

Rapid Assessment of the Sustainability Status of Tourism Area Management Through MDS-Rapfish R in Situ Rawa Kalong, Depok City, West Java, Indonesia



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ABSTRACT

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multidimensional scaling, Rapfish R, sustainability status, tourism area management

The sustainability concept can be applied to the Situ Rawa Kalong Tourism Area management plan as one of the natural tourist destinations in Curug Cimanggis Depok Village. This research aims to assess quickly the sustainability status of the management of Situ Rawa Kalong Tourism Area on a multidimensional scale, namely environmental, economic, social, and institutional dimensions. The analysis method used was *Multidimensional Scaling* with *Rapfish R*. The results of MDS analysis on ten units of research on each dimension show that the status of the environment is entirely sustainable and tends to increase (58.93%-72.21%), the economics are altogether sustainable and tends to fall (60.38-66.48%), the sociocultural is less sustainable and tends to rise (31.08%-51.68%); finally the institutional is less sustainable and tends to decrease (20.65-42.13%). Leverage analysis produces levers of environmental dimensions, namely carrying capacity; economics in tax revenue, purchasing power, and levies; sociocultural in the form of social impact; and institution in the form of management organisations and cooperation networks. The need for priority scale recommendations improves sustainability status, especially regarding sociocultural and institutional dimensions. Through this, Rapfish also compares MDS and Montecarlo values, which have a value of <5%, meaning that the selection of attributes has good accuracy.

1. INTRODUCTION

Sustainability is crucial in managing tourist areas because it offers a path to long-term success. Sustainable tourism area management can flourish by integrating economic policies alongside energy and environmental strategies [1, 2]. This concept includes holistic development, balancing conservation efforts with community welfare through effective resource management, and promotion of local culture and products [3-5]. Sustainable tourism has become a significant focus of tourism policymakers. Sustainable tourism relies on three main pillars: environmental, economic, and social dimensions, with an additional focus on institutional aspects involving various stakeholders [1, 4, 6-12]. For this reason, research on sustainable tourism area management includes multidimensional research. In sustainable tourism area management, the institutional dimension is significant because it involves the role of tourism stakeholders. Cooperation and engagement between the government as policymakers, industry, residents, communities, researchers, journalists, and communities will result in transparent and sustainable tourism area management strategies [4, 6]. Information, desire, public awareness, stakeholder policies, effective governance, expert

knowledge, and experience are procedures that must be carried out to achieve sustainable tourism area development and management [4, 13]. These four dimensions of sustainable development will be parameters and indicators in this study. From these four dimensions, attributes and indicators are determined to measure the sustainability of tourism management [4, 14]. Waste of resources and effort can be avoided if it has strong and statistically validated indicators.

Water resources are essential resources for human survival [15]. Tourism integrates conservation and reasonable use, providing potential and attractive development of water resources [16]. Planning and management of water resources as a sustainable tourism area is a means to produce sustainable growth. This concept is significant in the context of Situ Rawa Kalong, a small natural lake in Curug Village, Cimanggis District, Depok City. Initially, a swamp inhabited by bats, when it functioned as rice field irrigation, this situ experienced an increase in volume so that gradually the tree in the middle collapsed because it was not strong enough to withstand water discharge. This is what later made the site's name become Situ Rawa Kalong. Despite its natural beauty and water tourism potential, the area faces challenges such as unclear

management authorities, conflicting community interests, and biophysical constraints.

Despite the increasing emphasis on tourism sustainability, research on managing specific destinations such as Situ Rawa Kalong is lacking. The case presents unique challenges, including unclear management authority, conflicting community interests, and biophysical barriers. Before pursuing sustainable management, it is essential to thoroughly assess the current sustainability status of Situ Rawa Kalong. The study aims to quickly evaluate the sustainability of Situ Rawa Kalong as a tourist destination, providing a basis for future development plans. The rapid assessment of sustainability status contributes to the speed at which future management plans are formulated. Consistency in tourism assessment and monitoring will ensure sustainable tourism management. The evaluation will consider environmental, economic, sociocultural, and institutional factors using multidimensional analysis methods. Understanding the strengths and weaknesses of Situ Rawa Kalong's sustainability is critical for its effective management and long-term survival as a tourist destination.

2. LITERATURE REVIEW

Natural tourism areas are tourist areas that have the potential of natural resources as tourism destinations. Nature plays a significant role in humans overcoming stress, improving cognitive abilities, and restoring a relaxed mind [17]. The interrelationship between nature and humans in the management of tourist areas must consider the impact of humans on nature and nature on humans. For this reason, tourism area management must ensure optimal opportunities for the involvement of humans and nature sustainably.

Conservation and utilisation of the area are essential in managing sustainable natural tourism areas. In conservation efforts, ecosystem services in the future must be ensured through good ecosystem maintenance, for example, in water areas such as rivers, lakes, coastal waters, and others [18]. In addition, adaptive tourism area management to the local context, such as conservation support, dependence on nature, perception of governance, and food security, is a tool for area conservation that results in holistic development [19]. The involvement of local communities in the management of tourist areas can provide good dynamics to achieve sustainability. In achieving sustainable tourism area management, it is also necessary to make efforts to regulate recreational activities because this will be able to change the landscape [20]. Unplanned recreational activities can damage nature as a potential tourism destination. In another discussion, it was mentioned that the restriction of tourist traffic in the dimensions of space and time, the division of tourist area zones, and the provision of infrastructure in accordance with the area's carrying capacity are important aspects in the management of tourist areas. More advanced management strategies and strict environmental regulations will reduce environmental damage practices [21]. To effectively manage this tourist area, it is necessary to plan, implement, assess, correct, and adapt [22]. Before determining the planning strategy to achieve the effectiveness of water tourism management, it is necessary to evaluate the sustainability status of water resource areas as tourist areas [23].

The sustainability status of tourist areas is a status that shows the good and bad conditions of existing tourist areas.

This status will be the foundation for developing an area management strategy. The allocation of resources and sustainability strategies can be planned if you understand the primary status of sustainability [24]. Sustainability status can be supported by complete data from both secondary and primary data. Ecological footprint values simulated with quantitative data series can also support evaluating the sustainability status of an area's development [25]. The sustainability status of natural tourism is analysed based on multicriteria factors located in the environmental dimension, economic dimension, sociocultural and institutional dimensions based on the sustainability of ecosystem functions, the preservation of natural tourism attraction objects, sociocultural sustainability, satisfaction, safety and comfort, and economic benefits [26], where the measure of the connectedness of resource inputs and welfare outputs reflects the sustainability status of the region (ecological welfare performance) [27].

The multidimensional sustainability status assessment will show the leverage factors in the management of Situ Rawa Kalong Tourism Area. The analysis uses the multidimensional scaling method to analyse sustainability status based on multiple criteria. Rappfish R is used to run multicriteria analysis based on R software. The MDS Rappfish method has been widely used to assess the sustainability status of research in various fields, such as measuring the level of mangrove sustainability and multidimensional management [28]; the technique used is non-parametric MDS, the results of this analysis are helpful for mangrove sustainability observers; analyse the sustainability status of Magersaren agroforestry using Rappfish viewed from the aspects of sustainability, management and technology [29]; analyse the level of sustainability of the Martapura River area of Banjarmasin City using the Rap-RiverBuiltUp method through ecological, social and economic dimensions [30]. The MDS method can measure sustainability status in one or multiple dimensions. To support attribute data and analysis, MDS Rappfish can also be combined with other research methods such as spatial analysis of Landsat satellite imagery, Arc GIS, scoring, mapping, and other methods depending on the needs of each study's attribute data. The advantage of the MDS Rappfish method is its speed in conducting evaluations to provide fast information for decision making, visually easy to understand, combining multi-faceted and participatory. The weakness of this method is the subjectivity of its assessment, especially on qualitative data, which requires complete and valid data.

3. MATERIAL AND METHODS

3.1 Material

This present research was conducted in the Situ Rawa Kalong area, which was revitalised into a tourist area. Situ Rawa Kalong area is located in Curug Village, Cimanggis District, Depok City [31]. The geographical position of Situ Rawa Kalong Area is at 6°19' – 6°28' South Latitude and 106°43' – 106°55' East Longitude. It can be seen in Figure 1. The area of Situ Rawa Kalong is currently 8.5 ha, with a depth of 2 meters in the dry season and 3 meters in the rainy season. The initial area of Situ Rawa Kalong is 11.21 ha. The latest measurement results were obtained by the Water Resources Office of Situ Rawa Kalong area, which has a land area of 10.3 ha. Situ Rawa Kalong is located in a densely populated area

surrounded by built-up areas such as residential areas, factories, apartments, and water tourism (Green Lake View Waterpark).

From DLHK data 2016-2021, Situ Rawa Kalong has an air temperature between 29°C-34°C, while the average air temperature ranges from 28°C-32°C. Temperature conditions in Situ Rawa Kalong are comfortable in the morning, hot during the day, and return to normal in the afternoon. An uneven and sparse distribution of vegetation causes heat during the day. The topographic height of Situ Rawa Kalong is in the range of 78.9-95.5 MSL (Mean Sea Level). The topography of Situ Rawa Kalong Tourism Area tends to be sloping, which is an excellent requirement to be used as a tourist area. Water quality becomes one of the obstacles when Situ Rawa Kalong wants to be used as a tourist area. Based on data from the Depok City DLHK for 2016-2021, the water quality of Situ Rawa Kalong is still below the water quality standard in Class D in heavily polluted conditions. The diversity of vegetation in Situ Rawa Kalong was quite diverse when the initial research was conducted in 2020, but it decreased due to the development of facilities and infrastructure. The vegetation that seems to live in groups is *Bambusa Vulgaris Striata*. The *Cocos Nucifera* is a vegetation often found in the Situ Rawa Kalong Area. Many invasive species exist in Situ Rawa Kalong, while native vegetation species, such as Hibiscus trees, are rare. Butterflies, lizards, dragonflies, and sparrows are fauna found in Situ Rawa Kalong. Anglers find many types of fish in Situ Rawa Kalong, such as catfish, tilapia, cork, pomfret, belida, and broomfish. The tawes fish as a native species no longer exist.

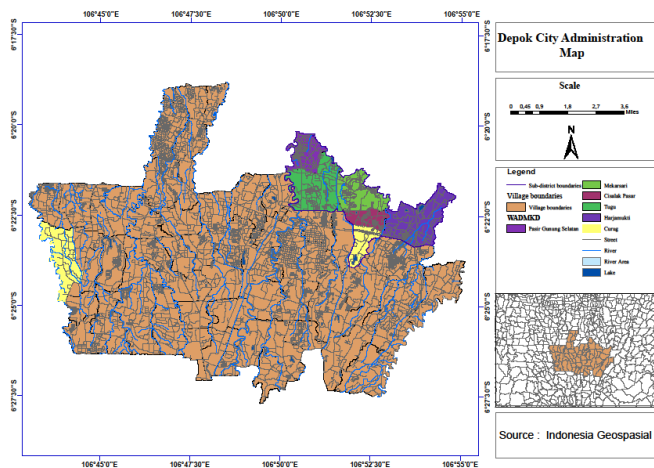


Figure 1. Depok City administration map

3.2 Methods

This research aims to analyse quickly the sustainability status of Situ Rawa Kalong Area as a tourist destination. Data was collected from secondary data (various sources), field survey results, in-depth interviews, and questionnaires at the research site. The questionnaire was distributed at the location to 100 respondents using a simple random sampling technique. Time series data was collected in 2016-2021 when the Situ Rawa Kalong Area was planned to become a tourist area. For this reason, this research includes mixed method research, where the data is quantitative and qualitative descriptive data, which is then quantified.

Multidimensional scaling rapidly assesses an entity's relative status through statistical techniques that assess

attributes on a bad-good scale [32]. Multidimensional scaling is used to find a sustainability status index that will be used as a basis for strategising [33]. The data in the coordinates of geometric spaces are shown to a degree of similarity by the MDS Matrix scaling technique [34, 35]. The unit of analysis is determined by space and time zone so that it has ten units of study (at least equal to the number of attributes). The attributes of each dimension have a different number, where the environmental dimension has ten attributes, the economic dimension seven attributes, the sociocultural dimension seven attributes, and the institutional dimension seven attributes. Indicators and scaling of each attribute are entered in the form of quantitative data in excel applications stored on csv. data types (comma delimited).

Rapfish R is an application used for sustainability analysis and evaluation through multidimensional analysis, including environmental, economic, social, institutional, and other dimensions [36]. Rapfish was first developed to evaluate fisheries' sustainability using the principle of rapid assessment. Rapfish is then used to assess sustainability status in various fields. Rapfish is determined by the score of the attributes derived from the reference. The stages in the analysis using Multidimensional scaling-Rapfish R (Figure 2) are [33]:

1. Define the attributes and indicators of each dimension
2. Determine the scale of each indicator based on the standards and indices of each indicator
3. Determine a scale of 1-10, where 1 has the worst score and 10 indicates the best value
4. Conduct an assessment based on existing data through Excel
5. Insert into R software
6. Exit results are in the form of MDS, leverage, and Montecarlo charts.

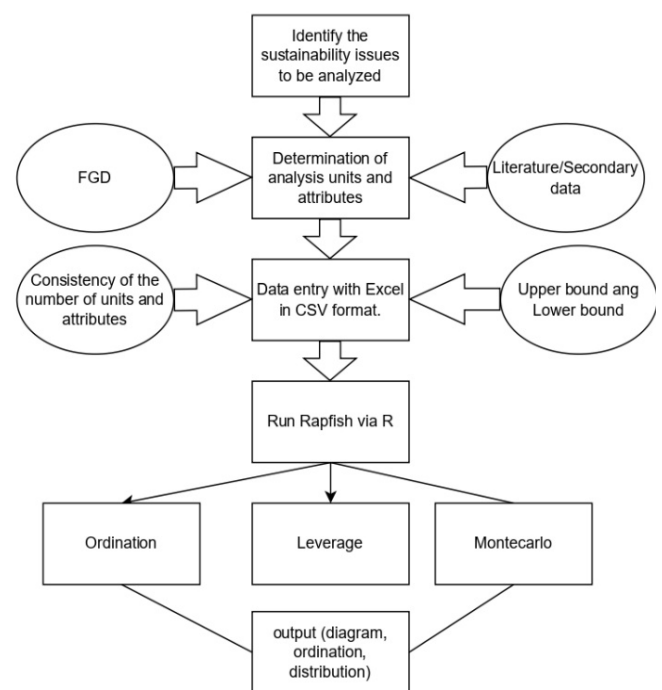


Figure 2. Stages of MDS analysis with Rapfish [37]

The assessment results are then compared with the index categories and sustainability status below in Table 1:

Table 1. Index categories and sustainability status

Value	Index Categories
0-25	Bad (Unsustainable)
26-50	Less (Less Sustainable)
51-75	Enough (Moderately Sustainable)
76-100	Good (Very Sustainable)

The weakness of the MDS Rappfish research method is that it determines the weights for each variable so that the process is subjective (especially in qualitative data), resulting in differences in results between researchers or analysts.

4. RESULTS AND DISCUSSION

The sustainability status that results in good or bad conditions of sustainability in the Situ Rawa Kalong area is indicated by a sustainability index that has a value of 0%-100%. Analysis of the sustainability status of Situ Rawa Kalong was carried out using the Multidimensional Scaling method. Before the analysis is carried out, the attributes and indicators that form the basis of the study are determined, as shown in Table 2. MDS analysis on the sustainability status of Situ Rawa Kalong Area management was carried out using four dimensions of analysis, namely environmental, economic, sociocultural, and institutional dimensions, with 31 attributes. Environmental dimension attributes are based on ecological and biophysical conditions such as water quality, hydrology, morphology, carrying capacity, topography, climate comfort, land use, land cover, biodiversity, and infrastructure. The attributes of the economic dimension are considered based on the financial benefits of tourism, such as income, livelihood, purchasing power, tax revenue, levy receipt, employment opportunities, and business opportunities. The sociocultural dimension is considered based on the local peculiarities of the region, such as attractions, regional identity, education, social impact, security, promotion, and conservation awareness and activities. The institutional dimension is considered for institutional roles such as management organisations, actor involvement, networks between actors, community

participation, governance, regulations and policies, and improving tourism human resources.

The data collection resulted from secondary data, questionnaires, survey data, and in-depth interviews, which were then assessed on a scale according to the standards of each attribute. The assessment was done in an Excel application table with a CSV file type. Then, a score assessment was carried out on each attribute, with a score of 1-10 from a poor scale to a good sustainability status for Situ Rawa Kalong. After the assessment with Excel, then entered into the R software and running produces sustainability, leverage, and Montecarlo indices.

4.1 Sustainability status

Sustainability can produce environmentally caring, fair, healthy, and beneficial places that begin with evaluating the potential of tourism areas through sustainability assessments [38]. Situ Rawa Kalong's sustainability status is analysed through assessments of attributes, indicators, scales, and scores on four dimensions: the environmental, economic, sociocultural, and institutional dimensions. The analysis is carried out starting from the determination of attributes of each dimension, indicators, and scales from various references. The scale of various references is then scored based on the MDS value interval, which is 0-10. Determining the unit of analysis is carried out with the minimum condition equal to the number of attributes. The most characteristics in the environmental dimension are 10, so unit analysis is determined by as many as ten units of study: Zone 1, zone 2, zone 3, zone 4, 2016, 2017, 2018, 2019, 2020, and 2021. Next, the data is collected, the results are compared with the existing scale, and an assessment is conducted.

The running results of the R software on the four dimensions show the sustainability index of each dimension. The results of Running MDS Rappfish can be seen in Table 3. The environmental dimension describes its sustainability status as quite sustainable, the economic dimension is entirely sustainable, the sociocultural dimension is less sustainable, and the institutional dimension is less sustainable.

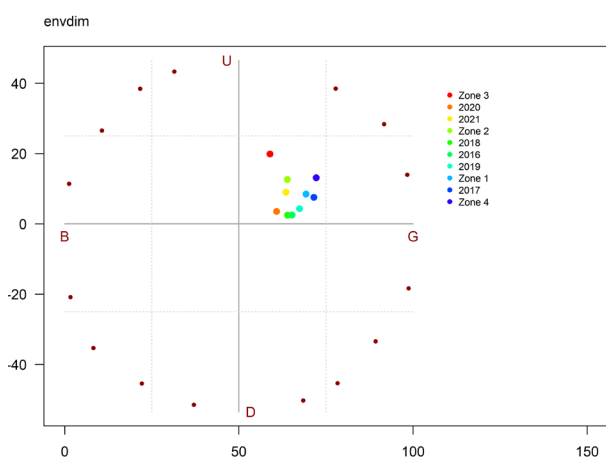
Table 2. Dimensions, attributes, and indicator of sustainability status analysis of Situ Rawa Kalong

Dimension	Attribute	Indicator	Dimension	Attribute	Indicator
Environmental	Water quality	Water quality standards	Sociocultural	Attraction	Destination attractiveness index
	Morphology	The decline in situ areas in the last ten years		Regional local identity	Physical and non-physical characters
	Hydrology	Flow regime coefficient		Education	Education level
	Climate comfort	Temperature humidity index		Promotion	Types of promotions
	Topography	Slope		Social impact	Internal conflicts
	Carrying capacity	Rated carrying capacity		Security	Security guarantee
	Diversity of vegetation	Diversity index		Conservation awareness and activities	Sensitivity and positive values
	Land cover	Closing headers			
	Land use	Land use suitability index			
	Facilities and infrastructure	Eligibility index			
Economic	Livelihood	Types of livelihood	Regulations and policies	Regulations and policies	
	Community income	Per capita income	Institutional	Actors' involvement	Number of actors
	Purchasing power	Inflation rate		Destination governance	Characteristic

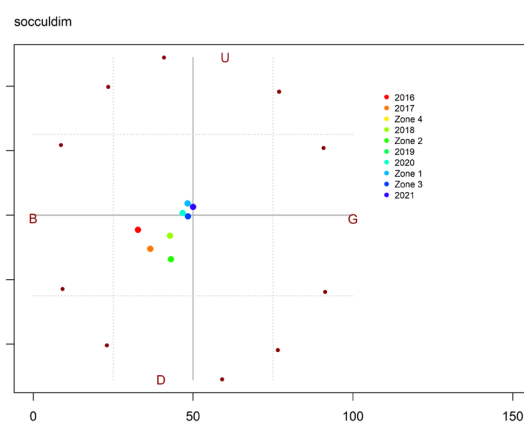
Retribution revenue	Retribution contribution to original local government revenue (PAD)	Managing organisation	Formation of a managing organization
Tax revenue	Tax contribution to original local government revenue (PAD)	Development of tourism human resources	Development of tourism human resources
Job opportunities	Employment rate	Cooperation network	Coordination and synchronisation
Business opportunities	The ratio of the number of entrepreneurs	Community participation	Community participation rate

Table 3. Running result MDS rapfish

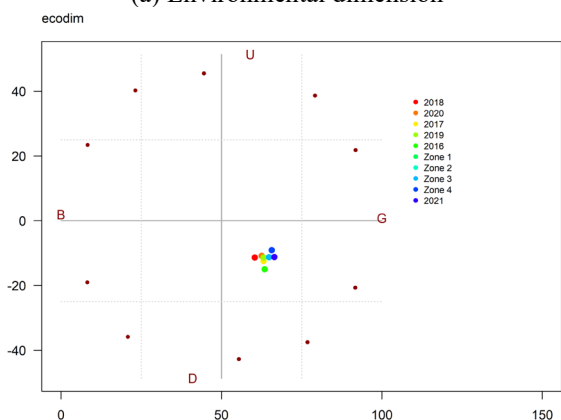
No	Dimension	Unit	MDS	Status	No	Dimension	Unit	MDS	Status
1	Environmental	Zone 1	69,24	Moderately sustainable	3	Sociocultural	Zone 1	48.27	Less sustainable
		Zone 2	63,90	Moderately sustainable			Zone 2	43.07	Less sustainable
		Zone 3	58,94	Moderately sustainable			Zone 3	46.71	Less sustainable
		Zone 4	72,21	Moderately sustainable			Zone 4	41.09	Less sustainable
		2016	65,27	Moderately sustainable			2016	31.08	Less sustainable
		2017	71,51	Moderately sustainable			2017	36.63	Less sustainable
		2018	63,93	Moderately sustainable			2018	42.79	Less sustainable
		2019	67,39	Moderately sustainable			2019	50.12	Less sustainable
		2020	60,80	Moderately sustainable			2020	50.12	Less sustainable
		2021	63,51	Moderately sustainable			2021	51.68	Moderately Sustainable
2	Economic	Zone 1	64,83	Moderately sustainable	4	Institution	Zone 1	37.63	Less sustainable
		Zone 2	64,83	Moderately sustainable			Zone 2	37.63	Less sustainable
		Zone 3	64,83	Moderately sustainable			Zone 3	37.63	Less sustainable
		Zone 4	65,66	Moderately sustainable			Zone 4	38.90	Less sustainable
		2016	63,46	Moderately sustainable			2016	20.65	Unsustainable
		2017	63,09	Moderately sustainable			2017	27.63	Less sustainable
		2018	60,38	Moderately sustainable			2018	32.65	Less sustainable
		2019	63,14	Moderately sustainable			2019	38.54	Less sustainable
		2020	62,52	Moderately sustainable			2020	38.54	Less sustainable
		2021	66,48	Moderately sustainable			2021	43.13	Less sustainable



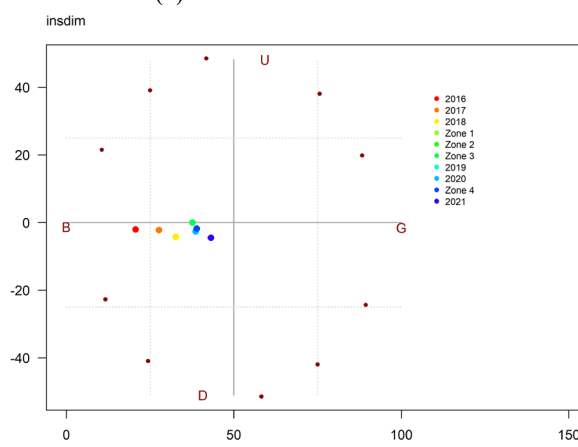
(a) Environmental dimension



(c) Sociocultural dimension



(b) Economic dimension



(d) Institutional dimension

Figure 3. Results of MDS of 4-dimensional analysis

The positions of the four dimensions in the graph can be seen in Figure 3. First, the position of the ten units is in the upper right of the graph, indicating that the sustainability status of the environmental dimension of Situ Rawa Kalong is in a suitable category (58.93%-72.21%), entirely sustainable, and tends to rise. Second, the MDS analysis of the economic dimension with Rapfish shows that its sustainability status is in a suitable category (60.38-66.48%), entirely sustainable, and tends to decline. Third, this indicates that the sustainability status of the sociocultural dimension of Situ Rawa Kalong is less sustainable (32.73%-49.96%) and tends to increase. Fourth, this result shows that the institutional dimension was in an unsustainable status (index < 25%) in 2016, but from 2017-2021, progress was in a less sustainable status (index 27.63%-42.13%). The graph above concludes that the sustainability status of the institutional dimension of Situ Rawa Kalong tourism is less sustainable and tends to decline.

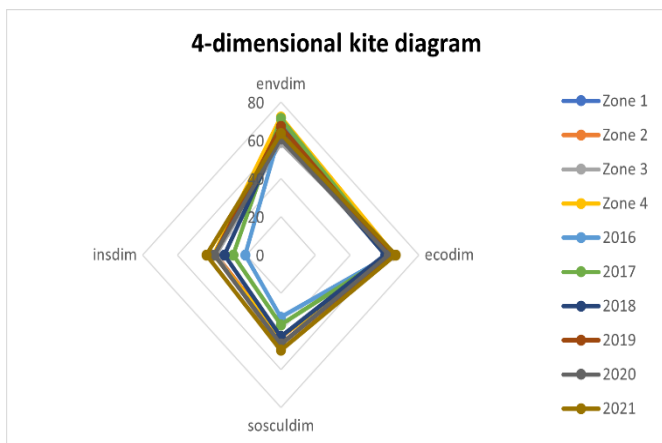


Figure 4. Kite Diagram of MDS analysis results of environmental, economic, sociocultural, and institutional dimensions

The results of the kite diagram (Figure 4) show that the environmental and economic dimensions are moderately sustainable, and the sociocultural and institutional dimensions are not or are less sustainable. This result illustrates that the priority of improving sustainability status is on the social and institutional dimensions whose status is less sustainable. Hence, the management of the Situ Rawa Kalong tourist area has become more effective. The environmental and economic dimensions are the next priority, so there will be synergy between the four dimensions. Efforts and strategies are carried out by looking in detail at leverage or sensitive attributes on the four dimensions that can be seen from the results of leverage analysis. The sustainability of Situ Rawa Kalong is still fairly sustainable, although monitoring is always needed to maintain this sustainability status. On the other hand, the use of situ has not been well planned, causing concern for its sustainability in the future. For this reason, it is necessary to synergize conservation activities with tourism activities.

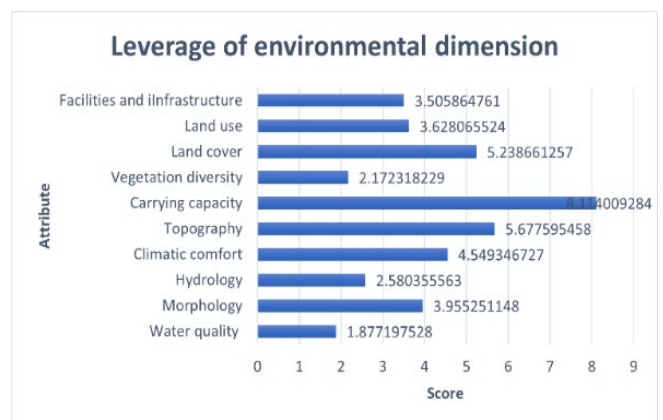
4.2 Leverage analysis

Leverage analysis is used to find sensitive sustainability indicators, where if the Root Mean Square (RMS) value is high, it will significantly affect the sustainability value [33]. The leverage factor is visually depicted with a bar chart, where the highest factor value if intervened, will affect the sustainability index above. The leverage analysis in this study

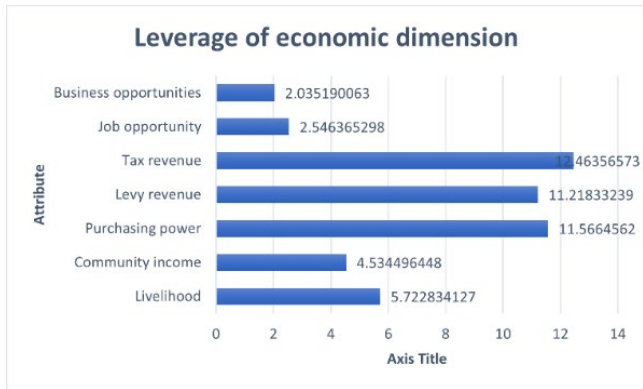
is the same as the MDS analysis carried out on four sustainability dimensions: environmental, economic, sociocultural, and institutional. By bringing up the presence of sensitive variables, the results of this Leverage assessment show which priority attributes are most important to pay attention to in efforts to manage Situ Rawa Kalong Tourism Area. Leverage analysis of environmental dimensions shows that the sustainability-sensitive factor is carrying capacity (8.11). Carrying capacity will be an essential factor in efforts to improve the sustainability of the management of Situ Rawa Kalong Area. Currently, the site’s carrying capacity is still below the adequate carrying capacity of <1558 people/day.

Still, the land area, which has a maximum width of 10 meters, has obstacles in developing facilities and infrastructure. It can also be seen from the carrying capacity of the land area (wet area) supporting the area surrounded by factory buildings and settlements. If there are efforts to relocate the factory and liberate the surrounding area into a green area, it will increase the level of sustainability there. The economic dimension through leverage analysis shows that the sensitive factors are taxes (12.46), purchasing power (11.57), and levies (11.21). To improve sustainability in the economic dimension, increasing tax and levy revenues to increase tourist areas and add facilities and infrastructure is necessary. People’s purchasing power also needs to be expanded to improve their access to tourism.

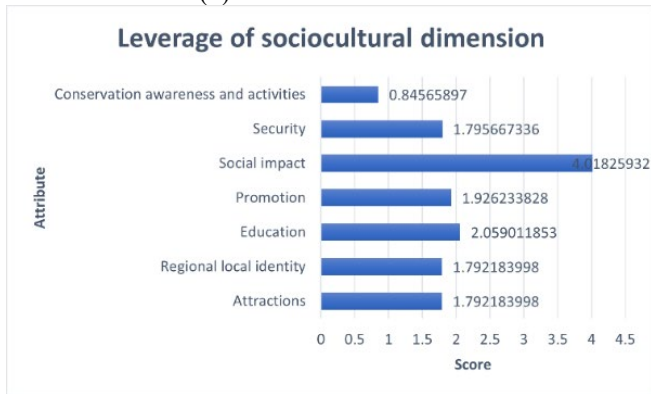
Furthermore, in the leverage analysis of social and cultural dimensions, the sensitive factor of sustainability analysis is the social impact factor of tourism activities (4.07). The most visible social impact is the conflict of interest between community groups around the Situ Rawa Kalong Area. It causes differences of opinion and conflict, so there is a tendency not to support each other’s activities. It needs efforts to discuss and understand mutual needs and interests that can also meet personal needs and interests. The final leverage analysis on the institutional dimension that resulted in the leverage factors was the managing organization (5.48) and the cooperation network (4.86). The tourism management organization of Situ Rawa Kalong Area has not yet been formed, and the Pokdarwis of Curug Cimanggis Village have also not been authorized to carry out management. If the management organization has been formed and then runs effectively, along with good cooperation between stakeholders, it will be able to improve the sustainability of the management of Situ Rawa Kalong Area as a tourist area. The results of leverage analysis of the four dimensions can be seen in Figure 5.



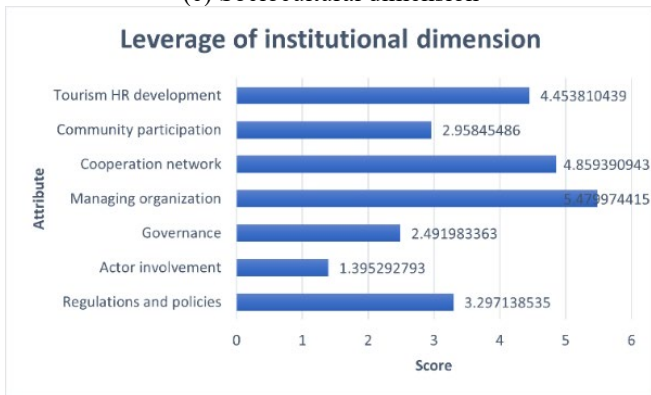
(a) Environmental dimension



(b) Economic dimension



(c) Sociocultural dimension



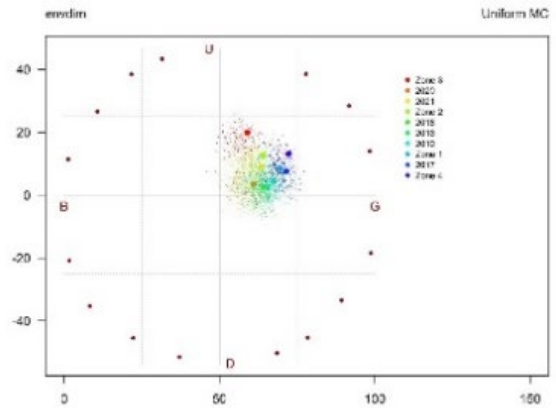
(d) Institutional dimension

Figure 5. Results of Leverage's of 4-dimensional analysis

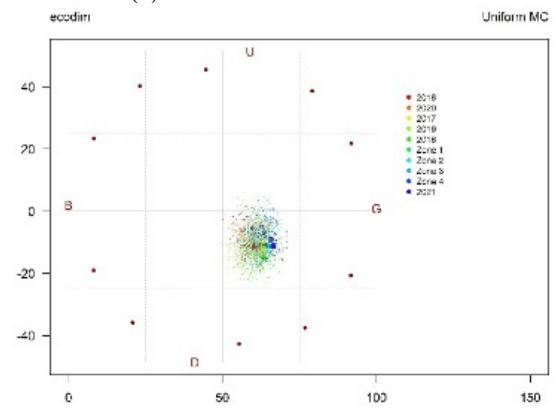
4.3 Montecarlo analysis

By looking at the difference between MDS and Montecarlo's <5% difference, Montecarlo's analysis prevents random errors from all dimensions. The smaller the difference in results, the higher the level of analysis can be trusted. Montecarlo simulations are used to see differences in ordinance values. Ordinance results help overcome random errors with scatter plots. Montecarlo's simulation analysis was carried out with 200 iterations on ten units of analysis and four dimensions, namely the environmental, economic, sociocultural, and institutional dimensions. The results of Montecarlo's analysis on ecological, economic, sociocultural, and institutional dimensions, when compared with MDS analysis, can be seen in Table 4. From the results of the Montecarlo analysis above, it can be seen that the value of the difference between the results of the Montecarlo analysis and MDS is below 5%, so it can be concluded that the determination of attributes and scales has a good level of

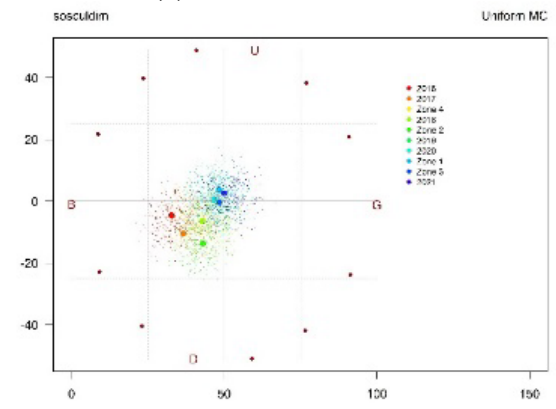
accuracy. It can also be seen in Figure 6 that the results of the Montecarlo analysis have adjacent point positions.



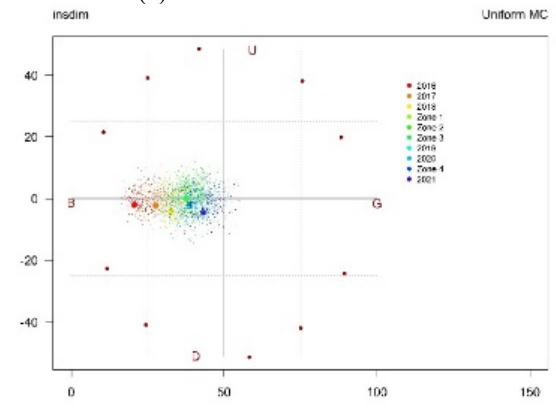
(a) Environmental dimension



(b) Economic dimension



(c) Sociocultural dimension



(d) Institutional dimension

Figure 6. Results of Montecarlo's of 4-dimensional analysis

Table 4. Comparison of MDS and montecarlo results

No	Dimension	Unit	MDS	Montecarlo	Difference (%)	No	Dimension	Unit	MDS	Montecarlo	Difference (%)
1	Milieu	Zone 1	69.24	66.38	2.86	3	Sociocultural	Zone 1	48.27	47.61	0.66
		Zone 2	63.90	60.51	3.39			Zone 2	43.07	42.53	0.53
		Zone 3	58.94	56.59	2.34			Zone 3	46.71	46.86	0.15
		Zone 4	72.21	69.82	2.39			Zone 4	41.09	41.92	0.84
	2016	65.27	64.39	0.87	2016		31.08	30.46	0.62		
	2017	71.51	68.50	3.01	2017		36.63	38.09	1.46		
	2018	63.93	61.43	2.50	2018		42.79	43.27	0.47		
	2019	67.39	63.63	3.75	2019		50.12	50.04	0.08		
	2020	60.80	58.34	2.45	2020		50.12	49.95	0.17		
	2021	63.51	61.49	2.02	2021		51.68	53.42	1.73		
	2	Economic	Zone 1	64.83	62.43		2.40	Zone 1	37.63	38.91	1.28
			Zone 2	64.83	62.13		2.70	Zone 2	37.63	38.51	0.88
Zone 3			64.83	61.65	3.18	Zone 3	37.63	38.14	0.52		
Zone 4			65.66	62.31	3.35	Zone 4	38.90	40.18	1.28		
2016		63.46	60.56	2.91	2016	20.65	23.76	3.11			
2017		63.09	61.00	2.09	2017	27.63	29.07	1.44			
2018		60.38	58.45	1.93	2018	32.65	34.34	1.69			
2019		63.14	60.22	2.92	2019	38.54	39.67	1.13			
2020		62.52	60.00	2.52	2020	38.54	39.46	0.91			
2021		66.48	64.00	2.48	2021	43.13	44.73	1.60			

5. CONCLUSIONS

The results of the analysis of the sustainability status of Situ Rawa Kalong are less sustainable to moderately sustainable. The result of the MDS Analysis of the environmental dimension with a fairly sustainable status, the economic dimension with a less sustainable status, the sociocultural dimension with a less sustainable status, and the institutional dimension with a less sustainable status. This potential is a benchmark for developing a sustainable strategy for managing the Situ Rawa Kalong Area as a tourist area in the future. The results of leverage analysis show that the highest leverage value in the analysis attribute is crucial in carrying out future regional management efforts. Recommendations from the results of the sustainability analysis that the sociocultural and institutional dimensions are the top priorities. That needs to be improved through efforts to reduce conflicts that occur in the community by prioritizing common interests so that they can work well together to improve the management of the Situ Rawa Kalong tourist area. The organization's management needs to be established while involving the community in decision-making. Public awareness of the importance of environmental sustainability in increasing the environment's carrying capacity needs to be done. Regulation of tourism and economic activities needs to be planned while still paying attention to the sustainability of the Situ Rawa Kalong Tourism Area.

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