

# Sustainability Analysis and Management Strategy for Sendang Tirta Arum Tourism in Dander District Bojonegoro Regency

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**Abstract:** Sumberarum Village is one of the villages in Bojonegoro Regency that has developed tourism potential. There are several tourism potentials in Sumberarum Village, namely Sendang Tirta Arum, Guo Lowo and Guo Lawang. However, Sendang Tirta Arum tourism has not been managed well, even though it should be able to have a positive impact on the attractiveness of tourist attractions which ultimately provides welfare for the community. To make this happen, it is necessary to identify the existing ecological, economic, social, and institutional aspects to determine the aspects that require improvement and development. This research aims to find a tourism strategy for Sendang Tirta Arum. The method used is Multidimensional Scaling (MDS) analysis. The resulting index value shows that each dimension analyzed sequentially has a diverse status, namely the ecological, social and institutional dimensions which are very sustainable and the economic dimension which is quite sustainable. The sensitive attributes that most influence sustainability and need to be considered are waste management facilities, business capital assistance, contribution to Original Local Government Revenue, conflicts between government and citizens, the role of private institutions, transportation facilities and infrastructure and the role of environmentally conscious groups.

**Keywords:** Multidimensional scaling; Strategy; Sustainability; Tourism.

## Introduction

The tourism sector plays a crucial role in enhancing the economy of Indonesia, particularly through the influx of both domestic and international tourists. As articulated in Law Number 10 of 2009 concerning Tourism, effective tourism management is essential for fulfilling the diverse needs of tourists while simultaneously boosting state revenue and promoting public welfare (Darmasetiawan et al., 2019). Sustainable tourism development is increasingly recognized for its multifaceted benefits, extending beyond mere economic gains to encompass social, environmental, and institutional dimensions (Sayuti, 2023). This holistic approach is vital for fostering community welfare and improving regional economic conditions, as tourism can create jobs and stimulate local businesses (Frleta et al., 2020).

In Bojonegoro Regency, the local government has taken significant steps to enhance tourism through the Bojonegoro Regency Regional Regulation Number 4 of 2020, which outlines a master plan for tourism development from 2019 to 2025. This regulatory framework is complemented by the Bojonegoro Regency Regent's Regulation (PERBUP) Number 28 of 2019, which establishes the organizational structure and operational procedures for the local Culture and Tourism Service (Harahab et al., 2021). The implementation of these regulations aims to create a conducive environment for tourism growth, ensuring that local communities can actively participate in and benefit from tourism initiatives (Nanda, 2024).

Community involvement is a critical factor in the success of tourism development, as evidenced by studies highlighting the importance of resident attitudes and participation in tourism initiatives (Saraswati & Athia,

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2018). For instance, the establishment of Village-Owned Enterprises (BUMDESA) in Bojonegoro has been instrumental in promoting local tourism by enhancing infrastructure, improving human resource quality, and fostering community engagement through training and promotional activities (Sari & Arif, 2021). Furthermore, collaborative governance among stakeholders is essential for the effective development of tourism, as it ensures that the interests of various parties are aligned and that resources are utilized efficiently (Nanda, 2024).

The potential for sustainable tourism development in Bojonegoro is further supported by research indicating that community readiness and stakeholder involvement are pivotal for achieving long-term sustainability goals (Sayuti, 2023). This is particularly relevant in the context of Bojonegoro's unique cultural and natural resources, which can be leveraged to attract tourists while preserving local heritage and promoting environmental sustainability (Megawati, 2023). The integration of sustainable practices in tourism development not only enhances the visitor experience but also contributes to the overall resilience of the local economy, especially in the post-pandemic recovery phase (Megawati, 2023).

Dander District, located in Bojonegoro Regency, consists of 16 villages and is strategically positioned 13 km south of the central government of Bojonegoro and 110 km from the provincial capital. The district is bordered by several other sub-districts, including Bojonegoro to the north and Bubulan to the south. Within this district, Sumberarum Village stands out due to its significant tourism potential, primarily attributed to its abundant water sources and caves, which include notable attractions such as Sendang Tirta Arum, Guo Lowo, and Guo Lawang.

The development of tourism in Sumberarum Village can be significantly influenced by various factors, including the availability of clean water sources, which are essential for both tourism and local community needs. The presence of caves, such as Guo Lowo and Guo Lawang, not only adds to the area's natural beauty but also serves as a unique attraction that can enhance the village's tourism appeal. Caves are recognized globally as valuable resources for tourism, contributing significantly to local economies, with the income from show caves globally exceeding \$2.3 billion annually ("Benchmarking of Cave Tourism Destinations in Greece", 2024). The management and promotion of these cave sites require careful planning and community involvement to ensure sustainable tourism practices that benefit both visitors and residents (Wangge et al., 2022).

The success of tourism in Sumberarum Village is contingent upon effective community engagement and participatory planning. Involving local residents in the

tourism development process can foster a sense of ownership and acceptance, which is crucial for the sustainability of tourism initiatives (Risdanareni, 2023). This participatory approach can enhance the community's capacity to manage tourism resources effectively, ensuring that the benefits of tourism are equitably distributed among residents.

The ecological aspects of tourism development in Sumberarum Village must be considered, particularly in relation to water management. The interaction between tourism activities and water resources can lead to both opportunities and challenges. For instance, while tourism can generate income and promote conservation efforts, it can also strain local water supplies if not managed properly (Wahyuni et al., 2022). Therefore, it is essential to implement strategies that balance tourism growth with the preservation of water resources to maintain the ecological integrity of the area (Izzati et al., 2022).

Sendang Tirta Arum is a notable tourist attraction in Sumberarum Village, offering various amenities such as a swimming pool, children's playground, photo spots, and water bikes. Additionally, facilities for food and drink, as well as life vest rentals, enhance the visitor experience. However, despite these offerings, the tourism potential of Sendang Tirta Arum has not been fully realized due to inadequate management, resulting in limited economic benefits for the local community and a lack of significant contributions to village income. The decline in visitor numbers, from approximately 100 visitors per day prior to the COVID-19 pandemic to around 20 visitors per day in the subsequent years, underscores the challenges faced in sustaining tourism in this area (Atmojo & Fridayani, 2021).

The impact of the COVID-19 pandemic on the tourism sector has been profound, leading to a drastic reduction in tourist numbers and revenue across Indonesia, including at Sendang Tirta Arum (Atmojo & Fridayani, 2021). This situation necessitates a comprehensive analysis of the sustainability of tourism in the area, focusing on economic, environmental, and institutional factors. Sustainable tourism practices are essential for ensuring that local communities can derive long-term benefits from their natural resources while preserving the ecological integrity of the region (Setiawati, 2023). The economic impact of tourism is particularly significant, as it can stimulate local economies and create jobs, thereby enhancing community welfare (Madnasir, 2024).

The role of effective management strategies in promoting tourism sustainability cannot be overstated. Research indicates that well-structured tourism management can lead to improved visitor satisfaction and increased return visits, which are crucial for the

long-term viability of tourist attractions like Sendang Tirta Arum (Poetra, 2024). Engaging local communities in the tourism development process is vital, as it fosters a sense of ownership and responsibility among residents, which can lead to better maintenance of facilities and services (Trimulato et al., 2023).

Moreover, the promotion of tourism in Sumberarum Village should also consider the integration of local cultural elements and environmental conservation efforts. By highlighting the unique cultural heritage and natural beauty of the area, tourism can be positioned as a means of preserving local traditions while providing economic opportunities (Ramadhaniah, 2020). This approach aligns with the principles of sustainable tourism, which emphasize the need to balance economic growth with environmental stewardship and social equity (Fasa et al., 2023).

### Method

This research employs quantitative research methods, which are characterized by systematic, planned, and clearly structured approaches from the outset of the research design (Provenzano & Baggio, 2020). Quantitative methods often utilize techniques such as surveys, experiments, and statistical data analysis to gather and interpret data. In this study, both primary and secondary data sources are utilized. Primary data is collected from the Sumberarum Village government, the Sendang Tirta Arum Tourism Manager, and the local community, while secondary data is sourced from village websites, scientific journals, and relevant literature.

The determination of the sample size, which consists of 65 respondents, is calculated using the Slovin formula, a widely accepted method for sample size determination in social science research (Mishra et al., 2015). The data analysis technique employed in this research is the scoring method using the Multidimensional Scaling (MDS) approach, facilitated by the Rapfish software. MDS is particularly effective for evaluating the influence of various components on observed problems, making it suitable for assessing the sustainability of tourism in Sendang Tirta Arum across environmental, social, economic, and institutional dimensions.

The use of MDS in tourism research has been highlighted as a valuable tool for understanding complex relationships among different attributes of tourism destinations. This method allows researchers to visualize and interpret the multidimensional aspects of tourism sustainability, providing insights that can inform management strategies. Furthermore, the integration of both quantitative and qualitative data can

enhance the robustness of the findings, as it allows for a more comprehensive understanding of the factors influencing tourism sustainability.

In the context of Sendang Tirta Arum, the analysis of sustainability across various dimensions is crucial for identifying areas for improvement and developing effective management strategies. Research has shown that a multidimensional approach to sustainability can lead to better outcomes for both tourism development and community welfare. By focusing on the environmental, social, economic, and institutional aspects, this study aims to provide actionable recommendations that can enhance the sustainability of tourism in Sumberarum Village.

**Table 1.** Dimensions and Attributes of Sendang Tirta Arum Tourism Sustainability Status Assessment

Item	Ecological Dimensions
I	Environmental cleanliness level
II	Cleanliness level of water sources
III	Availability of water sources
IV	Water conditions in tourist areas
V	Shape the area around the tourist attraction
VI	Community support for tourism
VII	Arrangement of tourist locations
VIII	Waste management facilities
IX	Garbage collection point
X	Availability of green open space
XI	Water pollution at tourist sites
XII	Economic Dimensions
XIII	Employment
XIV	Business opportunities
XV	Local community income
XVI	Business capital assistance
XVII	Contribution to Original Local Government Revenue (OLGR)
XVIII	The role of government in tourism development
XIX	Types of businesses in tourist locations
XX	Number of tourist visits
XXI	Sales of local products
XXII	Level of welfare of local communities
XXIII	The desire of visitors to return to visit
XXIV	Social Dimensions
XXV	Level of conflict between managers and local residents
XXVI	Level of education
XXVII	Unemployment rate
XXVIII	Conflict between government and citizens
XXIX	Community involvement
	Communication between government and management
XXX	Promotion of tourist locations
XXXI	Discussion activities between managers in tourism development
XXXII	Socialization of tourism development by the government
XXXIII	Participation in outreach activities
XXXIV	Local wisdom

Item	Ecological Dimensions
XXXV	Institutional Dimensions
XXXVI	The role of tourism institutions
XXXVII	The role of financial institutions
XXXVIII	The role of private institutions
XXXIX	Transportation facilities and infrastructure
XXXX	The role of environmentally conscious groups
XXXXI	Written regulations for tourist areas
XXXXII	The role of institutions to prevent environmental damage
XXXXIII	The role of all institutions in handling problems/conflicts

Source: (Firdausyah, 2021; Idris et al., 2023; Mohamad et al., 2018; Puspitasari et al., 2019).

Secondary data was obtained through observation and documentation. Table 2 shows the sustainability status of each dimension by category.

**Table 2.** Sustainability Status Category

Index Value	Sustainability category
0 ± 25.00	Bad (unsustainable)
25.01 ± 50.00	Less (less sustainable)
50.01 ± 75.00	Sufficient (sustainable enough)
75.01 ± 100.0	Good (very sustainable)

Source: (Kholil & Dewi, 2014)

Then Monte Carlo analysis was carried out to calculate uncertainty and Leverage analysis to determine the most sensitive attributes (Nandini et al., 2017). The validity of the MDS model is obtained from the difference in sustainability index values and Monte Carlo analysis. The model is considered valid if the difference is below 5% (Handayani et al., 2020).

## Result and Discussion

In this research, the sustainability status of Sendang Tirta Arum Tourism Management in Dander District, Bojonegoro Regency, is assessed through four dimensions of sustainable development: ecological, economic, social, and institutional. The sustainability index values for each dimension are as follows: ecological dimension at 86.41, economic dimension at 64.91, social dimension at 82.52, and institutional dimension at 77.00. The results indicate that the ecological, social, and institutional dimensions are very sustainable, while the economic dimension is categorized as quite sustainable. This analysis highlights the need for targeted strategies to maintain sustainability across the various dimensions.

The ecological dimension's high sustainability index reflects effective management practices that prioritize environmental conservation, which is crucial for sustainable tourism development. Sustainable

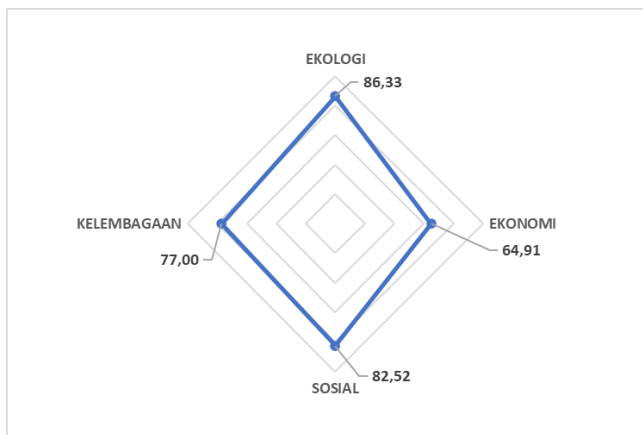
tourism practices are designed to mitigate environmental degradation caused by tourism activities, ensuring that natural resources are preserved for future generations. The emphasis on ecological sustainability aligns with global trends that advocate for responsible tourism practices, which not only protect the environment but also enhance the attractiveness of tourist destinations.

The economic dimension, while still sustainable, indicates room for improvement. Economic sustainability in tourism is essential for generating income and employment opportunities for local communities. The findings suggest that enhancing the economic viability of Sendang Tirta Arum could involve better integration of tourism resources and destination management, which can lead to increased competitiveness and resilience in the face of challenges such as the COVID-19 pandemic. Research has shown that effective destination management can significantly improve the economic outcomes of tourism, benefiting both local communities and the broader economy.

Social sustainability, with a strong index value, underscores the importance of community involvement and stakeholder engagement in tourism development. Engaging local communities in the planning and management of tourism initiatives fosters a sense of ownership and responsibility, which is vital for the long-term success of tourism projects. The positive social impacts of tourism, such as cultural exchange and community development, can be enhanced through collaborative governance and participatory approaches.

The institutional dimension's sustainability highlights the role of effective governance and policy frameworks in supporting tourism development. Strong institutions are essential for implementing sustainable tourism practices and ensuring that the benefits of tourism are equitably distributed among stakeholders (Sánchez & López, 2015). The establishment of Destination Management Organizations (DMOs) can facilitate better coordination among stakeholders, enhancing the overall governance of tourism destinations.





**Figure 1.** Index and Sustainability Status of Sendang Tirta Arum Tourism Management in Dander District, Bojonegoro Regency. Source: Data analysis results, 2023.

**Table 3.** Differences in Sustainability Index Values from MDS and Monte Carlo Analysis

Dimensions	Sustainability Index Value		Difference
	MDS	Monte Carlo	
Ecology	86.33	86.41	0.08
Economy	64.91	64.91	0.00
Social	82.52	82.52	0.00
Institutional	77.00	77.00	0.00
Infrastructure	86.33	86.41	0.08

Source: Data analysis results, 2023.

Viewing the error rate in MDS analysis can be done by comparing the difference between the Rapfish and Monte Carlo values (Table 3). The difference between the two shows that the sustainability index value at the 95% confidence level has a small error value in the analysis process (Febriana et al., 2022). The difference between MDS and Monte Carlo, which is less than 1, shows that the MDS value calculation reflects the true value with a high level of precision (Maharani & Sumardjo., 2017).

*Ecological Dimension Sustainability Index*

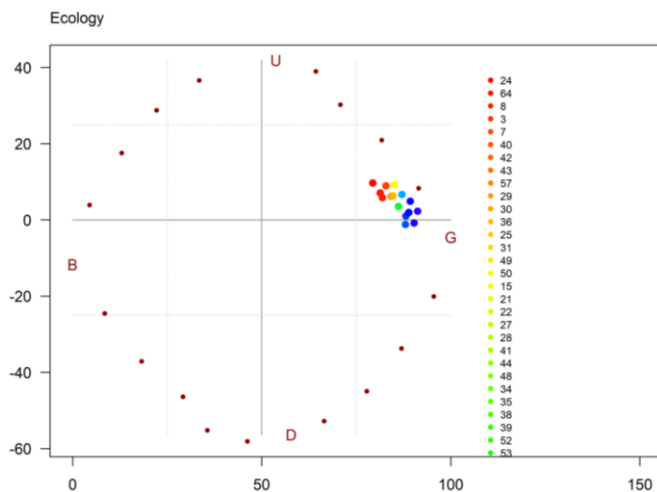
The results of the MDS analysis show that the ecological dimension has a very sustainable status with a sustainability index value of 86.33. The ecological sustainability index value is influenced by 11 attributes as the basis for assessing sustainability. These attributes are (L1) Level of environmental cleanliness, (L2) Level of cleanliness of water sources, (L3) Availability of water sources, (L4) Water conditions of tourist areas, (L5) Shape of the area around tourism, (L6) Community support for tourism , (L7) Arrangement of tourist locations, (L8) Waste management facilities, (L9) Waste collection places, (L10) Availability of green open space and (L11) Water pollution at tourist locations. Based on Figure 3, it can be seen that the sensitive attribute that

most influences tourism sustainability is (L8) Waste management facilities so that if you want to quickly increase sustainability status to 100%, you need to improve this attribute.

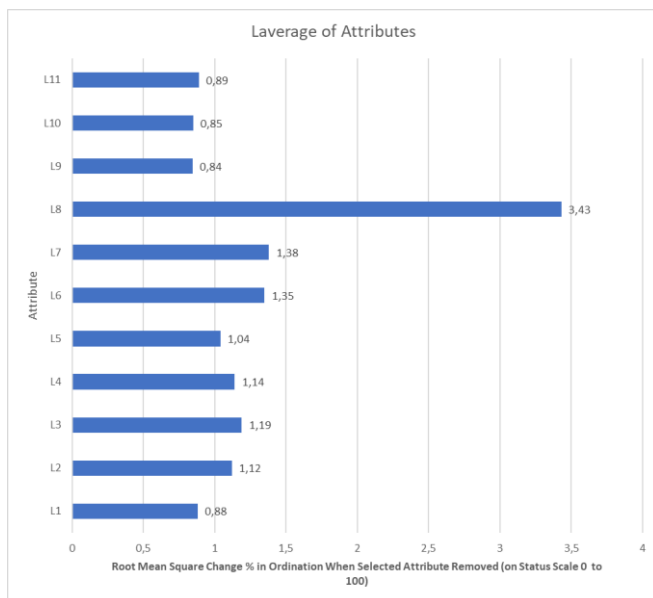
Sendang Tirta Arum Tourism still does not have independent waste management facilities, so waste disposal is carried out in landfills which are located far from tourist attractions. Waste management facilities that are far from tourist attractions can certainly cause a buildup of rubbish which creates unpleasant odors and disturbs the beauty of tourist locations. Tourist locations should create simple waste management facilities, such as making compost using dry leaves as raw materials or separating waste according to type first to make waste management easier. It is also appropriate for waste managers to provide rubbish bins that are classified by type to make it easier for visitors to help with the waste sorting process. Writing a warning, prohibition or punishment for littering can be given to provide a deterrent or fearful effect on visitors (Novitasari et al., 2022). The approach that can be taken by the government to help with the waste problem at tourist sites is by conducting outreach to provide motivation and knowledge to residents around tourist sites to manage their waste independently. An example is implementing the Waste Education House program (Suarinastuti & Mahagangga, 2016). This program teaches the community to manage organic waste in tourist areas so that it can be reused by the residents of Dander District themselves. By managing waste independently, tourist destinations can reduce the costs of transporting waste and increase the uniqueness of tourist locations compared to other tourist locations (Ramadhanti, 2020).

The local community also strongly supports the sustainability of tourist sites, this is proven by the mutual cooperation activities that are routinely carried out to maintain the cleanliness of the Sendang Tirta Arum tourist environment. Community mutual cooperation can occur because of a sense of responsibility for shared interests (Nerva, 2019). Apart from mutual cooperation in cleaning tourist sites, mutual cooperation can also be carried out in sorting waste. Sorted waste will be easier to process. Plastic waste or waste that still has sales value, such as plastic waste and cans, can be collected and sold at waste banks so that the proceeds can be used as cash (Sutrisnawati & Purwahita, 2018). The role of the community in waste control is stated/regulated in article 34 of the Minister of Home Affairs Regulation number 33 of 2010 concerning waste management guidelines, namely: keep the environment clean; active in waste reduction, collection, sorting, transportation and processing activities; and providing suggestions, suggestions, complaints,

considerations and opinions in efforts to improve waste management in the area.



**Figure 2.** Distribution of attribute data on ecological dimensions



**Figure 3.** Sensitive attributes that influence the sustainability of the ecological dimension of Sendang Tirta Arum Tourism Management in Dander District, Bojonegoro Regency

*Economic Dimension Sustainability Index*

The results of the MDS analysis show that the economic dimension has a sustainability index value of 64.91. This index value shows that the economic dimension is still a fairly sustainable dimension so its sustainability needs to be improved. The ecological sustainability index value is influenced by 12 attributes as the basis for assessing sustainability. These attributes are (E1) Labor absorption, (E2) Business opportunities, (E3) Local community income, (E4) Business capital assistance, (E5) Contribution to Original Local Government Revenue (OLGR), (E6) The role of

government in tourism development, (E7) Type of business at the tourist location, (E8) Number of tourist visits, (E9) Sales of local products, (E10) Level of welfare of local communities, (E11) Visitors' desire to return and (E12) The role of non-governmental bodies in tourism development. Figure 5 is the result of leverage from the economic dimension. In this figure it can be seen that the attributes (E4) Business capital assistance and (E5) Contribution to Original Local Government Revenue (OLGR), are sensitive attributes that can be used to increase the sustainability of the economic dimension in the tourist area.

Regarding business capital assistance, the village has a BUMDes which has a savings and loan unit. According to Government Regulation Number 72 of 2005 concerning Village-Owned Enterprises, Article 79 Paragraph (2) reads: "Capital for Village-Owned Enterprises can come from the Village Government, community savings, Government assistance, both Provincial Government and Regency/City Government, loans, capital participation of other parties or cooperation in sharing profits on the basis of mutual benefit". Weak sustainability in the economic dimension occurs because local communities do not take advantage of BUMDes or because there is no capital assistance from the private sector, community institutions or grants (Ferdiansyah et al., 2021). Capital, raw materials, equipment and others are indeed one of the obstacles to the development of MSMEs in Indonesia, so they should be facilitated by the government (Deanova et al., 2023). Optimizing savings and loan units for the community, especially underprivileged communities, can be used to improve community businesses so as to create a better community economy. This can be done by conducting outreach to the community through the village government or through activities in the community related to the convenience and facilitation provided by BUMDes to savings and loan units. Efforts that can be made to attract people to borrow capital from BUMDes can be done by eliminating fines based on applicable regulations and low interest rates while integrating other integrated programs into the community.

Currently, the contribution of Sendang Tirta Arum tourism to OLGR is not yet visible so strategies are needed to increase it. Factors that influence efforts to increase regional income through tourism development are supporting factors in the form of strategic location and the availability of facilities that support tourism, while inhibiting factors are political and policy problems, namely lack of financial budget, promotion of tourism resources that have not been utilized optimally, resource management. limited tourism resources, and a lack of quality human resources to manage tourism resources (Jaenuddin, 2019). This is in accordance with

what happened in the Sendang Tirta Arum tourist attraction, because tourism development was very hampered due to the lack of available budget and lack of promotion so that this tourist attraction was not visited by many tourists.

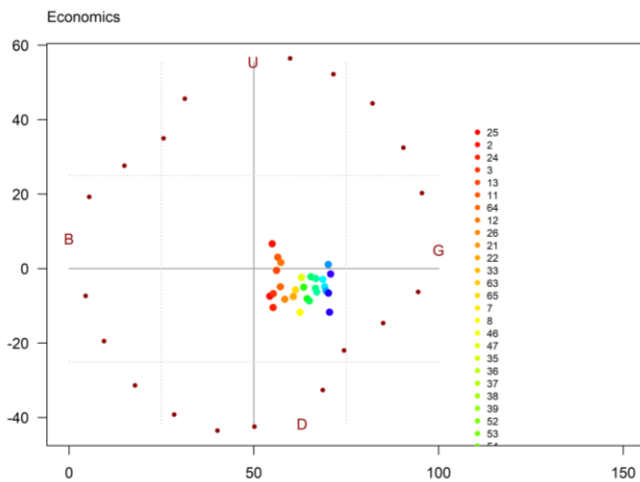


Figure 4. Distribution of attribute data on economics

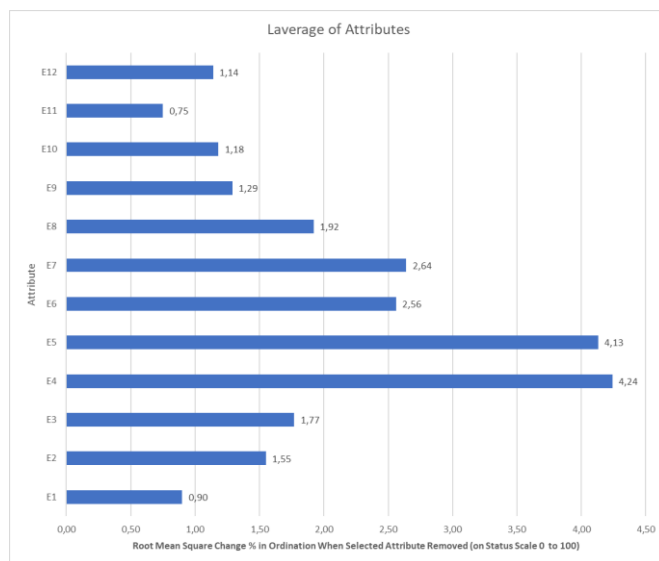


Figure 5. Sensitive attributes that influence the sustainability of the economic dimension of Sendang Tirta Arum Tourism Management in Dander District, Bojonegoro Regency

*Social Dimension Sustainability Index*

The results of the MDS analysis show that the social dimension has a very sustainable status with a sustainability index value of 82.52. Sustainability status can be further improved so that it becomes perfect or maintained so that its value does not decrease through Leverage analysis. The social sustainability index value is influenced by 11 attributes as the basis for assessing sustainability. These attributes are (S1) Level of conflict between managers and local residents, (S2) Level of education, (S3) Level of unemployment, (S4) Conflict

between government and residents, (S5) Community involvement, (S6) Communication between government and managers, (S7) Promotion of tourist locations, (S8) Discussion activities between managers in tourism development, (S9) Socialization of tourism development by the government, (S10) Participation in socialization activities, and (S11) Local wisdom. Based on the results of the Leverage test in Figure 6, it is very clear that conflict between the government and citizens is a sensitive factor that needs to be avoided so that there is no decline in sustainability status. Currently, the sustainability of the social dimension is very good because there is no conflict between the government and citizens. The government also strongly supports this tourism. The existence of BUMDes also plays a role in preventing potential conflicts in tourism management so that tourism can be managed well (Meriwijaya, 2016). Residents around tourism can also trade at tourist locations, so that they experience an increase in income (Pariyanti & Buchori, 2020).

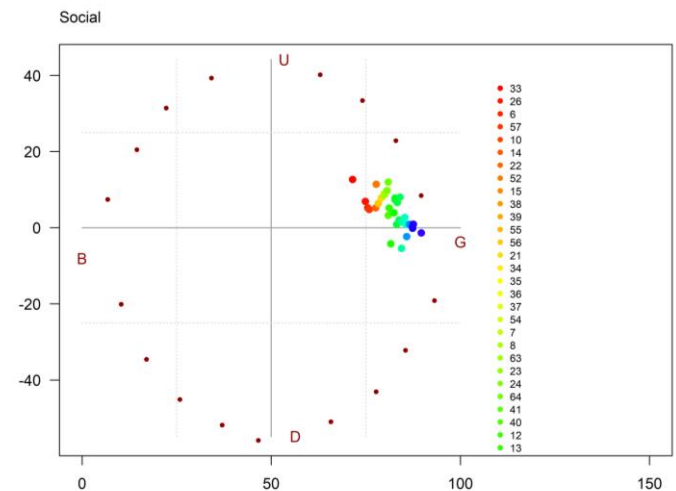
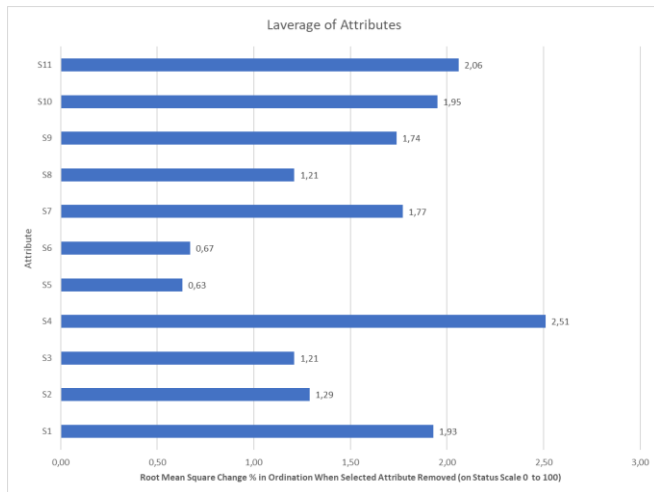


Figure 6. Distribution of attribute data on social dimensions

*Institutional Dimension Sustainability Index*

The results of the MDS analysis show that the institutional dimension has a very sustainable status with a sustainability index value of 77.00. The institutional sustainability index value is influenced by 8 attributes as the basis for sustainability assessment. These attributes are (K1) The role of tourism institutions, (K2) The role of financial institutions, (K3) The role of private institutions, (K4) Transportation facilities and infrastructure, (K5) The role of environmentally conscious groups, (K6) Written regulations for tourist areas, (K7) The role of institutions in preventing environmental damage and (K8) The role of all institutions in handling problems/conflicts. Based on Figure 9 below, it can be seen that there are 3 attributes that are most sensitive in influencing the sustainability

of the institutional dimensions of Sedang Tirta Arum tourism, namely (K4) Transportation facilities and infrastructure, (K3) The role of private institutions and (K5) The role of environmentally conscious groups. Weaknesses in this sensitive attribute, if improvements are made, will be able to increase sustainability in this dimension.

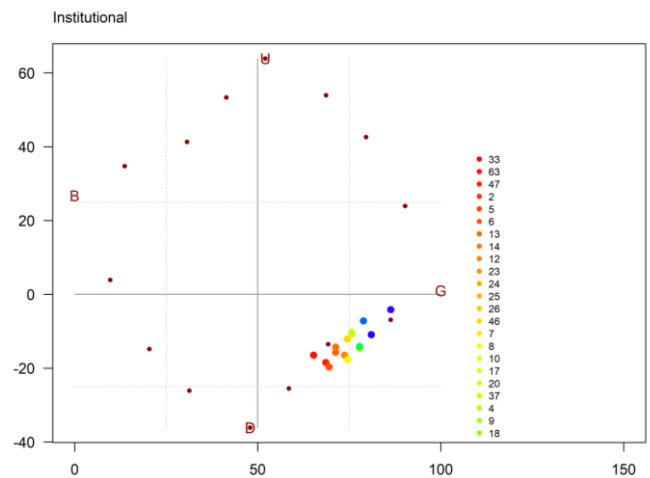


**Figure 7.** Sensitive attributes that influence the sustainability of the social dimension of Sendang Tirta Arum Tourism Management in Dander District, Bojonegoro Regency

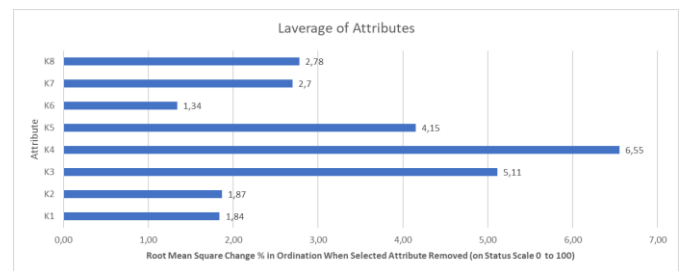
The role of private institutions in Sendang Tirta Arum Tourism does not yet show any cooperation. So far, this tourism has been managed using the village budget. Even though cooperation between other parties can attract tourists to come. Lack of cooperation from other parties can occur due to lack of promotion at tourist locations. The role of the private sector in the tourism sector can be in the form of: 1) Carrying out village development together with the government, 2) Marketing tourism packages, 3) Carrying out tourism promotions with the government, 4) Helping the community determine tourism rates, 5) Providing consultations with the government and the community regarding tourism development and 6) Participate in tourist village forums (Wahyuni et al., 2022). Cooperation carried out by the private sector in tourism management can be implemented through an agreement in a cooperation agreement between the government and tourist attraction managers or the government (Djabbari et al., 2021).

Regarding transportation facilities and infrastructure, so far there have been no special transportation facilities to get to tourist attractions. The distance between public transportation to the tourist location is around 800 meters. The existence of good transportation makes it easier for tourists to visit tourist locations and of course tourist arrivals will increase. If there is special transportation to the tourist location,

things that must be considered include (Pariyanti & Buchori, 2020): Complete information about the facilities, terminal location and destination must have the local dispatch service of all passengers before leaving the place of departure; Terminals must provide a security system to prevent crime; A standard traffic sign or integrated symbol system must be fully developed and installed at the airport; The information system must provide data about the information of other transport services that the terminal can contact including schedules and fares; Current and up-to-date information, with attached table Departure or arrival information must be available upon boarding, announcement, verbally or by telephone; Manpower to help passengers; Complete information about locations, rates, schedules and routes of local delivery services; City maps must be provided to passengers; and The role of tourism awareness groups is to support and participate in the sustainability of tourism.



**Figure 8.** Distribution of attribute data on institutional dimensions



**Figure 9.** Sensitive attributes that influence the sustainability of the institutional dimensions of Sendang Tirta Arum Tourism Management in Dander District, Bojonegoro Regency

From the 4 dimensions above, there are several sensitive attributes that have been collected based on their dimensions, namely: Waste management facilities, business capital assistance, contribution to OLGR,



conflict between government and citizens, role of private institutions, transportation facilities and infrastructure, role environmentally conscious group.

## Conclusion

The resulting index value shows that each dimension analyzed sequentially has a diverse status, namely the ecological, social and institutional dimensions which are very sustainable and the economic dimension which is quite sustainable. The sensitive attributes that most influence sustainability and need to be considered are waste management facilities, business capital assistance, contribution to OLGR, conflicts between government and citizens, the role of private institutions, transportation facilities and infrastructure and the role of environmentally conscious groups.

## Author Contributions

Conceptualization, D.R.A and N.H; methodology, N.H and N.B.; software, D.R.A.; validation, N.H and N.B.; formal analysis, D.R.A.; investigation, D.R.A; resources, D.R.A; data curation, D.R.A and N.H; writing – original draft preparation, D.R.A; writing – review and editing, D.R.A.; visualization, D.R.A; supervision, N.H and N.B; project administration, D.R.A.; funding acquisition, D.R.A.

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## Conflicts of Interest

The authors declare no conflict of interest.

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