

Sustainability management evaluations of bee Jay Bakau resort in Probolinggo using multi dimensional scaling Rapeco tourism approach

Mochammad Fattah, Candra Adilntyas and Tiwi Nurjannati Utami

Fisheries and Marine Science Faculty, Brawijaya University, Brawijaya, Indonesia

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ABSTRACT

Mangrove forests have ecological, economic, and social values that need to be sustainably maintained to minimize its destruction. This study is aimed to analyze the sustainability and management priority of Bee Jay Bakau Resort in Probolinggo. The analysis employs Multi-Dimensional Scaling using Rapecotourism (Rapid Appraisal for Ecotourism) approach. The result showed that the multi dimensional management of BJBR Mangrove resort generated a 71.32% index that categorized as adequately sustainable. The sustainable index value of ecological, economic, social, law and corporation, and technology dimensions were 74.95%, 73.54%, 66.81%, 70.83%, and 70.49%, respectively. The index value of five dimensions was between 51 – 75 and categorized as adequately sustainable. The main priorities for each dimension in management consideration are environmental pollution, economic contributions, educational facilities, legal awareness, and technological security. The development of BJBR ecotourism should consider ecological aspects so that it can improve its sustainability.

Key words : Mangrove, BJBR, Multi-Dimensional, Sustainability

Introduction

Bee Jay Bakau Resort (BJBR) in Probolinggo, Indonesia, is one out of nine tourist destinations, which integrates mangrove tourism and artificial tourism with the ecotourism concept. BPS data (2017) showed that Indonesia has vast mangrove forest ecosystems of 2.82 million hectares. Mangrove ecotourism management has a sustainable benefit on ecological, economic, and social aspects. Andronicus *et al.* (2016) state that the production of tourism opportunities with ecological considerations shall take account of the quality of natural capacity and environmental friendly. Ecotourism activities reduce the impact on biodiversity quality degradation resulting from mass tourism activities.

Multidimensional case study of mangrove management in Taman Jaya Village, resulting in a less sustainable status where the ecological dimension is sustainable but the economic dimension is less sustainable, and the social dimension is not sustainable (Pattimahu *et al.*, 2017). The multidimensional condition of Ambon's coastal mangroves has a fairly sustainable status. The economic, social, technological, and infrastructure, legal, and institutional dimensions are adequately sustainable, while the ecological dimensions are less sustainable (Berhitsu *et al.*, 2016). The multidimensional sustainability status of the mangrove forest ecosystem in Damasbeach, Trenggalek Regency, is in a less sustainable category. The value of the ecological dimension of the sustainability index in the category is adequately

sustainable. While the economic, social, and legal and institutional dimensions produce a less sustainable category (Purwanti *et al.*, 2018). The sustainability status of multidimensional mangrove ecosystem management in Akuni Village, Tinanggea Subdistrict, Konawe Selatan Regency is in the less sustainable category. The ecological and economic dimensions are in the adequately sustainable category, while the social and institutional dimensions are in a less sustainable category (Muhsimin *et al.*, 2018). The sustainability status of mangrove protected forest management in BatuAmpar District, West Kalimantan, is adequately sustainable in the ecological dimension but less sustainable in the economic and social dimensions (Karlina *et al.*, 2016).

Sustainable development is a development paradigm that is directly related to the balance of nature or the environment (Rosana, 2018). The development of the BJBR ecotourism stems from the aspiration of managers to recover the environment quality from mangrove damage and water pollution. The establishment of ecotourism has an impact on improving the sustainability of mangroves and the economy of surrounding communities. The tourists who come to BJBR will get an education about the functions and benefits of mangroves to increase tourist awareness to preserve the environment.

BJBR mangrove sustainably management provides a value of Rp.353,867,253 /year (Fattah *et al.*, 2020). The status of management sustainability is taken into consideration in the utilization of resources to minimize damage. Sustainable management of the ecological dimension will have a positive impact on other aspects. In contrast, the management of ecological dimensions that are not sustainable will be detrimental to other dimensions. The purpose of this study is to analyze the sustainability status and priorities of the management of Bee Jay Bakau Resort (BJBR) Probolinggo.

Research Methods

This research was conducted at Bee Jay Bakau Resort (BJBR) in Probolinggo, Indonesia. Determining the number of respondents must meet the science and authority requirements (Marimin, 2002). The selection of respondents based on experts or authorities in the field of Mangrove management, namely: manager of BJBR. This study uses a Multi-Dimensional Scaling (MDS) analysis with a modi-

fied Rapecotourism (Rapid Appraisal for Ecotourism) approach from Rapfish (Rapid Appraisal for Fisheries).

RAP fish analysis generally evaluates 6 (six) dimensions for sustainability, namely: ecology, technology, economy, social, ethics, and institutions. Each dimension consists of 6-12 indicators, which are assessed on a scale of 0-10 (Pitcher *et al.*, 2013). This study uses 5 (five) dimensions, namely: ecology, economics, social, law and institutions, and technology. The stages of Rapfish analysis consist of Multi-Dimensional Scaling (MDS), Monte Carlo (MC), and Leverage (Eunike *et al.*, 2018). Leverage analysis is used to determine attributes that are sensitive to sustainability indices, while Monte Carlo analysis and accuracy analysis are used to determine the accuracy of MDS analysis (Nandini *et al.*, 2017). The category of sustainability status of BJBR mangrove forest ecosystem management grouped into four values, namely: unsustainable, less sustainable, adequately sustainable, and sustainable (Table 1).

Table 1. Category of Sustainable Status

Index Value	Category
0 – 25	Unsustainable
>25 – 50	less sustainable
>50 – 75	adequately sustainable
>75 – 100	Sustainable

Results and Discussion

Status of Sustainability of Bee Jay Bakau Resort (BJBR) Probolinggo Management Using Multidimensional Scaling Rapecotourism Approach

Mangroves growing in Mangunharjo Urban Village has 6 (six) species in the area of 89,490 m². It is the locations of Bee Jay Bakau Resort (BJBR) mangrove forests, including *Avicennia alba*, *Avicennia marina*, *Sonneratia alba*, *Rhizophoramucronata*, *Rhizophoraapiculata* and *Bruguieragymnorhiza* (DKP Probolinggo City, 2014).

Community involvement in ecotourism management of CMC was tour guides, traders/ opening a stall, motorcycle taxi drivers, parking attendants, toilet guards, snorkeling facilities rental, checking visitors' luggage, and the locals' homestay (Husamah and Atok, 2018). BJBR mangrove forests have an economic function as a tourist attraction by utilizing economic value fauna to the community,

such as mangrove crabs (*Scylla serrata*), small crab (*Portunus palagicus*), oysters (*Crassostrea*), and green shells (*Mytilus viridis*). The communities are allowed to look for economic fauna in the BJBR ecotourism area while maintaining cleanliness and preservation of mangrove forests. Research by Febriansyah (2017) showed that the value of benefits obtained from mangrove forests in the BJBR ecotourism were direct benefits (DUV) worth Rp.117,847,820,168, indirect benefits (IUV) worth Rp.92,244,158, optional benefits (OV) worth Rp. 1,771,902, existence benefits (EV) valued Rp22,372,500, and inheritance benefits (BV) worth Rp.25,000,000.

Diversification of mangrove forests functions as ecotourism can be successful if sustainable mangrove planting carried out according to the planting pattern and accuracy of planting techniques (Mulyadi and Nur, 2010). Benjamin Mangitung, Justinus Tan, and Juda Mangitung established Bee Jay Bakau Resort in 2012 as ecotourism. They aimed to improve mangrove forest sustainability as a tourist attraction because the previous conditions on BJBR mangrove were not well managed, unkempt, seedy, and were used as garbage dumps causing unpleasant odors. According to Agussalim and Hartoni (2014), the use of mangrove ecosystems for ecotourism is a shift in tourist interest from old tourism (tourists who only come to travel) to new tourism (tourism activities that have elements of education and conservation).

Community participation is needed in managing, maintaining, and conserving mangrove resources so that the natural conditions and marine ecosystems are not damaged. Community participation in managing mangrove forests can increase community awareness of the surrounding environment (Yuliani and Nova, 2017). BJBR Mangrove has the right to manage ecotourism for 30 years since 2012 with a memorandum of understanding between the manager of the BJBR mangrove forest ecotourism and the DKP of Probolinggo City as the holder of mangrove forest management responsibilities from Probolinggo local government.

The construction of BJBR facilities considers ecological sustainability by using environmentally friendly materials and technology. BJBR offered *Sapta Pesona* tourism concept, namely: safety, cleanliness, beauty, order, hospitality, coolness, and memories. BJBR actualizes the *Sapta Pesona* tourism concept by increasing tourist attraction naturally and artificially. Attractions in BJBR includes sea-

scape, mangroves, wooden bridges, artificial white sand beaches, beach volleyball courts and beach futsal, cafe tents, meeting rooms, o-tent rest, lodging, BJBR icons, BJBR globe, sunflower park, flying fox, cycling track and love padlock.

The index value of ecological, economic, social, legal and institutional sustainability, and technology from the MDS Rapecotourism analysis in the BJBR management in Probolinggo were 74.95% (adequately sustainable), 73.54% (adequately sustainable), 66.81% (adequately sustainable), 66.81% (adequately sustainable), 70.83% (adequately sustainable), 70.83% (adequately sustainable) and 70.49 (adequately sustainable), respectively (Figure 1). The sustainability status of multidimensional BJBR mangrove ecotourism management was in the adequately sustainable category of 71.32%. To improve its sustainability status, it needs to consider sensitive variables.

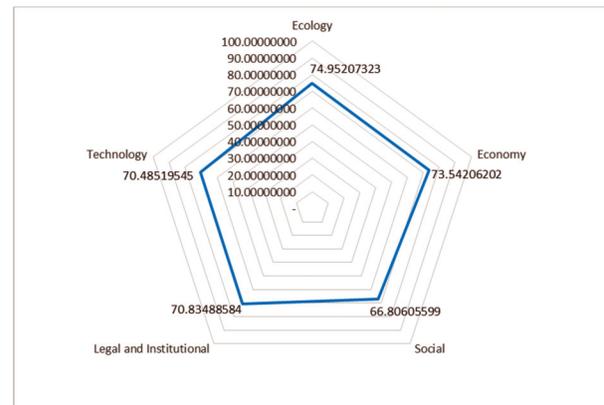


Fig. 1. Kite diagram of a multidimensional sustainability index

BJBR Mangrove Ecotourism

Monte Carlo analysis was employed to evaluate the effect of errors in the MDS ordination process (Kavanagh and Pitcher, 2004). The low value of the difference between the MDS and MC values resulted in an indication that the MDS value had a high level of confidence due to a minimum of misunderstanding or procedure for the indicator, and variations in the scoring (Table 2).

Management Priorities for Improving BJBR Ecotourism Sustainability

The pollution perpetrators were those who dumped waste into the river to the estuary before BJBR was created. Therefore, the river is called "Kali Banger" because the river produces an unpleasant and dirty

Table 2. Comparison of MDS and MC values

	Ecology	Economic	Social	Legal and Institutional	Technology
MDS	74,95207323	73,54206202	66,80605599	70,83488584	70,48519545
MC	74,95207419 0,00000097	73,54206129 0,00000073	66,80605161 0,00000438	70,83488710 0,00000126	70,48518710 0,00000835

odor from rubbish heaps and household waste. According to Agussalim and Hartoni (2014), the diversity of mangrove fauna species can support the attraction of mangrove tourism. Based on DKP data in 2014, the fauna utilizing mangrove forest ecosystems in the BJBR region were Cormorant (*Phalacrocorax sulcirostris*), Mangrove crab (*Scylla Serrata*), Small crab (*Portunus palagicus*), Uca crab (*Uca sp.*), Green shell (*Mytilus viridis*), oysters (*Crassostrea*). Mangrove Crab and Uca Crab are the symbioses of mutualism fauna in mangrove ecosystems because they have a role in recycling organic matter in the ecosystem. The parasitism fauna of the mangrove forest ecosystem is *Crassostera oyster*, which causes stunted growth of mangrove stems. Three priorities that need to be considered in the sequential ecological dimension are pollution, fauna and organism diversity, and habitat change (Figure 2).

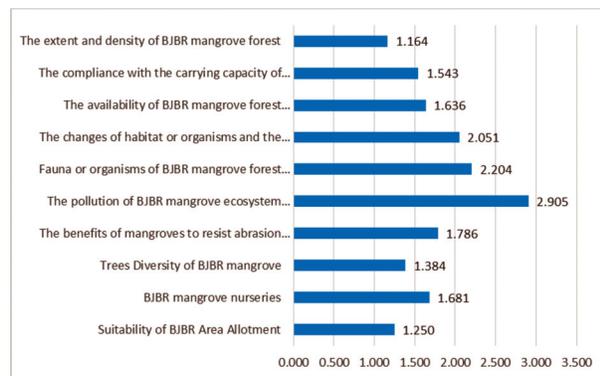


Fig. 2. Value of Ecological Leverage Dimension

The number of BJBR visitors impacts the income of ecotourism. The higher the number of visitors, the more contribution to PAD for Probolinggo Government in the form of user fees and taxes. BJBR is one of nine tourist attractions that produce high PAD. The BJBR location was established in compliance with the Zoning Plan of the Coastal Areas and Small Islands, which was a conservation area with restricted use as habitat and subsoil preservation of the fish population, tourism and recreational areas, research and development as well as education. The overall economic value of BJBR mangrove

ecotourism for a year worth Rp.117,989,488,729. Three priorities that need to be considered in a sequential economic dimension are the value of contributions, zoning, and economic evaluation of BJBR mangrove ecosystems (Figure 3).

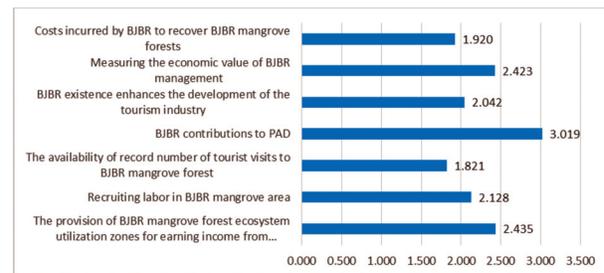


Fig. 3. Value of Economic Leverage Dimension

Tourist attractions are the primary motivation for tourists to make visits (Witt and Mountinho, 1994). Tourist attractions include natural, cultural, and man-made tourism (UNESCO, 2009). The diversity of tourist attractions offered by the BJBR ecotourism varies greatly. However, there was still a lack of educative tourist attractions, for example, mangrove ecosystem museums, smart mangrove houses, information on the functions and benefits of mangrove ecosystem sustainability, getting to know fauna, and mangrove organisms and other educational attractions. Mangrove Ecotourism BJBR offers an educational package for students who want to learn about the functions and benefits of mangroves.

Damage to the mangroves can be caused by population growth and strain, resulting in land-use change and the excessive use of natural resources (Yuliani and Nova, 2017). The density of visitors influences the ability to supervise visitors' activities, which can cause pollution or damage the environment of the mangrove ecosystem. The local culture of Probolinggo can be a tourist attraction for tourists. The development of BJBR involves the community and Probolinggo fishers in the form of nurseries, mangrove planting, BJBR ecotourism development, fishing boats rental, and fulfill the needs of fish in restaurants and snack vendors. Three priori-

ties that need to be considered in a sequential social dimension are educational facilities, destructive nature, and utilization of local culture (Figure 4).

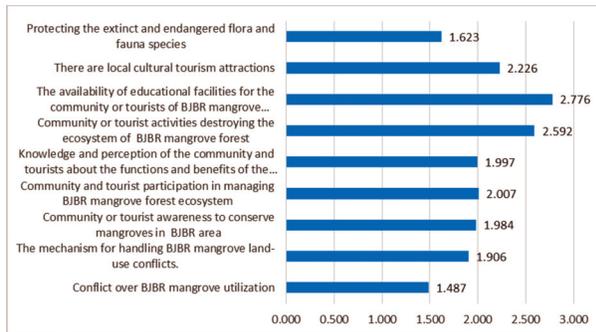


Fig. 4. Value of Social Dimension Leverage

Damage to the mangrove ecosystem occurs when human activity exceeds the environmental capacity to rehabilitate nature naturally and thus requires human interference (Akbar *et al.*, 2017). The implementation of law enforcement in Sidodadi Village had not been well implemented because there were still violations in the form of logging by farmers and surrounding communities (Mukhlisi *et al.*, 2014). The act of obedience and compliance with the applicable regulations should be able to promote ecological sustainability, and the use of mangroves should not exceed carrying capacity. Sanctions and law enforcement will help the community be mindful not to damage the mangrove ecosystem. Communication and coordination between relevant institutions support the sustainability of BJBR ecotourism management. Three priorities to be addressed in the legal and institutional dimensions are compliance with the law, strict sanctions, and communication and coordination between relevant institutions (Figure 5).

The development of BJBR mangrove ecotourism employs 100% of human labor to maintain

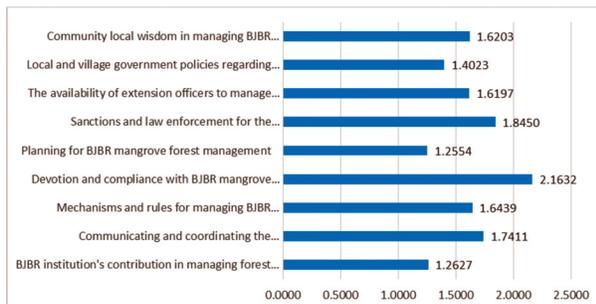


Fig. 5. Value of Leverage Dimensions of Legal and Institutional

sustainability. The bridge's raw material uses coconut wood, which is adapted to the path of a sustainable mangrove forest. There are various attractions in BJBR tourist sites, but safety is required to use the attractions. Management of liquid waste that flowed to the BJBR ecotourism estuary requires appropriate technology to minimize unpleasant odors and dirty water. It also involves the management of solid waste (rubbish). According to Husamah and Atok (2018), CMC is implementing a luggage checklist program that can trigger trash. When leaving tourist attractions, CMC is checked and matched with the initial list. If the garbage is left behind, a fine of Rp. 100,000 will be charged to the guests-per item. Three priorities that need to be considered in the technology dimension are attractions' safety, and liquid and solid waste management (Figure 6).

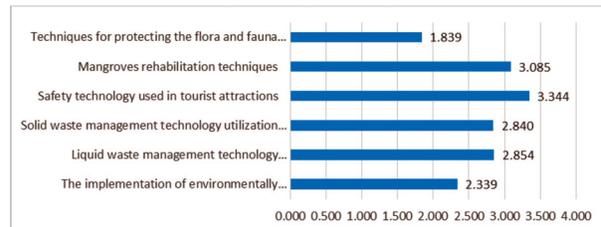


Fig. 6. Value of Leverage Technology Dimensions

Conclusion and Suggestions

BJBR's multidimensional management in Probolinggo results in an adequately sustainable status. Priorities that are considered for improving its sustainability are environmental pollution, economic contributions, educational facilities, legal awareness, and technological security. This study suggests that managers and government should work together to improve the quality of BJBR Probolinggo mangrove ecosystem management and development that considers ecological aspects.

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