



ENHANCING THE MULTIDIMENSIONAL SCALING APPROACH FOR DESIGNING AGRITOURISM SUSTAINABILITY STRATEGY

DANY JUHANDI^{1*}, ASMARA WILDANI PASARIBU², NORA ANALISA BR SINULINGGA³ AND NILAM KEMALA ODANG⁴

¹*Agribusiness of Horticulture, Politeknik Wilmar Bisnis Indonesia, 20371 Deli Serdang, North Sumatra, Indonesia.* ²*Event Management, Politeknik Wilmar Bisnis Indonesia, 20371 Deli Serdang, North Sumatra, Indonesia.* ³*International Marketing Management, Politeknik Wilmar Bisnis Indonesia, 20371 Deli Serdang, North Sumatra, Indonesia.* ⁴*Tax Accounting, Politeknik Wilmar Bisnis Indonesia, 20371 Deli Serdang, North Sumatra, Indonesia.*

*Corresponding author: dany.juhandi@wbi.ac.id

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ABSTRACT

The Indonesian government has designated the Lake Toba area as one of the super-priority tourism destinations, leading to substantial investments and programmes to boost tourist visits. However, the development of agritourism must consider sustainability, which aligns with the objectives of the Sustainable Development Goals (SDGs). As such, the development of agritourism in Meat Village requires careful attention to various aspects of sustainability. Correspondingly, this study aims to determine the sustainability status and value, identify factors influencing sustainability, and illustrate sustainability strategy designs. The research utilised primary data obtained through interviews with several stakeholders, including farmers, Village-Owned Enterprises (BUMDes), local society members, local government officials, local community groups, and tourists. Furthermore, the analysis employed the Multidimensional Scaling (MDS) approach with the aid of Multiple-Aspect Sustainability Analysis (MSA) software. Five sustainability aspects with a total of 50 factors were identified. The study revealed that agritourism is at a moderate level of sustainability. Meanwhile, the economic and institutional aspects scored 50, the environmental aspect scored 77.27, the marketing aspect scored 60, and the cultural aspect scored 50. In addition, this study illustrated sustainable designs through scenario simulations and the results demonstrated an increase in sustainability to 72.15. Overall the illustrated designs can serve as alternatives for the government to enhance the sustainability of agritourism in Meat Village.

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Introduction

Lake Toba, located in North Sumatra has been designated as one of the super-priority tourism destinations since 2019, following the directive of President Joko Widodo. This directive has resulted in an increase in tourist visits to North Sumatra. In August 2024, the number of international tourist visits reached 22,261, compared to only 10,615 visits in 2022 (BPS, 2024). Notably, this rise in tourist numbers can be attributed to the directive, which has spurred investment, capital, and promotional activities

by the government in areas within the Lake Toba region.

Meat Village is a tourist village situated within the Lake Toba area, specifically located in the Tampahan District of Toba Regency. The majority of its residents work as farmers. Abadi and Khakzand (2022) asserted that integrating agriculture with tourism can provide benefits for farmers. In 2022, 58.47% of the working population in the village was engaged in farming

(BPS, 2023). Accordingly, Meat Village has become a popular tourist destination due to its location on the shores of Lake Toba, offering stunning views of the lake. Tourist activities in Meat Village, in addition to enjoying the beauty of Lake Toba, include the Thousand Tents event and observing the process of *ulos* weaving. At the same time, festivals or events celebrating local culture attract tourists, support the local economy, and strengthen communities (Ndhlovu & Dube, 2024). In line with this, Leite *et al.* (2023) noted that key components in tourism development include attractions or events, accounting for 36%.

Following the COVID-19 pandemic, the government, through the Ministry of Tourism has sought to increase tourist visits by allocating a budget of IDR298.5 billion for the Ministry of Tourism and Creative Economy. Measures include providing incentives to tourism stakeholders, offering financial assistance to local governments, and additional support (Anggraini, 2021). Furthermore, infrastructure improvements have been undertaken to support tourism programmes. Riad Mohamed Khatab (2024) stated that infrastructure support has the potential to maximise the benefits of the tourism industry. Moreover, efforts to increase tourist visits continue, including hosting international events in the Lake Toba area. In essence, tourism events that provide profound experiences for visitors can enhance the sustainability of tourism programmes (Üzümoğlu & Turkan, 2022).

The development of tourist villages must prioritise sustainability, balancing economic, social, and environmental aspects (Nedeljković *et al.*, 2024). Correspondingly, local cultural values must be explored as potential assets for tourism development. In agritourism development, striking a balance between tradition and innovation is crucial for preserving cultural heritage and attracting tourists (Zaburaeva, 2024). For example, research by Gutierrez-Velez *et al.* (2022) emphasised that rural development should foster collaboration and solidarity among communities to create inclusive and equitable environments.

Additionally, Sawe *et al.* (2018) examined the social and cultural aspects of agritourism and discovered that cultural heritage has a positive influence on agritourism, potentially increasing local income and creating employment opportunities. Building on this, effective planning and management are essential for enhancing the sustainability of agritourism (Navarro-Martínez *et al.*, 2020). Moreover, Haywood *et al.* (2020) studied the sustainability of rural tourism by evaluating only social and economic aspects, concluding that tourism sustainability must consider both economic and social benefits. Consistent with this, achieving sustainability in rural agritourism necessitates attention to social cohesion and equitable resource distribution to safeguard the environment (Cheteni & Umejisi, 2023).

Research on agritourism sustainability is essential, as it can deliver environmental benefits, though the social and cultural aspects remain underexplored (Ndhlovu & Dube, 2024). However, existing research often focuses on limited aspects of sustainability, identifying only the status and influencing factors. Following this, Si *et al.* (2024) emphasised the importance of comprehensively evaluating all aspects of sustainability to contribute to the Sustainable Development Goals (SDGs). Additionally, it is vital to develop strategies for achieving sustainability in tourism management (Yuliani *et al.*, 2024).

Previous studies have largely been limited to assessing and determining the status of tourism sustainability without formulating strategies for improvement. Conversely, this research offers several innovations: (1) Assessing and determining the status of sustainability while also formulating sustainability strategies; (2) illustrating sustainability strategies through scenario simulations based on stakeholder roles; and (3) developing programmes based on scenario illustrations to enhance sustainability. In particular, this study aims to determine the sustainability status and value of Meat Village's agritourism, identify factors influencing sustainability, and illustrate sustainability

strategy designs based on stakeholder roles through scenario simulations.

Given the increasing tourism activities in the Lake Toba region, a sustainability assessment of tourism is necessary. This research contributes to the development of sustainable agriculture-based tourism in Meat Village. Notably, tourism in Meat Village involves enjoying the beauty of Lake Toba and developing local resource potentials such as agriculture to ensure that tourism does not displace agriculture as the primary livelihood of the local community.

Materials and Methods

Site Location

This study was conducted in November 2023 in Meat Village, Tampahan District, Toba Regency, North Sumatra. Meat Village is a top tourist destination within the Lake Toba region, offering stunning landscapes of rice fields and the lake. Most of the village residents are rice farmers. Typically, agritourism activities are conducted during the harvest season, often accompanied by traditional rituals. In addition to its scenic beauty, the village offers attractions such as *ulos* weaving and the Thousand Tents Festival. Figure 1 shows the methodology steps.

Respondents

The respondents in this study were stakeholders involved in the development of agritourism. These included farmers, tourism managers, local residents, local government officials, community leaders, and tourists. A total of 50 respondents participated, comprising 10 farmers, five tourism managers, 10 local residents, three local government officials, two community leaders, and 20 tourists (Table 1). Note that each respondent received tailored questions related to various sustainability aspects.

Data

This study utilised primary data collected through questionnaires and interviews with farmers, tourism managers, local residents, government officials, community leaders, and

tourists. Accordingly, data were analysed using a Likert scale to identify factors across seven economic, 11 environmental, 12 institutional, 15 marketing, and 50 cultural dimensions.

Data Analysis

Community-based tourism sustainability was analysed using the Multidimensional Scaling (MDS) approach, employing licensed software, Multiple-aspect Sustainability Analysis (MSA). Traditional sustainability research typically considers three pillars: Economic, social, and environmental (WCED, 1987). Concurrently, this study expanded the framework to include five aspects: Economic, environmental, institutional, marketing, and cultural (Table 2). Factors influencing these aspects were selected based on relevant prior studies and their significant impacts on sustainability, totalling 50 factors.

Statistical Analysis

Statistical analysis utilised a Likert scale, with indicators classified as “good” or “bad” using Fisher’s (2002) criteria. Good conditions were scored 3 or 2 while the worst conditions were scored 0 on a scale of 0-3 or 0-2. The definitive score, based on the mode, determined each aspect’s sustainability position relative to “good” and “bad” points using multidimensional statistical techniques. Subsequently, the sustainability index was classified into three categories (Gunduz *et al.*, 2011): Low (0-0.4), moderate (0.41-0.67), and high (> 0.68).

Leverage or sensitivity analysis identified the most sensitive factors affecting sustainability indices in each aspect. As such, the Root Mean Square (RMS) was employed to determine factor sensitivity, with larger RMS changes indicating greater sensitivity. Simultaneously, critical factors were selected for policy strategy formulation.

Goodness of fit for MDS analysis was assessed using S-stress and R² values. Low S-stress values (< 0.25) indicate a good fit while higher values suggest the opposite (Fauzi &

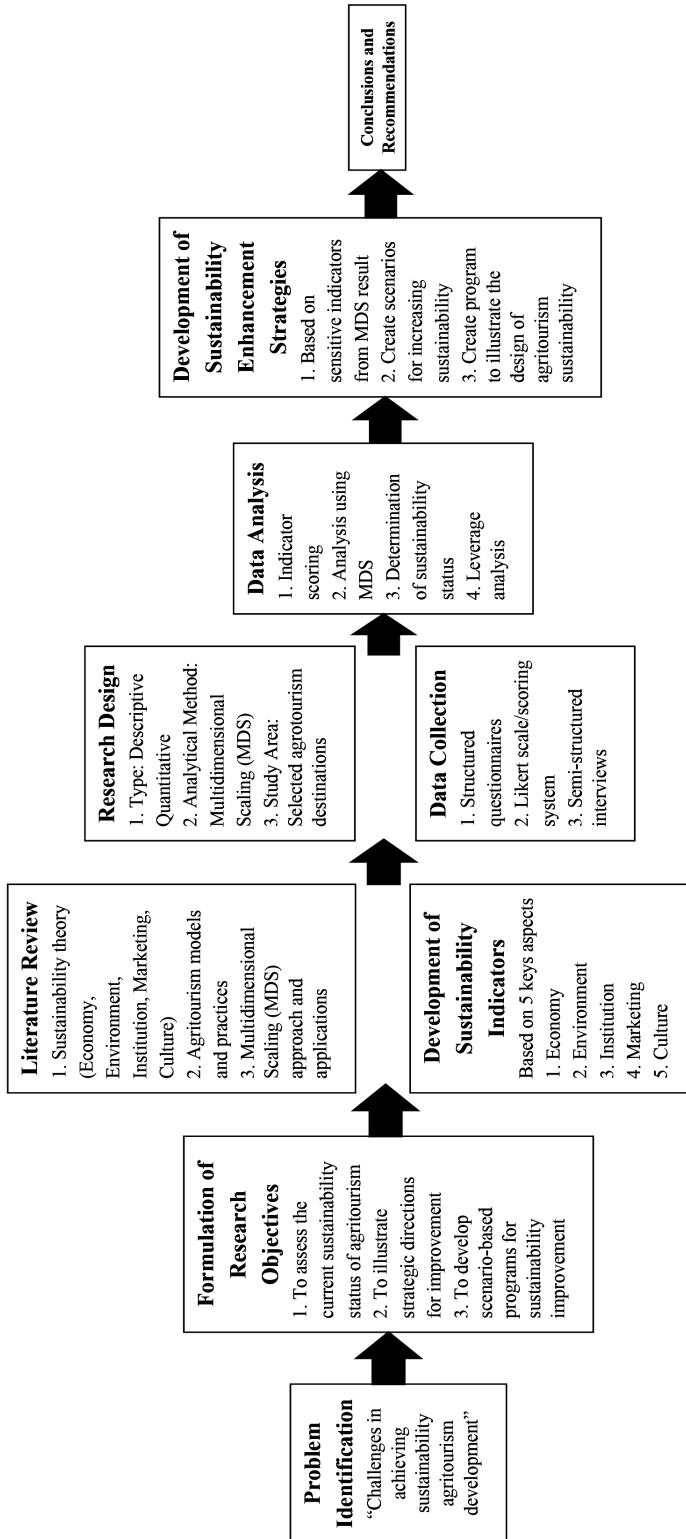


Figure 1: Methodology steps

Table 1: Characteristics of respondents

Type of Respondent	Number	Percentage (%)
Farmer	10	20,0
Village-owned enterprise	5	10,0
Local society	10	20,0
Local government	3	6,0
Local community	2	4,0
Tourist	20	40
Total	50	100,0

Table 2: Aspects and factors

No.	Aspects	Factors	References
1.	Economy	1. Business training 2. Buyer of production 3. Business type 4. Manufacturing industry 5. Source of income 6. Subsidy 7. Capital support	(Sgroi & Modica, 2022) (Benziouche <i>et al.</i> , 2024) (Benziouche <i>et al.</i> , 2024; Crespi-Vallbona & Plana-Farran, 2023; Vasco <i>et al.</i> , 2024) (Ramos-Gerena, 2024) (Benziouche <i>et al.</i> , 2024) (Harsanto & Wahyuningrat, 2024; Pinheiro <i>et al.</i> , 2022) (Harsanto & Wahyuningrat, 2024; Juhandi <i>et al.</i> , 2023)
2.	Environment	1. Water source 2. Harvest failure 3. Weather changes 4. Efforts to protect animals or plants 5. Preserving biodiversity 6. Availability of clean water sources 7. Source of clean water 8. Access to clean water sources 9. Tourist spot view 10. The naturalness of the site 11. Availability of trash bins	(Quinta-Nova & Ferreira, 2024) (Ariyarathna <i>et al.</i> , 2023) (Sawe <i>et al.</i> , 2018) (Abadi & Khakzand, 2022) (Escribano <i>et al.</i> , 2018; Quinta-Nova & Ferreira, 2024; Zamzuki <i>et al.</i> , 2023) (Valderrama & Polanco, 2024) (Chen <i>et al.</i> , 2024) (Chen <i>et al.</i> , 2024) (Batle <i>et al.</i> , 2018) (Kaswanto, 2015) (Figueroa B & Rotarou, 2018; Leite <i>et al.</i> , 2023)
3.	Institution	1. Community empowerment in tourism management 2. Community involvement in tourism management 3. Women empowerment in tourism management 4. Decision-making 5. Community commitment in tourism management 6. Community oversight of tourism administration	(Harsanto & Wahyuningrat, 2024; Ndhlovu & Dube, 2024) (Ndhlovu & Dube, 2024; Sesotyaningtyas & Manaf, 2015) (Barlagne <i>et al.</i> , 2023; Kutlu & Ngoasong, 2024) (Pachoud <i>et al.</i> , 2023) (Zamzuki <i>et al.</i> , 2023) (Batle <i>et al.</i> , 2018)

	7. Engagement of external stakeholders in resolving tourism issues	(Juanjuan & Wei, 2024)
	8. Resolving tourism management conflicts	(Idziak <i>et al.</i> , 2015; Utami <i>et al.</i> , 2023)
	9. Community role in decision-making	(Barlagne <i>et al.</i> , 2023; Harsanto & Wahyuningrat, 2024)
	10. Independent problem solving	(Zaburaeva, 2024)
	11. Engagement of community leaders in tourism management	(Barlagne <i>et al.</i> , 2023)
	12. Public control of tourism management financial reports	(Batle <i>et al.</i> , 2018)
4. Marketing	1. Transportation access	(Maldonado-López <i>et al.</i> , 2024; Sesotyanningtyas & Manaf, 2015)
	2. External community service activities	(Riad Mohamed Khatab, 2024)
	3. Tourist spot design	(Üzümoğlu & Turkan, 2022)
	4. Enjoyment of tourist sites	(Üzümoğlu & Turkan, 2022)
	5. Services in tourism management	(Riad Mohamed Khatab, 2024)
	6. Internet access	(Cheteni & Umejese, 2023)
	7. Availability of restaurants	(Cheteni & Umejese, 2023; Secondi <i>et al.</i> , 2024)
	8. Use of a ticket to enter the tourism site	(Valderrama & Polanco, 2024)
	9. Tourist location distance	(Leite <i>et al.</i> , 2023)
	10. Availability of experience in making fabric crafts	(Sawe <i>et al.</i> , 2018)
	11. Traveller origin	(Leite <i>et al.</i> , 2023)
	12. Availability of public facilities	(Gutierrez-Velez <i>et al.</i> , 2022; Juhandi <i>et al.</i> , 2024)
	13. Social event activities	(Leite <i>et al.</i> , 2023)
	14. Tourist identity	(Leite <i>et al.</i> , 2023)
	15. Availability of tourism services offered	(Maldonado-López <i>et al.</i> , 2024)
5. Culture	1. Community connection to tourist attractions	(Riad Mohamed Khatab, 2024)
	2. People depend on the community for decision-making	(Utami <i>et al.</i> , 2023; Zamzuki <i>et al.</i> , 2023)
	3. Tourism managers control tourists	(Gutierrez-Velez <i>et al.</i> , 2022)
	4. Ownership rights to tourism management	(Juanjuan & Wei, 2024)
	5. Family members' participation in tourism management	(Zamzuki <i>et al.</i> , 2023)
		(Zaburaeva, 2024)

Anna, 2005). Meanwhile, R^2 values approaching 1 (100%) denote model accuracy (Pitcher *et al.*, 2013). The final step involved designing sustainability strategies based on the identified influential factors. Moreover, MSA software

enabled scenario simulations to improve sustainability values. Accordingly, users could select factors to modify and create illustrative scenarios for agritourism sustainability strategies (Figure 2).

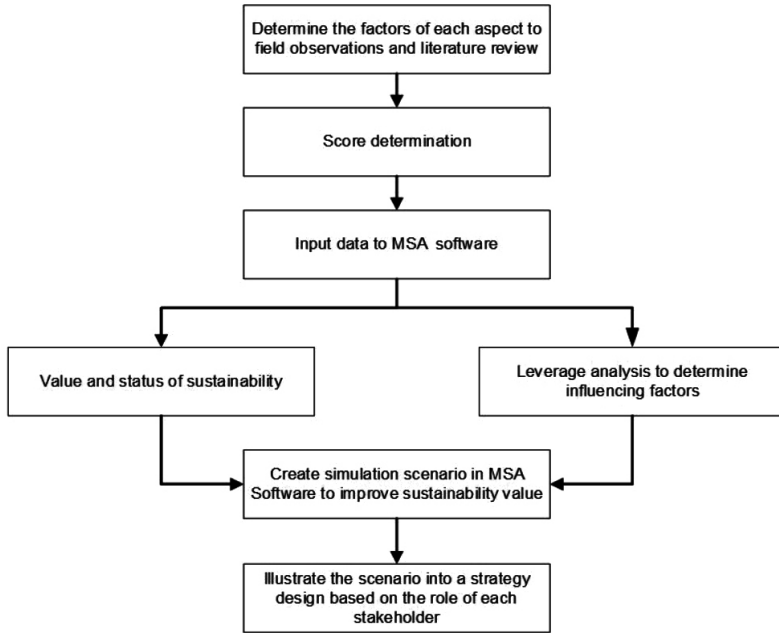


Figure 2: The process of data analysis

Results and Discussion

Value and Sustainability Status of Meat Village Agritourism

Table 3 presents the sustainability of agritourism in Meat Village, which scored 57.57, placing it in the moderate sustainability category. In particular, the lowest sustainability values were observed in the economic, institutional, and cultural aspects while the environmental aspect scored the highest. However, previous research by Ngo and Creutz (2022) indicated that the environmental aspect ranks second to the economic aspect as a priority. The differing

findings arise from variations in the factors considered within each aspect, leading to varied outcomes.

Figure 3 illustrates the radar chart of MSA software analysis results based on the values in Table 3. The chart illustrates the dominance of the environmental aspect in sustainability, causing the radar chart to lean to the right. Note that this imbalance necessitates strategy

Table 3: Value and sustainability status of Meat Village agritourism

No.	Aspects	Existing Value
1.	Economy	50
2.	Environment	77.27
3.	Institution	50
4.	Marketing	60
5.	Culture	50
Sustainability Value		57.57
Sustainability Status		Moderate

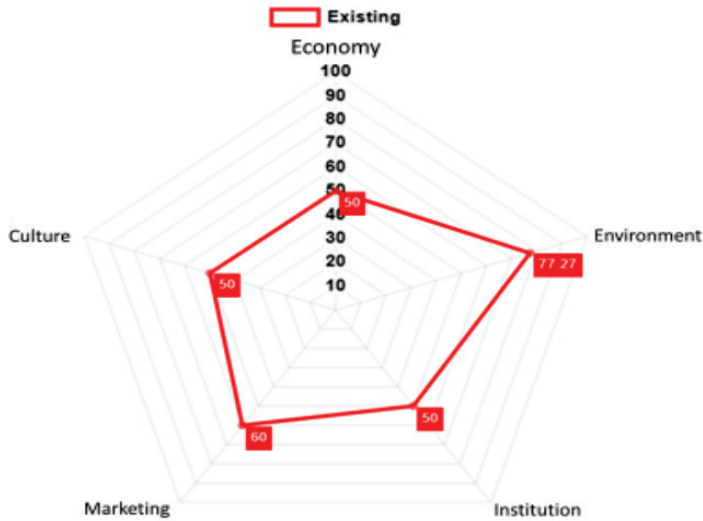


Figure 3: Chart radar of sustainability analysis for agritourism in Meat Village

designs to enhance other aspects and achieve a more balanced sustainability radar chart. These strategy designs are discussed in the subsequent sections.

Determinants of Agritourism Sustainability in Meat Village

Economic Aspect

The economic aspect scored 50, placing it in the moderate sustainability category for Meat

Village’s agritourism. Figure 4 highlights two influential factors: The type of business and the processing industries. The primary occupation of local residents is farming, specifically rice cultivation. However, farming involves risks such as crop failure due to external environmental factors and fluctuating market prices, which can be detrimental to farmers. Therefore, alternative livelihoods are crucial for promoting economic sustainability.

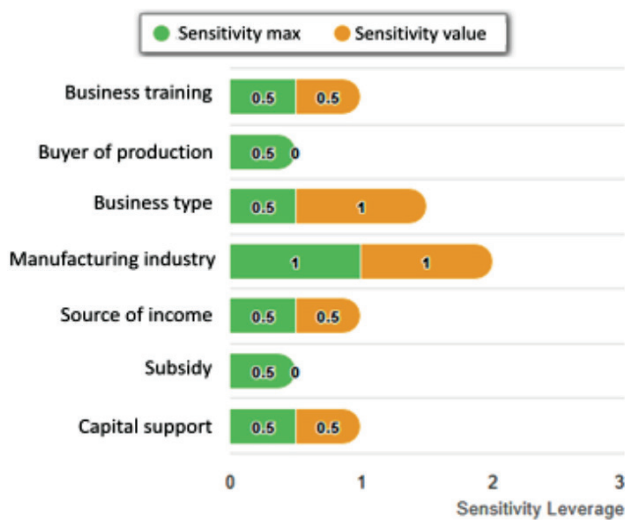


Figure 4: Sensitive leverage variable for the economic aspect

Sgroi and Modica (2022) asserted that agritourism businesses can be profitable for farmers, serving as a strategy to increase income, attract visitors, and sustain the local economy. For instance, tourism development offers alternative livelihood options complementing farming activities. Processing industries also play a crucial role in supporting farming and tourism. At the same time, agricultural processing industries add value to products, enabling farmers to secure higher prices for their produce. On a similar note, industries related to tourism such as *ulos* weaving are also vital. Consistent with this, the government should develop agritourism supported by industrial sectors to build sustainable agritourism regions.

Furthermore, Ramos-Gerena (2024) highlighted the significance of industry in sustaining agritourism. This finding further supports the Linkage Theory proposed by Albert O. Hirschman, which posits that the agricultural and industrial sectors exhibit backward and forward linkages (Hirschman, 1958). As indicated by backward linkage, the industrial sector utilises inputs from the agricultural sector. Conversely, as demonstrated by forward linkage, the agricultural sector produces raw

materials that are subsequently processed by the industry.

Environment Aspect

The environmental aspect scored the highest sustainability value of 77.27, classified as high sustainability. As displayed in Figure 5, there are no influential factors within this aspect, indicating an optimal state of environmental sustainability. By contrast, research by Ramaano (2024) highlighted the negative impacts of unplanned agritourism activities impacts such as environmental degradation, pollution, and biodiversity loss. The findings differ as this study focuses on broader sustainability components, rather than solely on environmental and climate change impacts. According to Odum (1971), ecological balance is a prerequisite for sustaining ecosystems, as outlined in ecosystem theory. The findings of this study demonstrate that the ecosystem equilibrium delineated by the theory is attained when the condition of resource indicators such as water availability, weather patterns, and biodiversity, remains within a favourable range. This is evident from the variable sensitivity outcomes.

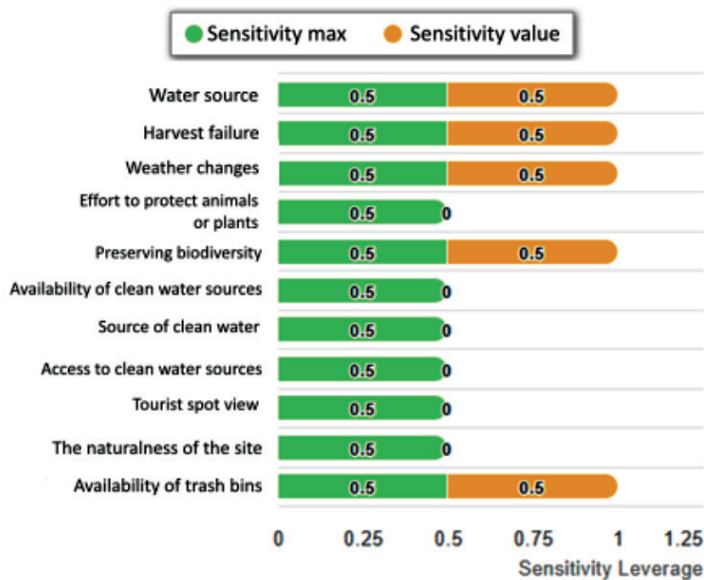


Figure 5: Sensitive leverage variable for the environment aspect

Institution Aspect

The institutional aspect, comprising 12 factors, shares the same sustainability value as the economic aspect, scoring 50 or moderate sustainability. Figure 6 illustrates three factors that influence sustainability: Decision-making, resolving tourism management conflicts, and public control over tourism management financial reports. Zamzuki *et al.* (2023) explained that active local community involvement in tourism management is a key contributor to sustainability.

Decision-making in agritourism management in Meat Village is conducted solely through the Tourism Awareness Group (*Pokdarwis*), whose members are predominantly local government representatives. Decision-making should involve traditional leaders and local residents to ensure decisions address community needs in tourism development. For example, Pachoud *et al.* (2023) stated that community involvement in decision-making fosters an inclusive environment for exchanging ideas, enabling the development of action plans to address existing challenges.

In addition, Herbert A. Simon’s rational decision-making theory posits that the formation of sound judgements is contingent upon the accessibility of valid information (Simon, 1947). Consequently, accurate information can be obtained from trustworthy primary sources. The findings of this study demonstrate that traditional leaders and local residents can serve as valid sources of information, thereby contributing to the formulation of a sustainable agritourism strategy.

Community conflict resolution in Meat Village involves traditional leaders but excludes local residents, particularly women. Women primarily participate in annual events such as the Thousand Tents Festival, where they sell food and showcase *ulos* weaving. However, women are often excluded from decision-making processes. Notably, active female participation in agritourism development can create more sustainable systems (Barlagne *et al.*, 2023). The findings of this study corroborate the Gender And Development (GAD) theory presented by Moser in 1993, which states that the development

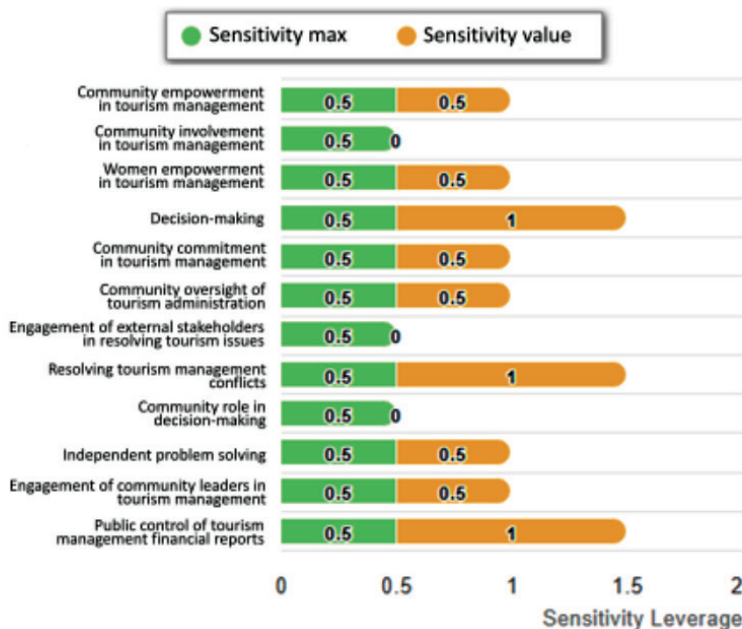


Figure 6: Sensitive leverage variable for the institution aspect

process requires equal participation between men and women in planning and decision-making (Moser, 1993).

Community oversight in tourism management is crucial for fostering a sense of collective ownership over village resources. However, Meat Village lacks such social oversight. Social oversight can strengthen social ties and support sustainability (Batle *et al.*, 2018). Demsetz’s (1967) theory of property rights posits that the clarity of property rights is essential for ensuring ownership certainty. The findings of this study suggest that proprietary rights over village resources play a pivotal role in agritourism management, ensuring the predictability of investment and the conservation of these resources.

Marketing Aspect

The marketing aspect scored 60, indicating moderate sustainability. Among 15 analysed factors, only one significantly influences sustainability: External community service activities. External community service activities in Meat Village have been primarily conducted

by universities through community engagement programmes, albeit infrequently. However, effective agritourism management requires collaboration among government, community, and external stakeholders to address sustainable environmental challenges (Juanjuan & Wei, 2024).

Community service activities in Meat Village, though often conducted by universities have not aligned with local needs. For instance, homestay management training programmes are conducted. Nevertheless, the acquired knowledge and skills are not effectively applied, resulting in some homestays being poorly maintained. Hence, university-led community service activities should focus on maintaining and improving existing facilities. Moreover, these programmes should provide information and offer guidance for homestay maintenance (Figure 7).

Culture Aspect

The cultural aspect also scored 50, indicating moderate sustainability. Two factors influence sustainability in this aspect: Community

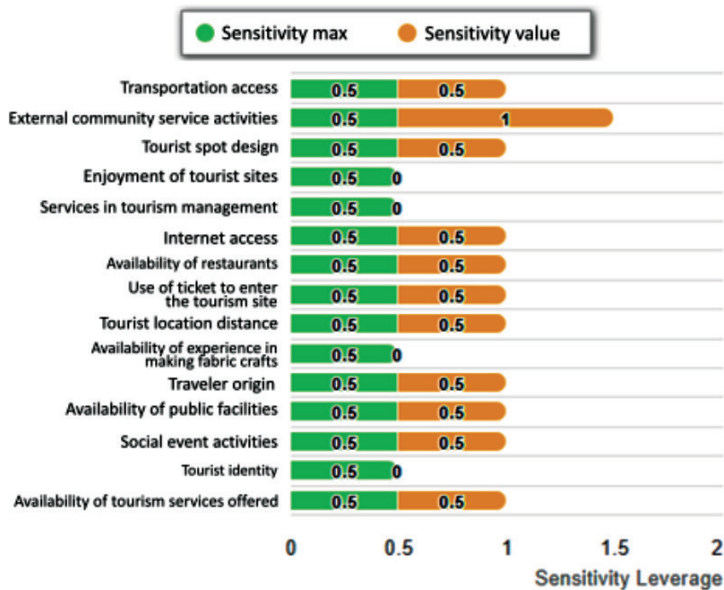


Figure 7: Sensitive leverage variable for the marketing aspect

dependence for decision-making and ownership rights to tourism management. The findings of this study support Trait Theory, which posits that effective decision-making is also influenced by leadership characteristics such as confidence, assertiveness, integrity, and social skills (Stogdill, 1974). Community leaders lack organised groups to participate in decision-making. Ndhlovu and Dube (2024) emphasised the need for community leader involvement in planning and implementing agritourism activities to ensure decisions align with community values and needs while fostering a sense of ownership.

Notably, ownership rights for tourism management in Meat Village are fully held by the government. Following this, the government informs residents about the availability of homes that can be converted into homestays. Subsequently, the *Pokdarwis* group identifies willing residents who receive financial assistance to renovate their homes into homestays for tourists. The homestay management is then entirely handed over to the homeowners.

Government financial assistance is initially provided, with maintenance costs subsequently borne by homeowners. Most homestay owners are *Pokdarwis* members. In line with this, the government should allocate funds for

maintenance to ensure homestays remain well-maintained. Monitoring and oversight by the government are also necessary to maintain the quality of homestay facilities and services. This is mainly attributed to the fact that tourism services rank second after attractions in key components of tourism development (Leite et al., 2023) (Figure 8).

Sustainability Strategy Design Based on the Role of Stakeholders

Table 4 compares the existing sustainability value and status with a simulated scenario for improving agritourism sustainability in Meat Village. The simulation involved enhancing all aspects of sustainability, resulting in a higher sustainability value of 72.15, placing it in the high sustainability category. Specifically, economic aspects increased by 57.14%, from 50% to 78.57%; environmental aspects improved by 11.76%; institutional aspects rose by 25%; marketing aspects increased by 5.55%; and cultural aspects grew by 40%. Overall, the sustainability value improved by 25.32%.

Figure 9 illustrates the radar chart comparison between the existing sustainability and the simulated scenario sustainability. The existing sustainability chart is positioned on



Figure 8: Sensitive leverage variable for culture aspect

Table 4: Comparison of values and status of existing sustainability and simulation scenarios

No.	Aspects	Existing Value	Value of Scenario
1.	Economy	50	78.57
2.	Environment	77.27	86.36
3.	Institution	50	62.50
4.	Marketing	60	63.33
5.	Culture	50	70
Sustainability Value		57.57	72.15
Sustainability Status		Moderate Sustainability	High Sustainability

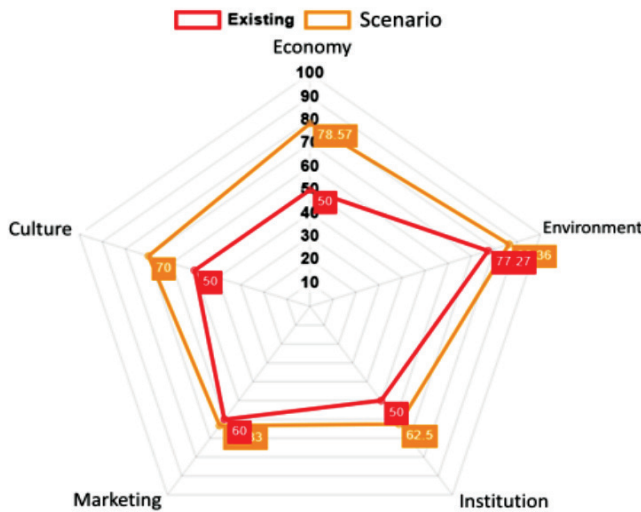


Figure 9: Radar chart comparison of existing and simulated scenarios for sustainability analysis for agritourism in Meat Village

the inner side of the radar while the simulated scenario’s sustainability is on the outer side. However, the existing sustainability chart appears imbalanced, leaning to the right, whereas the simulated scenario sustainability chart appears more balanced. As a result, this visual comparison alone is insufficient to demonstrate the sustainability improvement based on the simulated scenario provided by the MSA Software. Therefore, technical considerations are necessary to define each stakeholder’s role according to the factors influencing agritourism sustainability in Meat Village.

Prior to illustrating the strategy design for improving sustainability, programmes must be developed to enhance sustainability.

Accordingly, programmes are designed based on the influential factors, including their objectives and expected outputs. Note that each programme is assigned a code to facilitate the subsequent illustration process. Table 5 presents the programmes, along with their objectives and outputs.

Six key stakeholders are involved in agritourism in Meat Village: Farmers, tourism managers, local residents, government officials, community leaders, and tourists. The strategic programmes are outlined in Table 5. At the same time, the roles of stakeholders are presented in Figure 10, highlighting the role of each stakeholder in the programmes as part of the sustainability strategy for agritourism.

Table 5: Programme strategies to improve the agritourism sustainability of Meat Village

No.	Improved Factors	Sustainability Strategy Programme	Programme Code	Objective	Output
1.	Business type	Business start-up programme	A1	The existence of alternative businesses other than farming for the community	Tourism service business, tourism product industry business
2.	Industry	Small-scale industry programme	A2	The existence of a crop processing industry and a tourist product industry	Small-scale industry for agricultural crop processing and <i>ulos</i> weaving
3.	Decision-making	Community empowerment programme	B1	Improve local government capacity in decision-making	Independence in problem solving
4.	Resolving tourism management conflicts	Conflict management training programme	B2	Improved ability to identify sources of conflict and resolve them	Community harmony and peace without conflict in agro-tourism management
5.	Public control of tourism management financial reports	Joint group business programme in managing businesses such as BUMDES	B3	The existence of professional agritourism management involves collaboration between local governments and the community	BUMDES, which manages agrotourism
6.	External community service activities	Homestay management assistance programme	C1	Increased homestay management services and improved homestay facilities	- Professional homestay management services - Clean and well-maintained homestays
7.	People rely on the community for decision-making	Joint communication forum/joint deliberation	D1	Increasing the culture of discussion in solving problems involving the local government and community	- Regular communication forum - Village meeting place
8.	Ownership rights to tourism management	Homestay monitoring and evaluation programme	D2	Improving homestay facilities and increasing homestay standardisation	Standardised homestays

The results of the design illustration in Figure 9 provide implications for government policy and agritourism management to improve sustainability. First, the government acts as the regulator and facilitator, creating regulations, providing, and facilitating all programmes (A1,

A2, B1, B2, B3, C1, D1, and D2). Following this, the policy implications of this analysis suggest that the government should provide training facilities to farmers, the local community, society, and Village-Owned Enterprises (BUMDes). This includes providing training

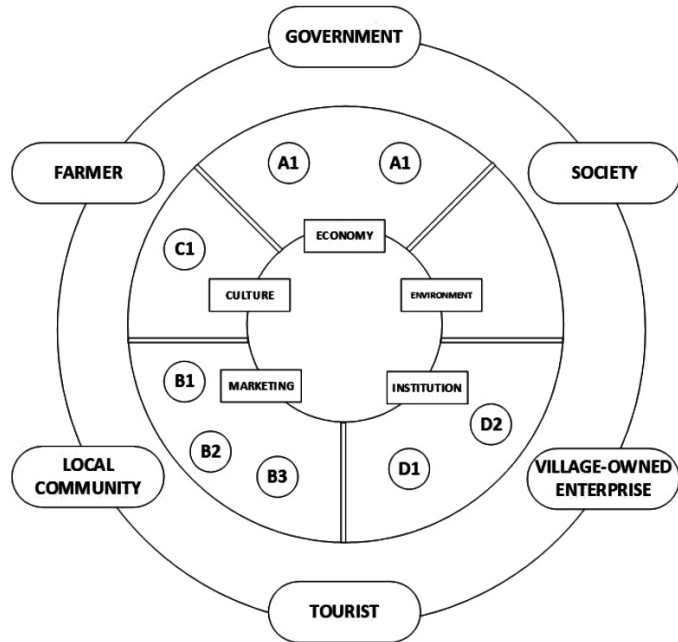


Figure 10: The design of the agritourism sustainability strategy based on the role of stakeholders

facilities to local communities to educate professional tour guides. Accordingly, the government can provide training to BUMDes to enhance the quality of services provided to tourists. For instance, the government can implement training programmes to ensure the cleanliness of homestays.

Second, farmers may participate in entrepreneurial training programmes (A1) and small-scale industry programmes (A2) while local residents may participate in entrepreneurial training programmes (A1), small-scale industry programmes (A2), and empowerment programmes (B1). For this reason, the government should implement a programme to train farmers and local communities to enhance their entrepreneurial skills. This skill is essential for farmers and communities seeking to generate income through agritourism management. Therefore, the government can facilitate a series of structured meetings to enhance the entrepreneurial competencies of farmers and local communities.

Third, the local community may take part in community empowerment programmes (B1), conflict management training (B2), programmes to initiate BUMDes (B3), and actively engage in community communication forums (D1). To address the limited ownership rights in agritourism management, the establishment of BUMDes is necessary, which oversee specific agritourism business units. For instance, the management of a tour guide business, which is independently run by BUMDes, enables broad community participation in sustainable agritourism.

Fourth, tourism managers may participate in tourism management assistance programmes (C1) and homestay monitoring and evaluation programmes (D1). Tourists tend to provide feedback on agritourism services to inform service improvement (D2). Thus, establishing a system to receive visitor suggestions for enhancing agritourism management is imperative. In essence, the government should initiate this system through tourism managers. Moreover, suggestions from tourists can be utilised to improve services in agritourism.

Conclusions

The sustainability assessment of agritourism in Meat Village indicates a moderate level with a value of 57.57%. The economic aspect scored 50, the environmental aspect scored 77.27%, the institutional aspect scored 50, the marketing aspect scored 60, and the cultural aspect scored 50. Accordingly, sensitivity analysis to identify influential factors revealed eight key factors. For the economic aspect, the influencing factors are the type of business and the processing industries. However, no influencing factors were identified for the environmental aspect. For the institutional aspect, the key factors include decision-making, resolving tourism management conflicts, and public control over tourism management financial reports. Meanwhile, for the marketing aspect, the influencing factor is external community service activities.

Moreover, from a cultural perspective, the influencing factors include community reliance on decision-making and ownership rights in tourism management. The illustrated sustainability strategy design for Meat Village's agritourism improved the sustainability value from 57.57% to 72.15%, achieving a high sustainability level through enhancements across all sustainability aspects. In particular, the sustainability strategy for Meat Village's agritourism aims to enhance sustainability through scenario illustrations. In line with this, several recommendations for management in agritourism include improving services and facilities. This includes increasing agritourism services such as cultural education tour packages and tour guide services and expanding supporting facilities such as integrated parking areas and cafes with lake and rice field landscapes. Nevertheless, the limitations of this study include the fact that some indicators used to assess aspects of sustainability remain general in nature. Thus, they cannot serve as a standard for other studies to use the same indicators to assess sustainability in similar research topics.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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