimensions.

ACKNOWLEDGEMENTS

REFERENCES

Akgöz, E., & Karagöz, B. (2024). The Assessment of the Products with Geographical Indications of Konya in terms of Their Availability in Restaurants based on Multi-Moora Method. *DETUROPE - The Central European Journal of Tourism and Regional Development*, *16*, 75–94. https://doi.org/10.32725/det.2024.004

Blancas, F. J., Contreras, I., & Lozano-Oyola, M. (2023). Evaluating destinations' efforts to improve sustainability in tourism using the inter-temporal decomposition of a composite indicator. *Environmental Impact Assessment Review*, *98*, 106947. https://doi.org/https://doi.org/10.1016/j.eiar.2022.106947

Chakraborty, S., Raut, R. D., Rofin, T. M., & Chakraborty, S. (2023). A comprehensive and systematic review of multi-criteria decision-making methods and applications in healthcare. *Healthcare Analytics*, *4*, 100232. https://doi.org/https://doi.org/10.1016/j.health.2023.100232

Forje, G. W., & Tchamba, M. N. (2022). Ecotourism governance and protected areas sustainability in Cameroon: The case of Campo Ma'an National Park. *Current Research in Environmental Sustainability*, *4*, 100172. https://doi.org/https://doi.org/10.1016/j.crsust.2022.100172

Kolcha, T., Biazen, M., & Girma, Z. (2025). Site suitability evaluation for ecotourism using geographic information system (GIS) and analytical hierarchy process (AHP) in Aroresa and Chire districts, Southern Ethiopia. *International Journal of Geoheritage and Parks*, *13*(4), 601–615. https://doi.org/https://doi.org/10.1016/j.ijgeop.2025.12.001

Ksissou, K., El Kadri, A., El-Khodary, M., & Trid, S. (2024). The tourism attractiveness of the Moroccan archaeological site of Volubilis: An analysis of the determinants through analytic hierarchy process (AHP). *International Journal of Geoheritage and Parks*, *12*(4), 606–620. https://doi.org/https://doi.org/10.1016/j.ijgeop.2024.11.007

Kunjuraman, V., Hussin, R., & Aziz, R. C. (2022). Community-based ecotourism as a social transformation tool for rural community: A victory or a quagmire? *Journal of Outdoor Recreation and Tourism*, *39*, 100524. https://doi.org/https://doi.org/10.1016/j.jort.2022.100524

Liu, Y., Wang, J., Huang, K., Li, Y. (William), & Wan, L. C. (2025). The sustainable paradox of community tourism in world cultural heritage villages: The case of Xidi and Hong. *Annals of Tourism Research*, *115*, 104020. https://doi.org/https://doi.org/10.1016/j.annals.2025.104020

Nikjoo, A., Seyfi, S., & Saarinen, J. (2025). Promoting gender inclusivity through community-based tourism. *Annals of Tourism Research Empirical Insights*, *6*(1), 100181. https://doi.org/https://doi.org/10.1016/j.annale.2025.100181

Pineda, F., Padilla, J., Granobles-Torres, J. C., Echeverri-Rubio, A., Botero, C. M., & Suarez, A. (2023). Community preferences for participating in ecotourism: A case study in a coastal lagoon in Colombia. *Environmental Challenges*, *11*, 100713. https://doi.org/https://doi.org/10.1016/j.envc.2023.100713

Reina-Usuga, L., Camino, F., Gomez-Casero, G., & Jara Alba, C. A. (2024). Rural tourism initiatives and their relationship to collaborative governance and perceived value: A review of recent research and trends. *Journal of Destination Marketing & Management*, *34*, 100926. https://doi.org/https://doi.org/10.1016/j.jdmm.2024.100926

Singh, R., Pathak, V. K., Kumar, R., Dikshit, M., Aherwar, A., Singh, V., & Singh, T. (2024). A historical review and analysis on MOORA and its fuzzy extensions for different applications. *Heliyon*, *10*(3), e25453. https://doi.org/https://doi.org/10.1016/j.heliyon.2024.e25453

Suriyankietkaew, S., Krittayaruangroj, K., Thinthan, S., & Lumlongrut, S. (2025). Creative tourism as a driver for sustainable development: A model for advancing SDGs through community-based tourism and environmental stewardship. *Environmental and Sustainability Indicators*, *27*, 100828. https://doi.org/https://doi.org/10.1016/j.indic.2025.100828

Trang Le, T. K., Nguyen, H. P., & Nguyen, N. Q. (2025). Assessing Vietnam's sustainable agritourism by integrated multi-criteria decision-making approach. *Journal of Open Innovation: Technology, Market, and Complexity*, *11*(4), 100652. https://doi.org/https://doi.org/10.1016/j.joitmc.2025.100652

van Onselen, V. M., Bayrak, M. M., Gladfelter, S., & Lin, T.-Y. (2025). Community insights on tourism development and nature-based solutions for increased resilience to coastal hazards at Caota sand dunes Geopark in Taiwan. *Progress in Disaster Science*, *28*, 100472. https://doi.org/https://doi.org/10.1016/j.pdisas.2025.100472

Withanage, N. C., Chanuwan Wijesinghe, D., Mishra, P. K., Abdelrahman, K., Mishra, V., & Fnais, M. S. (2024). An ecotourism suitability index for a world heritage city using GIS-multi criteria decision analysis techniques. *Heliyon*, *10*(11), e31585. https://doi.org/https://doi.org/10.1016/j.heliyon.2024.e31585.