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*(<sup>1,2</sup> Department of Public Administration, Faculty of Social and Political Sciences, Universitas Hang Tuah, Surabaya, Indonesia)*  
*(<sup>3</sup> Department of Oceanography, Faculty of Engineering and Marine Science, Universitas Hang Tuah, Surabaya, Indonesia)*

## Stakeholder Interaction in the Development of Oxygen Ecotourism on Gili Iyang Island, Indonesia

Moh. Musleh<sup>1</sup>, Agus Subianto<sup>2\*</sup>, Viv Djanat Prasita<sup>3</sup>

<sup>1,2</sup> Department of Public Administration, Faculty of Social and Political Sciences, Universitas Hang Tuah, Surabaya, Indonesia

<sup>3</sup> Department of Oceanography, Faculty of Engineering and Marine Science, Universitas Hang Tuah, Surabaya, Indonesia

\*Email Correspondence: agus.subianto@hangtuah.ac.id

### ABSTRACT

Oxygen Ecotourism on Gili Iyang Island has the highest oxygen levels reaching 21.5% above the normal threshold, the highest compared to other regions in Indonesia. This article adopts the collaborative viewpoint of the Quintuple Helix model, to discuss stakeholder interactions and highlight the level of success and identify several problems in the development of oxygen ecotourism on Gili Iyang Island, Sumenep Regency. This qualitative research uses a case study approach and visualizes collective interactions between stakeholders through the following five subsystems: 1) Education system, 2) Economic system, 3) Political system, 4) Media-based and culture-based society, 5) and Natural environment, Natural Environment Society based on the Quintuple Helix model from Carayannis and Campbell (2010). Data collection was carried out through observation, semi-structured interviews, and document review. The research results show that the Political System contributes to the initiation of ecotourism stakeholder collaboration, while an important role in the development of ecotourism has been played by the Higher Education System, as well as media-based and culture-based Societies. However, this collaboration is not yet optimal because it is still informal, and the lack of innovation from the Economic System, as well as the Natural Environment, and the Natural Environment of Society, is still limited. The findings of this research recommend that the role of local government (political system) needs to be increased by developing policies that ensure the maintenance of oxygen levels, increasing innovation in the use of local natural resources to support tourism, and institutionalizing stakeholder collaboration to ensure sustainable collaboration.

**Keywords:** Stakeholder interaction, ecotourism, small islands, Quintuple helix model

### ABSTRAK

Ekowisata Oksigen di Pulau Gili Iyang memiliki kadar oksigen tertinggi mencapai 21,5% di atas ambang batas normal, tertinggi dibandingkan wilayah lain di Indonesia. Artikel ini mengadopsi sudut pandang kolaborasi model Quintuple Helix, untuk membahas interaksi pemangku kepentingan dan menyoroti tingkat keberhasilan serta mengidentifikasi beberapa masalah dalam pengembangan ekowisata oksigen di Pulau Gili Iyang, Kabupaten Sumenep. Penelitian kualitatif ini menggunakan pendekatan studi kasus dan memvisualisasikan interaksi kolektif antara stakeholder melalui lima subsistem berikut: 1) Sistem pendidikan, 2) Sistem ekonomi, 3) Sistem politik, 4) Masyarakat berbasis media dan berbasis budaya, 5) dan Lingkungan alam, Lingkungan Alam Masyarakat berdasarkan model Quintuple Helix dari Carayannis dan Campbell (2010). Pengumpulan data dilakukan melalui observasi, wawancara semi terstruktur, dan telaah dokumen. Hasil penelitian menunjukkan bahwa Sistem Politik berkontribusi pada inisiasi kolaborasi pemangku kepentingan ekowisata, sementara peran penting dalam pengembangan ekowisata telah dimainkan oleh Sistem Pendidikan Tinggi, serta Masyarakat berbasis media dan berbasis budaya. Namun kolaborasi tersebut belum optimal

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karena masih bersifat informal, serta kurangnya inovasi dari Sistem Ekonomi, maupun Lingkungan Alam, dan Lingkungan Alam Masyarakat masih terbatas. Temuan penelitian ini merekomendasikan bahwa peran pemerintah daerah (Sistem politik) perlu ditingkatkan dengan mengembangkan kebijakan yang menjamin pemeliharaan kadar oksigen, meningkatkan inovasi dalam pemanfaatan sumber daya alam lokal untuk mendukung pariwisata, dan melembagakan kolaborasi pemangku kepentingan untuk memastikan kolaborasi yang berkelanjutan.

**Kata Kunci:** Interaksi pemangku kepentingan, ekowisata, pulau-pulau kecil, model quintuple helix

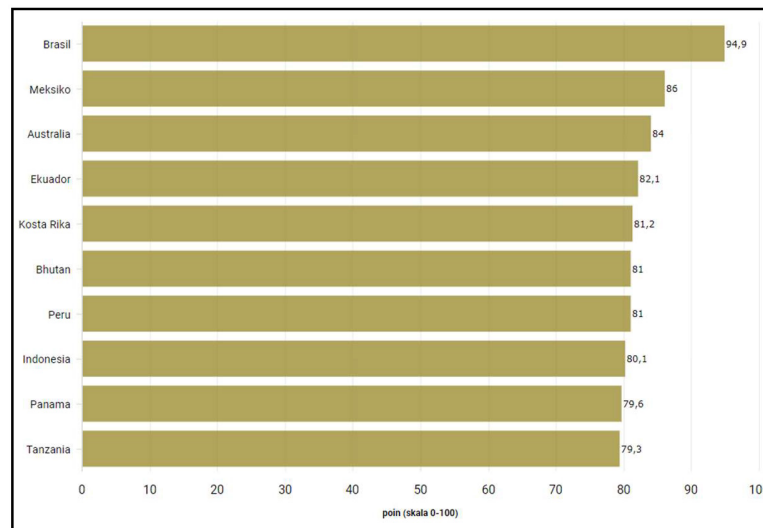
## INTRODUCTION

Tourism is an important thing for a country, its existence will grow economic businesses in the tourist area so that it can increase people's income (Kristianti & Bala, 2019). Ecotourism is related to nature and humans, therefore ecotourism is a combination of environmental conservation and development (Suhardono et al., 2023) to improve the welfare of local communities (Hijriati & Mardiana, 2015), maintain the local culture, and maintain demographic changes without violating human rights. Humans (Widiyanto et al., 2019). The main principles of ecotourism are nature-based activities, conservation, sustainability, ethical management, local orientation in terms of control, benefits, and scale, and environmental education (Kontogeorgopoulos, 2010). An important aspect in the development of ecotourism lies in its implementation in the local area because at the local level, it meets the interests of ecotourism service providers and tourist demands (Nugroho & Dahuri, 2012), so the involvement of stakeholders will result in a well-accepted tourism strategy plan, to avoid conflicts that arise during policy implementation and unite those who are directly and indirectly involved in tourism (Wanner & Pröbstl-Haider, 2019).

Ecotourism has the potential to be developed in the archipelago because traveling on islands with natural nuances can create positive thoughts (Habib Soleh, 2017). Forbes Advisor in 2023 conducted research measuring the Ecotourism Index in international tourist destination countries, to help tourists get the best ecotourism experience. This index is compiled from a number of assessment indicators, which include: 1) Number of animal and plant species; 2) Number of protected species; 3) Number of natural heritage sites registered with UNESCO; 4) CO<sub>2</sub> emissions per capita, and; 5) General environmental performance such as air quality (Nabilah Muhamad, 2023).

These various indicators are then accumulated into a score on a scale of 0-100. The higher the score, the better the quality of ecotourism in a country is considered. As a result, Brazil was ranked first as the country with the best ecotourism index in the world, with a score of 94.9 points, because it has a wealth of more than 43,000 animal and plant species. Meanwhile, Indonesia is in 8th position with 80.1 points, recorded as having the most protected animals, namely 209 species (Figure 1).





**Figure 1. Highest Ecotourism Index Score in the World**

**Source: Forbes Advisor (2023)**

Local wisdom, cultural heritage, and the geographically limited location of the island are an attraction for tourists (Canavan, 2013; Cheng et al., 2013). On the other hand, remote islands face challenges to sustainable tourism (Graci, 2013), poor connectivity, and transport capacity (Sitorus & Sitorus, 2017), inadequate infrastructure (Jannah & Idajati, 2018), and limited support for local attractions affect the level of tourist arrivals (Handayani et al., 2022). Ecotourism on the island requires risk management and waste management from the level of tourist arrivals (Jang et al., 2014; Mateu-Sbert et al., 2013; Sealey & Smith, 2014), and evaluates energy use and CO<sub>2</sub> emissions from the transportation, accommodation, and recreational activities in island tourism (Ng et al., 2017; Sánchez-Cañizares & Castillo-Canalejo, 2014) to prevent air pollution and maintain the balance of the sustainable island tourism industry (Becken et al., 2014; Hamzah & Hampton, 2013).

Research on ecotourism management on the island that examines the potential of natural and cultural resources in the development of ecotourism strategies was carried out by (Agius et al., 2021; Nurlaela & Warlina, 2013; Rudiastuti et al., 2018; Sofia & Baharuddin, 2017; Wardani et al., 2017). In addition, mapping and analysis of land suitability and area carrying capacity are important for ecotourism management on the island (Chand et al., 2015; Dashti et al., 2020; Lelloltery et al., 2016; Tanto et al., 2017). Therefore, ecotourism on the island emphasizes the importance of community participation in developing and maintaining social, economic, and environmental sustainability (D'hauteserre, 2016; Hariadi et al., 2022; Ismail & Habibah, 2020; Modestus Ziku, 2015; Ulumi & Syafar, 2021; Widiyanto et al., 2019).

Tourism has great potential, if managed by involving stakeholders, known as a multi-stakeholder model. Multi Stakeholder is a governance structure that seeks to unite stakeholders to participate in dialogue, decision making, and implementation of solutions to common problems or goals (Musleh et al., 2023), such as the Multi Stakeholder Triple helix model recommended for economic development, which includes three important factors designed by Etzkowitz and Leydesdorff (2000), focus on the relationship between universities, industry and government. Furthermore, in 2009 Carayannis and Campbell, (2009) developed the Triple Helix model into a Quadruple Helix model, by adding one important factor in the media and culture-based public perspective. In 2010 Carayannis and Campbell further developed the Quadruple Helix model into Quintuple Helix, by framing knowledge and innovation in the context of the natural environment, so that it can be interpreted that the Quintuple Helix model is an approach that is in line with sustainable development and social ecology.

Partnership and collaboration research is a trend approach in tourism management (Subianto & Kurniawan, 2021). Multi-stakeholder collaborative research on sustainable tourism from a penta helix perspective (Chamidah et al., 2020; Maturbongs & Lekatompessy, 2020; Naldi & Fatimah, 2019); Identify environmental problems based on the Quadruple Helix perspective (Abdullah et al., 2018); Development of penta helix-based tourism potential (Sulistiowati et al., 2020; Vani et al., 2020; Widowati & Larasati, 2021); and Quintuple Helix model innovation, solution to increase the resilience of tourism destinations (Perrain & Jean-pierre, 2021). The issue of ecotourism as part of a form of recreational tourism in small islands has received a lot of attention, including research on multi-stakeholder collaboration in the management of ecotourism on islands, such as research by Calzada and Arranz, (2017); Wibisono, Setiawati, Raka and Utomo (2020).

Gili Iyang Island, which is known as “Oxygen Island” in Sumenep Regency (Department of Tourism, Culture, Youth and Sports/DISPARBUDPORA, 2021), has the potential for clean air with high oxygen levels, cave, and beach attractions, residents aged over 100 years, as well as the local culture that has the potential to be developed into an ‘icon’ for island tourism in Sumenep Regency (Musleh, 2023). The presence of tourists is an opportunity to create new jobs for the community. However, there are concerns that the carrying capacity of the environment will decrease if tourism management is exploitative of natural resources (Zainuri et al., 2018) as well as community activities that have an impact on decreasing oxygen quality, such as an increase in the number of motorized vehicles by 43.80% for motorcycles (2011-2020), as well as pick-ups and three-wheeled motorized vehicles. In addition, in 2017 a Diesel Power Plant was built and 585 households used Generator/Diesel (BPS, 2021), thus potentially affecting the quality of oxygen levels.

The studies on multi-stakeholders in the development of ecotourism on islands and small islands in Spain and Indonesia, namely the research of Destiana, Kismartini, and Yuningsih, (2020) explores the role and relationship between stakeholders, that stakeholders act as policymakers, coordinators, facilitators, implementers, and accelerators. Values and communication are supporting factors in the development of tourist destinations, while trust and policies are inhibiting factors. Garcia and Cater's (2020) research examines the contribution of stakeholders in increasing maritime literacy empirically in marine ecotourism, that partnerships are less successful, due to limited knowledge of tourism dynamics, so the importance of a multi-stakeholder structure to design a marine literacy framework as a means to build the foundation and develop sustainable marine ecotourism partnership. The research of Yuliaty, Kurniasari, Triyanti, and Zulham, (2021) Multi-stakeholder collaboration is realized through cooperation with parties who have interests and power, as well as increasing the role of academics. The research of Hariadi, Subianto and Lubis (2022) analyzed the implementation of collaborative principles in the management of marine ecotourism on small islands that the quality of achieving common goals in marine ecotourism was not optimal. However, stakeholder interaction can take place because it is supported by enabling environmental factors, namely, the tourism actors are local communities. Ecotourism sustainability requires the institutionalization of collaboration, ethical management, form and scope of benefits as well as environmental and conservation education for local communities.

This study discusses the role played by stakeholders in developing oxygen ecotourism on small islands, and explores the interaction of five helixes: Higher Education Institutions or academics; entrepreneur/entrepreneur; government (Central, District, and Village), Regional House of Representatives (DPRD), media and culture-based communities, as well as natural and environmental resources on Gili Iyang Island, Dungkek District, Sumenep, East Java. The site selection took into account: (1) Gili Iyang Island, a small island that has the highest potential for oxygen levels in Indonesia, based on the results of research by LAPAN (2006) and BBTCLPP (2013); (2) This island, is one of the 126 islands in Sumenep which has the potential to be developed into an ecotourism "icon" in Kab. Sumenep and Indonesia; (3) On this island, there are 20 residents aged over 100 years (source: Interview with the Head of Banraas Village, and DISPARBUDPORA Sumenep Regency, 2022).

This study aims to investigate the roles played by stakeholders in managing sustainable oxygen ecotourism on Gili Iyang Island: first, the involvement of educational institutions and academics in the diffusion of knowledge; second, entrepreneurial activities and the presence of service providers; third, government policies; fourth, build destination branding and promote the value of local wisdom; fifth, utilization and preservation of natural resources and the environment. The important finding of this study is to prove the role of dominant stakeholders in five helix systems using the Quintuple Helix theory from Carayannis and Campbell (2010).



## RESEARCH METHODS

This study discusses the interactions and roles played by stakeholders collaboratively in the development of oxygen ecotourism on Gili Iyang Island, Dungkek District, Sumenep Regency, East Java. The location selection took into account: (1) Gili I Island, which is a small island that has the potential for the highest oxygen levels in Indonesia based on research results from LAPAN (2006) and BBTKLPP (2013); (2) This island is one of 126 islands in Sumenep which has the potential to be developed into an ecotourism “icon” in Sumenep Regency and Indonesia; (3) On this island there are 20 residents over 100 years old (source: Interview with the Head of Banraas Village, and DISPARBUDPORA Sumenep Regency, 2022).

This research uses qualitative methods, namely qualitative research studying something in its natural setting, to understand or interpret phenomena, in terms of what people say (Merriam, 2009), while the type of qualitative research in this research is a case study, in this case Sumenep Regency, Indonesia which aims to understand the complexity of social phenomena and real life events (Creswell & Poth, 2016). Primary data and secondary data were collected through observation, semi-structured interviews, and document review for six months (September 2021 to March 2022), complemented by field notes, archives, websites, and findings obtained from the author’s interpretation. Determining informants used a snowball sampling technique, meaning that statements from key informants were developed extensively to select people who were experts in their fields (Creswell & Creswell, 2017). These findings were analyzed in the five-step spiral model popularized by Creswell and Poth (2016) using the Quintuple Helix theory of Carayannis and Campbell (2010) as a theoretical basis, by visualizing collective interactions between stakeholders through the following five subsystems: 1) Education system, 2) Economic system, 3) Political system, 4) Media-based and culture-based society, 5) and Natural environment, Natural Environment of Society.

This research uses data and information from fifteen key informants and supporting informants, from the education system: academics; economic system: Micro, Small and Medium Enterprises (MSMEs), sea transportation entrepreneurs and odong-odong transportation entrepreneurs; political system: Head of the Tourism Service, Head of Banraas Village, Head of Bancamara Village, Member of the Gili Iyang DPRD, Head of the Transportation Service; Media-based and culture-based society: Chair of POKDARWIS Andang Taruna, Chair of GENPI Sumenep Regency.

## RESULTS AND DISCUSSION

### Sumenep and Gili Iyang Island

This Sumenep Regency, East Java Province, located on the eastern tip of Madura Island is a unique area, covering land and islands totaling 126 islands (48 inhabited islands, 78 uninhabited islands). Sumenep covers 27 sub-districts, and 332 villages/ward, with an area of 2,093.47 km<sup>2</sup> (BPS, 2021). Gili Iyang Island is one of 16 small islands east of Madura Island, administratively it belongs to Dungkek Sub-district, an island covering an area of ± 9 km<sup>2</sup> covering Banraas Village and Bancamara Village. Bancamara village has an area of 56.28% of Gili Island with a population reaching 56.86% of the island's population and the number of motorized vehicles reaching 66.12% of all motorized vehicles on the island. The increase in the number of motorized vehicles has the potential to affect the sustainability of oxygen levels as a natural resource, so it is necessary to innovate alternative land transportation that is environmentally friendly based on local potential (figure 2).

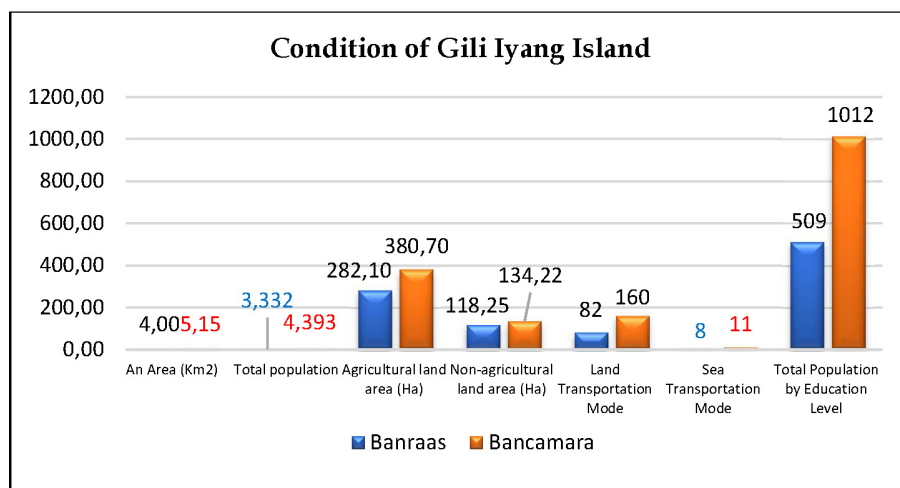


Figure 2. Graph of Gili Iyang Island condition in 2021

Source: BPS Dungkek District in Figures, (2021)

### Stakeholder Collaboration in the Development of Oxygen Ecotourism on Gili Iyang Island based on the Quintuple Helix model

The Quintuple Helix theory according to Carayannis and Campbell (2010) provides a guide for analyzing success and knowing the supporting and inhibiting factors in the process of Stakeholder Collaboration in the Development of Oxygen Ecotourism on Gili Iyang Island. Quintuple Helix visualizes collective interaction and knowledge exchange of sustainable development in oxygen ecotourism on Gili Iyang Island through five helix systems, namely: 1) Higher Education System: In this helix, 'human capital' is needed

from academics and higher education institutions (universities) in an area that are directly involved in the diffusion and research of knowledge in the development process of Gili Iyang Island; 2) Economic System: as the second subsystem, consists of industry, service companies and banking. This helix concentrates and focuses on entrepreneurial activities, as well as providing services to facilitate tourists on Gili Iyang Island oxygen ecotourism; 3) Political System: as the third subsystem, in which there are stakeholders from the central government, regional government, and village government who have a very important role, because they have the political and legal capital to formulate a policy for developing oxygen ecotourism on Gili Iyang Island, and regulate as well as managing general conditions on Gili Iyang Island; 4) Media-based and Culture-based Public: The fourth subsystem, has an important contribution in developing ecotourism on Gili Iyang Island, through culture-based society, for example traditions and local wisdom which are made into a tourist attraction to attract tourists, then promoted through the media public-based to build Destination Branding for oxygen ecotourism on Gili Iyang Island so that it is easy for tourists to remember; 5) Natural Environment and Community Natural Environment: as the fifth subsystem, is crucial for the sustainable development of natural resources and preservation of the natural environment in oxygen ecotourism on Gili Iyang Island.

## **Education System**

### *Knowledge Diffusion Process*

The level of awareness of the local community on Gili Iyang Island is still relatively low, they still think that tourism activities will only damage the cultural values and local wisdom on Gili Iyang Island, and feel disturbed by the presence of foreign tourists visiting, this is because the local community on Gili Iyang Island still holding tight to local culture and still strong with eastern culture. If this is not changed immediately, it is feared that it will have an impact on the sustainability of ecotourism on Gili Iyang Island.

The academic world is considered to have an important role in advancing tourism. The role of academics as one of the stakeholders participating in the Ecotourism Management Collaboration on Gili Iyang Island, Sumenep Regency is expected to be able to change the mindset of local communities and provide understanding to tourism actors that developing ecotourism on Gili Iyang Island will have a positive impact on the welfare of local communities on Gili Iyang Island.

Human resources are an important factor in tourism development, both in terms of capacity and quality. The education of the population of Gili Iyang Island at the Senior High School (SLTA) to Bachelor level reached 629 people or 8.14% of the total island population with formal education (BPS, 2021). The involvement of universities and academics in the knowledge diffusion process such as research, outreach, and community service has an impact on the management of oxygen ecotourism (Table 1), as the research

findings of Yuliaty, Kurniasari, Triyanti, and Zulham (2021) show that multi- Stakeholder interaction is realized through collaboration with interested parties and power, as well as the increasing role of academics.

**Table 1. Data on the Diffusion of Science from Higher Education Academics**

No	SDM/Year	Institution/ University	Activity Form	Forms of Diffusion of Knowledge	Impact
1	Academic 2018-2020	Institut Teknologi Sepuluh Nopember/ITS; Universitas Hang Tuah/UHT dan Universitas Trunojoyo Madura/UTM	Research	The concept of an integrated island tourism development strategy (Gili Iyang, Gili Labak, and Gili Genting); Community Based Tourism Management Studies and community assistance to participate in tourism; conduct Oceanographic Parameter Analysis for Coastal Tourism Development	24.14% increase in tourist visits (2017- 2018); Establishment of 5 homestays/tourist lodges; Increasing the number of POKDARWIS members and increasing public awareness of cleanliness and the environment; Availability of a tourist safety guide pocket
2	Academic 2021	Universitas Muhammadiyah Malang/UMM	Devotion to Public	Carrying out ecotourism development in the New Normal Era	Improving the infrastructure to support branding on Youtube and Instagram

*Source: Processed by the Author from Various Sources, 2022*

## Economic System

### *Existence of Entrepreneurial Activities*

One way to improve the welfare of the community around tourist attractions is by mobilizing the micro and medium enterprise (MSME) sector to support tourism itself. MSMEs are one of the stakeholders who play a very important role in the development of tourism. The existence of entrepreneurial activities at tourist attractions is a supporting facility for the tourist attraction itself, such as the characteristics of an area that are often sought after by tourists in general are provided by these MSMEs.

The existence of entrepreneurial activities in Gili Iyang Island Ecotourism is still small, the number of MSMEs in Gili Iyang Island Ecotourism is still small, they are still unable to support Ecotourism activities on Gili Iyang Island, this is because the MSME Mindset in Gili Iyang Island Ecotourism is still not developed, they still use selling methods, a product that is general, does not have its own uniqueness, so that until now there have been no MSMEs that focus on creating creative economic products by utilizing the natural resources they have to process them and make them into products that have higher economic value (Table 2).

**Table 2. Entrepreneurial Roles and Activities on Gili Iyang Island**

No	Since	Name of MSME	Contribution
1.	2016	Rumah Makan Puma	Providing various typical Sumenep food menus for tourists visiting Gili Iyang Island Ecotourism
2.	2012	Toko Klontong Barokah	Providing various basic needs for tourists who stay for several days at Gili Iyang Island Ecotourism
3.	2009	Warung Jukok Tasek	Providing various kinds of fish produced by fishermen as souvenirs for tourists visiting Gili Iyang Island Ecotourism

*Source: Processed by the Author from Various Sources, 2022*

The role of MSMEs in the collaborative management of Gili Iyang Island Ecotourism is still not optimal, because they still use the old mindset, only selling raw goods, MSMEs should be able to innovate by utilizing the natural resources they have to manage them into products that have higher value, such as making souvenirs and handicrafts which



can later be used as typical souvenirs for tourists visiting Gili Yang Island Ecotourism. The role and support of academics is very necessary in this case, because academics who are agents of change are expected to be able to provide solutions as well as train and change the mindset of MSMEs in Gili Iyang Ecotourism to be more innovative in entrepreneurship.

Economic activity, especially among local community entrepreneurs in the form of Micro Small Medium Enterprises (MSMEs) including home industries in the last three years (2018-2020) has increased. As for community activities in the economic sector (2018-2020), small industries are only found in Banraas Village, with an increase of 1.5%, home industry in Banraas Village, an increase of 46.13%, and an increase of 38.68% in Bancamara Village (BPS, 2021). This sector produces various processed marine fish, traditional foods, and basic needs for tourists and the community, but according to the Chair of POKDARWIS that product innovation is still limited, as research findings by Garcia and Cater, (2020) that partnerships are less successful, due to lack of knowledge about tourism dynamics.

#### *Existence of Service Providers*

Tourist transportation is an important part of meeting tourist needs, every tourist activity of course requires land transportation and sea transportation, to support tourists' journey to the tourist attraction they want to go to. The role of the private sector as one of the stakeholders in the management of Gili Iyang Island ecotourism is very important and its role is really needed, where the private sector is the only provider of sea transportation to access travel to Gili Iyang Island Ecotourism.

To arrive at Gili Iyang Island Ecotourism, tourists must use a boat that is available at Dungkek Harbor. The travel time that must be taken from Dungkek Harbor to Gili Iyang Island Ecotourism is approximately 30 - 45 minutes depending on weather conditions, and can dock directly at the existing pier in Banraas Village and the pier in Bancamara Village. After tourists arrive at Gili Iyang Island Ecotourism, there are "odong-odong" service providers, which are three-wheeled means of transportation or often known generally as "Dorkas motorbikes", which can be rented by tourists to surround and enjoy Gili Iyang Island Ecotourism, service providers These odong-odong can be found in the area near the pier in Banraas Village and Bancamara Village where they usually wait for tourists to get off the boat (Table 3).

**Table 3. Sea and Land Transportation Services on Oxygen Ecotourism on Gili Iyang Island**

No	Service Provider	Rental rate	Contribution	Disadvantages
1	Sea Transportation Entrepreneur at Dungkek Pier	1 person Rp. 15,000; 1 boat 24 hours Rp. 600,000 (morning hours 5-7, noon 11-12)	Providing crossing transportation services to Gili Iyang Island Ecotourism	1. Ship crossing schedule from Dungkek Harbor to Gili I Island which is still limited 2. There are no security facilities, such as life jackets
2	Local Transport Entrepreneur in Odong-odong	Rp. 50.000 (4-5 persons)	Provide transportation facilities to visit several tourist destinations on Gili Iyang Island	1. The number of ship passengers is limited 2. Transportation is not environmentally friendly because it causes air pollution, so it affects the quality of oxygen levels on Gili Iyang Island
3	BUMDes Banraas	Rp 5.000/6 hrs	Provide alternative local transportation: Mountain Bike	1. The number of available mountain bikes is still limited

*Source: Processed by the Author from Various Aources, 2022*

Sea transportation services have not met the safety and comfort standards of sailing, because they have not provided a life jacket. The schedule for ferry boats, especially general passenger ships, is still limited, so tourists must rent a special boat if returning from the island exceeds the schedule for general passenger ships. Tourist activities on the island use local transportation: Odong-odong (three-wheeled transportation or Dorkas motor), but it is not yet environmentally friendly, so it has the potential to affect the quality of oxygen levels.

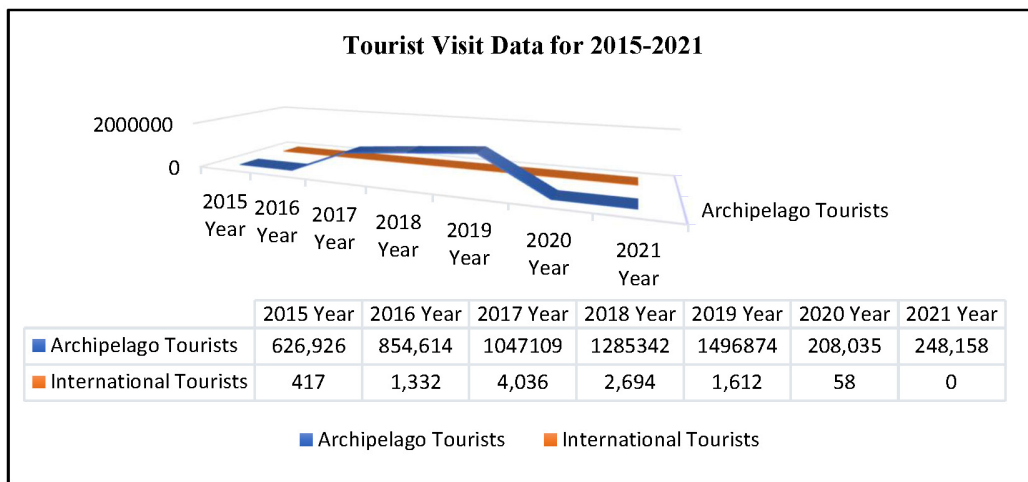
## **Political System**

### *Government Policy*

The government is one of the stakeholders in the management of the tourism sector. The government also has a function as a maker of various policies regarding tourism in a region and plays a role in m increasing foreign exchange and local income through the

tourism sector. The regional government, in this case the “Department of Tourism, Culture, Youth and Sports”, which oversees the tourism sector, is expected to have a role in providing tourism or in the region by developing attractiveness and other tourism suggestions.

In 2017, Sumenep was designated as one of the national tourism development areas. In 2015-2019 the number of domestic tourist visits increased by 58.12%, while foreign tourists increased by 83.67% (2015-2017). The increase in tourists is supported by the development of tourist destinations, there are 29 tourist destinations including island tourism, natural tourism, artificial tourism, marine tourism, culinary tourism, historical tourism, and religious tourism. However, the Covid-19 pandemic has had an impact on tourist visits. The tourist visit rate decreased to 83.42% (2019-2021) and foreign tourists decreased to 96.40% (figure 3).



**Figure 3. Tourist Visits in Sumenep Regency 2015-2021**

**Source: DISPARBUDPORA**

The district government establishes a detailed Spatial Planning (RDTR) policy and the Gili Iyang Island Strategic Area Zoning Regulation as one of the integrated tourism areas. Based on the Sumenep Regency Tourism Development Master Plan (RIPPARKAB) 2016-2030, the main priority for developing Gili Iyang Island tourism as a leading natural tourism destination for Sumenep Regency. DISPARBUDPORA Sumenep Regency has a pilot project to develop Gili Iyang Island as a health tourism destination that has been equipped with various infrastructure facilities by the central, provincial, district, and village governments (table 4), as research findings by Yuliaty, Kurniasari, Triyanti, and Zulham, (2021) show that interaction multi-stakeholder is realized through cooperation with parties who have interests and power as well as increasing the role of academics.

Table 4. Role of Government Policy in Gili Iyang Island 2014-2021

No.	Year	Collaboration Actor		Roles and Policies	Impact
1	2014	Government Center	Suramadu Regional Management Agency (BPWS)	Assistance for paving road infrastructure development around the island	Improving the comfort of tourists and the public
2	2017		BPWS	Construction of a tourist lodge in Banraas Village	Increasing the facilities to stay for tourists
3	2019	Provincial Government	East Java Provincial Government	Grant assistance for the construction of the pier at Dungkek Harbor and on the island of Gili Iyang Rp. 60 billion	Streamlining loading and unloading of goods and passengers
4	2016	District Government	DISPARBUDPORA, Sumenep Regency	Making RDTR and Zoning Regulations for the Strategic Area of Gili Iyang Island for the 2016 fiscal year	integrated island tourism development
5	2019			Gili Iyang Island which is designated as one of the integrated tourism areas Development of the 'Batu Canggih' tourist destination Improved facilities for tourists	Increasing alternative tourist destinations
4	2020			Determination and Guidance of POKDARWIS	Increase island tourism management capacity
5	2020	Village Government	Banraas Village Government	'Andang Taruna' Maintenance of attractions Mentoring with	Improving the professionalism of tourism

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			POKDARWIS Establishment of Village Owned Enterprises (BUMDes Banraas)	destination development
6	2021	Banraas and Bancamara Village Government	The collaboration between the Village Heads of Banraas and Bancamara establishes an Inter-Village Owned Enterprise (BUMADes)	Integrated tourism development

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**Source: Processed by the Author from Various Sources (2022)**

### **Media-based and Culture-based Society**

#### *Building Destination Branding*

Destination Branding is an identity that makes a destination can be identified differently by providing a different perception from other destinations. The potential for natural beauty, oxygen levels, and local culture are used to build Destination Branding so that Gili Iyang Island is increasingly known. The development of Gili Iyang Island as oxygen tourism began in 2011, was initiated by the Head of Banraas Village through a socialization approach to the community, and a Tourism Awareness Group was formed (POKDARWIS "Andang Taruna"). In 2016 POKDARWIS was established as a legal entity so that it could carry out wider activities (table 4) and POKDARWIS carried out Destination Branding by creating another name for Gili Iyang Island, namely "Oxygen Island", based on the potential for quality oxygen levels above the normal 20% threshold owned Gili Iyang Island, compared to other islands or regions in Indonesia (Lapan, 2006).

Gili Iyang Island is also known as the "Ageless Island" because there are many residents aged over 90-100 years. This is supported by high oxygen levels so it affects the high life expectancy of humans. The mention of "Oxygen Island", the island that has the highest oxygen content in Indonesia, even second after the Dead Sea in Jordan (Lapan, 2006), is a potential branding to be promoted to attract tourists. Health issues are important because tourists are not only traveling but also traveling, breathe clean air with high oxygen content (table 5).



**Table 5. Roles of POKDARWIS and GENPI in Developing Destination Branding**

No	Stakeholders	Roles
1	POKDARWIS Andang Taruna	<ol style="list-style-type: none"> <li>1. Developing Destination Branding Gili Iyang Island: Oxygen Island and Ageless Island</li> <li>2. Creating the O2 Logo for Gili Iyang Island Ecotourism</li> <li>3. Create a promotional website <a href="https://pariwisataduniagiliyang.blogspot.com">https://pariwisataduniagiliyang.blogspot.com</a></li> <li>4. Create a social media account for Gili Iyang Island Ecotourism on Instagram @giliyang.o2_official as a promotional platform</li> </ol>
2	GENPI Sumenep Regency	<ol style="list-style-type: none"> <li>1. Documenting the potential of the island: unique photos and videos for promotion on Instagram</li> <li>2. Conduct promotional activities and offer tour packages on the Instagram account @genpimadura</li> <li>3. Including Gili Iyang Island Ecotourism as a must-visit package of selected tourist destinations</li> </ol>

**Source: Processed by the Author from Various Sources (2022)**

#### *Promoting Local Wisdom Values*

Gili Iyang Island holds a lot of interesting local wisdom and is still preserved today. The Andang Taruna Tourism Awareness Group (POKDARWIS) has an important role in sustaining the local wisdom values of Gili Iyang Island Ecotourism. POKDARWIS Andang Taruna has the aim of turning local wisdom values into tourist attractions that can be offered to attract the attention of tourists to visit Giliyang Island Ecotourism.

This goal is motivated by the concern of Mr. Akhyak as Chair of POKDARWIS Andang Taruna towards the sustainability of tourism on Gili Iyang Island in the future, this is because so far Gili Iyang Island Ecotourism is famous for the quality of its oxygen levels, but oxygen can only be felt by inhaling it, and cannot be seen. directly by tourists when visiting Gili Iyang Island, therefore POKDARWIS Andang Taruna took the initiative to utilize the local wisdom values on Gili Iyang Island to become a supporting tourist attraction and additional facilities for visitors. tourists visiting Gili Iyang Island Ecotourism. The potential of local wisdom can strengthen local cultural identity, so that POKDARWIS preserves and promotes various traditional cultures to support oxygen ecotourism (table 6).

**Table 6. The Role of POKDARWIS in Promoting the Value of Local Wisdom**

No	Stakeholders	Roles
1.	POKDARWIS "Andang Taruna"	<ol style="list-style-type: none"> <li>1. Promote local wisdom-based tourist attractions:</li> <li>2. Traditional martial arts "Mancak Saramaan" or "Mancak Silat" typical of Gili Iyang Island</li> <li>3. Culture of "Penganten Jaran Serak" or "Horse Bride"</li> <li>4. "Gebey" traditional arisan becomes a tourist attraction (traditional arisan within the family scope, arisan is not only money but can be in the form of necessities)</li> <li>5. The traditional culture of Sumenep Regency "Ludruk or Ketoprak"</li> </ol>

**Source: Processed by the Author of the Indonesian Tourism Village Association (Asidewi) Sumenep, 2022**

### **Natural Environment and Community Natural Environment**

#### *Natural Resources*

Gili Iyang Island has the potential for natural resources, including high oxygen levels, so it has been named the island in Indonesia with the second highest oxygen content in the world after the Dead Sea in Jordan (Lapan, 2006). In addition, the local wisdom and natural resources of a small island surrounded by sea views, are able to support the health level of the population to reach a high age and keep a person young. Research by the National Institute of Aeronautics and Space (LAPAN) on Gili Iyang Island, in 2006 on oxygen levels to be developed into a health tourism destination. Measurements were carried out at 17 sample points in Banraas and Bancamara Village. The measurement results show oxygen levels of 20.9% and in 2013 BBTCLPP Surabaya City conducted a review of environmental quality on Gili Iyang Island by taking and measuring environmental samples in the form of clean water, ambient air, and oxygen levels. BBTCLPP Surabaya City also conducted a study with samples on Gili Ketapang Island, Probolinggo Regency, and Madura Island with a comparison of the results of measuring oxygen levels on Gili Iyang Island (Table 7).

**Table 7. Comparison of Average Oxygen Levels on Madura Island and its Surroundings**

No	Location	Oxygen Level (%)
A	Gili Iyang Island& its surroundings	
1	Banraas Village, Gili Iyang Island	21.5
2	Bancamara Village, Gili Iyang Island	20.9
3	Dungkek Pier, Lapak Lauk village, Dungkek District, Sumenep Regency	19.6
4	Talang Tourism Beach, Karang Siring village, Larangan District, Pamekasan Regency	20.5
5	Camplong Beach, Tambaan village, Camplong District, Sampang Regency	20.1
6	Geger Forest Area, Geger village, Blega District, Bangkalan Regency	20.4
B	Nongko Jajar, Pasuruan Regency	
1	In front of Poskesdes Krajan Hamlet, Tlogosari village, Tuttur District	20.9
C	Gili Ketapang Island	
1	The front yard of the Gili Ketapang sub-health center in Ghozali Hamlet, Gili Ketapang Village, Sumber Asih District	20.9
D	Measurement Results LAPAN 2006	20.9

**Source: Processed by the Author from Various Sources (2022)**

The results of research from LAPAN in 2006 showed that oxygen levels were 20.9%, while the results of a review of the Surabaya City BBTKLPP in 2013, actually showed oxygen levels in Gili Iyang Island Ecotourism increased to 21.5%. However, in 2019 the Covid-19 pandemic era 19 the use of firewood for cooking in Banraas Village increased by 85.80% and 88.74% in Bancamara Village (BPS Dungkek District in Figures 2019-2021), so environmental education and conservation are needed for local communities to maintain oxygen levels in island ecotourism. Gili Iyang is sustainable, as the findings of research by Hariadi, Subianto, and Lubis (2022) that the need for environmental education and conservation for local communities to ensure the sustainability of ecotourism.

#### *Natural Environment Conservation*

Stakeholder collaboration in preserving the natural environment on Gili Iyang Island Ecotourism is still not optimal, seriousness in carrying out environmental preservation is only shown by academic stakeholders, efforts made by academics are by conducting

outreach and providing understanding to local communities about the importance of protecting the surrounding environment, because However, those who carry out activities there every day are local people, so changing the mindset of local people is very important to be able to realize the preservation of the natural environment on Gili Iyang Island.

The sustainability of the natural environment and oxygen levels on Gili Iyang Island Ecotourism can be influenced by various factors, and one of the most influential factors is the daily lifestyle of local people on Gili Iyang Island, such as the fuel used for cooking, using generators as a source of lighting, the increasing livestock population, and the increasing use of land transportation such as motorbikes and dorcas, which can cause exhaust emissions which can pollute the air and the quality of oxygen levels on Gili Iyang Island (Table 8).

**Table 8. Development of Livestock Population on Gili Iyang Island in 2018 – 2020**

No.	Types of Farm Animals	Banraas Village			Bancamara Village			Number
		2018	2019	2020	2018	2019	2020	
1	Cattle	1.465	2.445	1.032	1.582	2.562	1.293	2.325
2	Horse	1	1	1	-	-	-	1
3	Goat	223	519	202	212	712	282	484
4	Sheep	-	21	21	-	12	12	33
Number of Farm Animals		1.698	2.986	1.256	1.794	3.286	1.587	2.843

**Source: BPS Dungkek District in Numbers, 2019, 2020, 2021**

This research has implications for further researchers to further develop research in the field of institutions, especially related to traditional institutions in preserving local wisdom and the potential of oxygen natural resources. Future researchers can examine more deeply the role of traditional institutions and local values related to the use of local resources, to better understand the role of traditional institutions in ensuring the sustainability of oxygen ecotourism potential on small islands.

#### **Analysis of Stakeholder Collaboration in the Research of Destiana, Kismartini, & Yuningsih, (2020); Garcia & Cater, (2020); Yuliaty, Kurniasari, Triyanti & Zulham, (2021)**

The success of stakeholder interaction on oxygen ecotourism on Gili Iyang Island using the Quintuple helix model from Carayannis and Campbell (2010), is supported by political system factors: the role of the village government, that the initiation of tourism development is carried out by the village head; higher education system factors in the form of the

process of knowledge diffusion in local communities; Media-based and culture-based public factors play a role in building destination branding and promoting local wisdom. The findings of this study support the results of research by Yuliaty, Kurniasari, Triyanti and Zulham, (2021) using the multi-stakeholder Penta Helix Theory from Calzada and Arranz (2017) with the MACTOR approach, that the supporting factors for the development of tourist destinations are dominated by the government: service, field extension, community and values and communication; and supports the research results of Destiana, Kismartini, and Yuningsih, (2020) using the Penta Helix Theory from Arif Yahya (2016) that stakeholders act as policymakers, coordinators, facilitators, implementers, and accelerators.

This study also reveals that stakeholder interaction is not optimal because it is informal, so the role of local governments needs to be increased through policy making that ensures sustainable stakeholder interaction, as the results of research by Garcia and Cater (2020) that the importance of a multi-stakeholder structure to build the foundation and develop ecotourism sustainable. The inhibiting factor for the development of oxygen ecotourism is the economic system factor, namely the lack of innovation in utilizing the potential of local natural resources. The findings of this study support the results of Calzada and Arranz (2017) research using the Penta Helix Multi-stakeholder Interdependencies Model Theory from Calzada (2019) that the policy of developing tourist destinations through innovation has a positive impact on local economic income. In addition, the results of Destiana, Kismartini, and Yuningsih's (2020) research using the Penta Helix Theory from Arif Yahya (2016) also revealed that the inhibiting factor for the interaction process was the absence of trust and policy; as the results of Garcia and Cater's (2020) research using the Elaboration of Penta Theory Helix of Bjork (2015); Calzada (2019); Putra (2019) that interaction is less effective, due to the limited knowledge transfer system, so it is necessary to change the mindset, as the research findings of Hariadi, Subianto, Lubis (2022) that the need for environmental education and conservation for local communities to ensure the sustainability of ecotourism.

## CONCLUSION

Gili Iyang Island ecotourism activities involve five helix systems, namely Higher Education System, Economic System, Political System, Media-based and Culture-based Public, and Natural Environment, the natural environment of society. The parties involved in the interaction play a role according to their capacity, although not optimally. This study reveals that the supporting factors include: Political System, that the initiation of collaboration comes from the Village Government, namely the village head factor, while the Higher Education System plays a role in the process of knowledge diffusion to improve tourism human resources. Promote the value of local wisdom. The inhibiting factor is the



Economic System, namely the lack of innovation in utilizing local natural resources, Natural Environment, Natural Environment of Society show the potential for air pollution originating from the increasing number of motorized vehicles. In addition, the role of the local government is still not optimal, which is still informal. We suggest that the development of oxygen ecotourism on Gili Iyang Island needs the support of local government policies that ensure the preservation of the potential of natural resources and the environment related to environmentally friendly local transportation alternatives and institutionalize existing stakeholder interactions sustainably. The contribution of this study provides evidence that in the analysis of the interaction of stakeholders in oxygen ecotourism in small islands, it is necessary to pay attention to environmental factors and innovation as a system, to ensure the existence of oxygen levels as the main asset of ecotourism.

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