



## Investment Feasibility of Ecotourism Development in Small Island

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### ABSTRACT

The small islands have unique natural conditions, although they are surrounded and isolated by the sea, their natural environment is well preserved and offers interest views. Ecotourism is one of the activities to utilize ecosystem services of small islands. The study aimed to evaluate the suitability of tourism and assess the feasibility of investing in ecotourism development using the Tourism Suitability Index (TSI) and the Small Island Investment Index (SII). The research location is on Saor Island, one of the small islands in Madura Island. The results showed that Saobi Island is suitable for diving and snorkelling tourism ( $2.0 \leq TSI < 2.5$ ). Infrastructure conditions, governance, socio-culture make Saobi Island a suitability investment place for tourism investment (SII = 3.70). Saobi Island policies to support small island ecotourism investments are improving the quality of accessibility, land ownership, availability of infrastructure, reinventing local traditions and improved the quality of human resources.

**Keywords:** Ecotourism, Saor island, Small island investment

### ABSTRAK

Pulau-pulau kecil memiliki kondisi alam yang unik, meskipun dikelilingi dan diisolasi oleh laut, namun lingkungan alamnya tetap terjaga dengan baik dan menawarkan pemandangan yang menarik. Ekowisata merupakan salah satu kegiatan pemanfaatan jasa ekosistem di pulau-pulau kecil. Ekowisata bukan hanya tentang lanskap dan jasa ekosistem, tetapi lebih dari itu. Berdasarkan fakta tersebut, maka tujuan penelitian ini adalah mengevaluasi kesesuaian pariwisata dan menilai kelayakan investasi dalam pengembangan ekowisata dengan menggunakan Indeks Kesesuaian Wisata (TSI) dan Indeks Investasi Pulau Kecil (SII). Lokasi penelitian berada di Pulau Saor, salah satu pulau kecil di Pulau Madura. Hasil penelitian menunjukkan bahwa Pulau Saobi sesuai untuk wisata selam dan snorkelling ( $2,0 \leq TSI < 2,5$ ). Kondisi infrastruktur, tata kelola, sosial budaya menjadikan Pulau Saobi sebagai tempat investasi yang layak untuk investasi pariwisata (SII = 3,70). Arah kebijakan untuk pengembangan ekowisata berupa peningkatan kualitas aksesibilitas, kepemilikan tanah, ketersediaan infrastruktur, penemuan kembali tradisi lokal dan peningkatan kualitas sumber daya manusia.

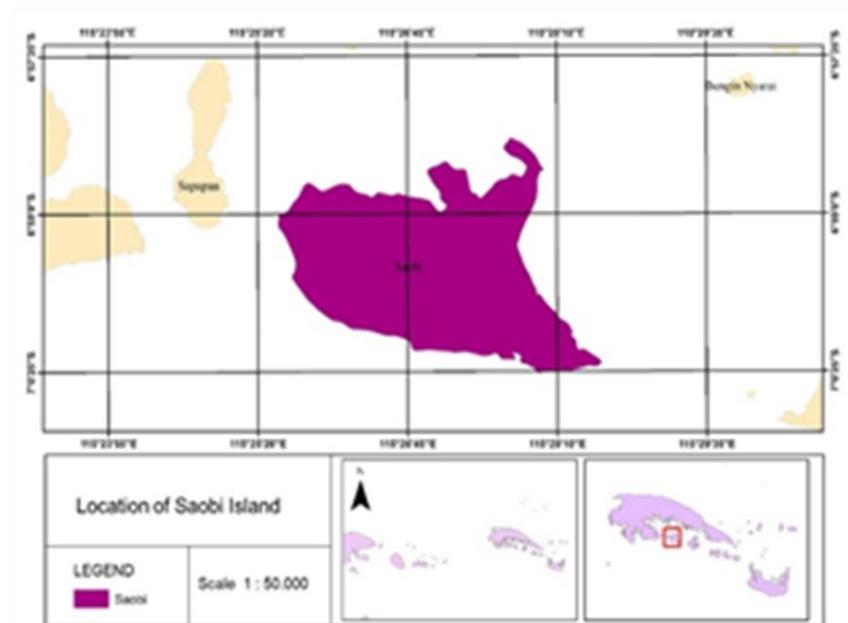
**Kata kunci:** Ekowisata, Pulau saor, Investasi pulau kecil

### 1. Introduction

Island is mass land naturally formed, surrounded by water and always / appeared above the surface of the high tide, has an area less than or equal to 10,000 km<sup>2</sup>, has a population around 500 to 200,000 people (Marine and Fisheries Ministry of Indonesia, 2001). For island-based conservation, a small island with a size less than 2000 km<sup>2</sup>, recommendable population around 20,000 people. A small island

has characteristics as follows: smallness, even isolation, remoteness, sensitive and vulnerable to external influence, low terrestrial biodiversity, water scarcity, high marine biodiversity, limited resources, poor provision of services and infrastructure that have low economic attractiveness (Poirine, 2014).

As an entity with characteristics and vulnerabilities specifically, the development of small islands requires a different format with



**Figure 1.** Location of Saobi Island

mainland. Bengen et al (2006) describe two sustainable activities on small islands are fisheries and ecotourism. Beyond all limitations, small islands have ecosystem services as special environmental attributes with high landscape value, exotic wildlife, and distinctive culture. For small islands, tourism development is seen as driving economic growth through use ecosystem services as a potential tourist attraction (Scheyvens & Momsen, 2008; Shareef & McAleer, 2005).

Ecosystem Services (ES) refers to all goods and services and processes that occur in ecosystems to meet human life needs. (Costanza et al., 2014; Braat and De Groot, 2012;). Furthermore, ecosystem services have close links with tourism on the small island. In another hand, sustainable tourism aims to meet all needs of tourists (eg infrastructure, beauty and natural perception of recreational sites), without compromising environmental conditions, and the needs of local residents (Simpson, 2008). Through this statement, it can be said sustainable small island development need integration of two components - biophysical, including the environment, environmental services, infrastructure, too socio-economic, which has an impact on changes in the perception and quality of life of the local community. Each has a natural limit in its which ecotourism should operate; beyond this natural limit indicates unplanned development and directed to environmental degradation or social conflict (Wong, 1998).

Based on small island conditions and tourism development needs, this study aims ware to evaluated tourism suitability, and assess investment feasibility of tourism.

## 2. Materials and methods

### 2.1. Study site

Saobi island is one of small island in Kangean Archipleago with an area of 430 ha. Located at  $6^{\circ} 59' 3.03'' - 7^{\circ} 00' 25.83''$  S dan  $115^{\circ} 26' 45.59'' - 115^{\circ} 28' 35.25''$  E (Figure 1).

### 2.2 Sources of data

We assembled quantitative data from primary and secondary literature to assess (i) marine biodiversity; (ii) weather and oceanographic conditions; and (iii) water resources and distribution. Qualitative information from personal observations.

### 2.3. Data analysis

#### Tourism suitability

We used data from marine biodiversity (coral reef, beach), oceanographic conditions (current speed, bathymetry; salinity, temperature). Using tourism suitability matrix from Yulianda (2019), we assess tourism suitability for dive tourism and snorkeling tourism. Algoritma used as follows:

$$\text{Dive tourism} = \text{CoC} (0.375 \times \text{score}) + \text{WaB} (0.15 \times \text{score}) + \text{CoD} (0.15 \times \text{score}) + \text{LiF} (0.135$$

**Table 1.** Category of Tourism Suitability Index

TSI	Category
$TSI \geq 2,5$	Very suitable
$2,0 \leq TSI < 2,5$	Suitable
$1 \leq TSI < 2,0$	Not suitable
$TSI < 1$	Very not suitable

$x \text{ score}) + CoF (0.12 \times \text{score}) + CuW (0.07 \times \text{score})$

$Snorkeling \text{ tourism} = CoC (0.375 \times \text{score}) + WaB (0.10 \times \text{score}) + CoW (0.10 \times \text{score}) + LiF (0.145 \times \text{score}) + CoF (0.14 \times \text{score}) + CuW (0.07 \times \text{score}) + CrW (0.07 \times \text{score})$

Where: CoC is coral coverage; CoF is coral fish; WaB is water brightness; CuW is current; CoD is coral depth; CrW is coral width; LiF is lifeform.

Tourism suitability index calculated as follow:

$$TSI = \sum_{i=1}^n (Wi \times Si)$$

Where TSI is Tourism Suitability Index; Wi is Parameter weighting -i; Si is Score -i. Category of Tourism Suitability Index as follow Table 1.

#### Investment Feasibility of Tourism

Using Small Island Investment Index (SIII) referred to Adrianto et al (2011), we asses investment feasibility of tourism. There are 4 indices to determine small islands with high investment value, 1) natural resources and geostrategic island index (NI), government index (GI), infrastructure index (II), socio-economic and culture index (SI).

$$SIII = \alpha * NI + \beta * GI + \varphi * II + \Omega * SI$$

Where: SIII is Small Island Investment Index; NI is natural resources and geostrategic island index;  $\alpha$  is 0.4; GI is Governance index;  $\beta$  is 0.3; II is infrastructure index;  $\varphi$  is 0.2; SI is socio economic and culture index; and  $\Omega$  is 0.1. Category of Small Island Investment Index as follow Table 2.

#### Natural Resources and Geostrategic Island Index

$(NI) = (LA \times 0.03) + (SiH \times 0.02) + (Vulne \times 0.05) + (IPos \times 0.01) + (DtC \times 0.03) + (DtA \times 0.02) + (Amt \times 0.05) + (MdT \times 0.05) + (MdC \times 0.04) + (AvT \times 0.03) + (TA \times 0.04) + (TF \times 0.04) + (TC \times 0.02) + (AvW \times 0.05) + (SuB \times 0.05) + (BeT \times 0.05) + (EcC \times 0.07) + (CrW \times 0.07) + (IsS \times 0.03) + (EuB \times 0.05) + (TuA \times 0.05) + (CC \times 0.05) + (BeW \times 0.07) + (BeS \times 0.03)$

**Table 2.** Category of Small Island Investment Index

SIII	Category
$>4 - 5$	Very feasible
$>3 - 4$	Feasible
$>2 - 3$	Moderate feasible
$1 - 2$	Not feasible

Where: LA is land area; SiH is small island height; Vulne is vulnerability; IPos is island position; DtC is distance to economic centre; DtA is distance to administration centre; AmT is amenities; MdT is modes of transportation; MdC is modes of transportation conditions; AvT is average travel time; TA is transportation availability; TF is travel frequency; TC is transportation costs; AvW is availability of fresh water; SuB is substrate type of beach; BeT is beach typology; EcC is ecosystem condition; CrW is coral width; IsS is island structure; and EuB is unique biota; TuA is total used area; CC is carrying capacity; BeW is beach width; BeS is beach slope

$Governance \text{ Index } (GI) = (PeC \times 0,21) + (Apl \times 0,17) + (ImA \times 0,19) + (InDs \times 0,21) + (LaO \times 0,22)$

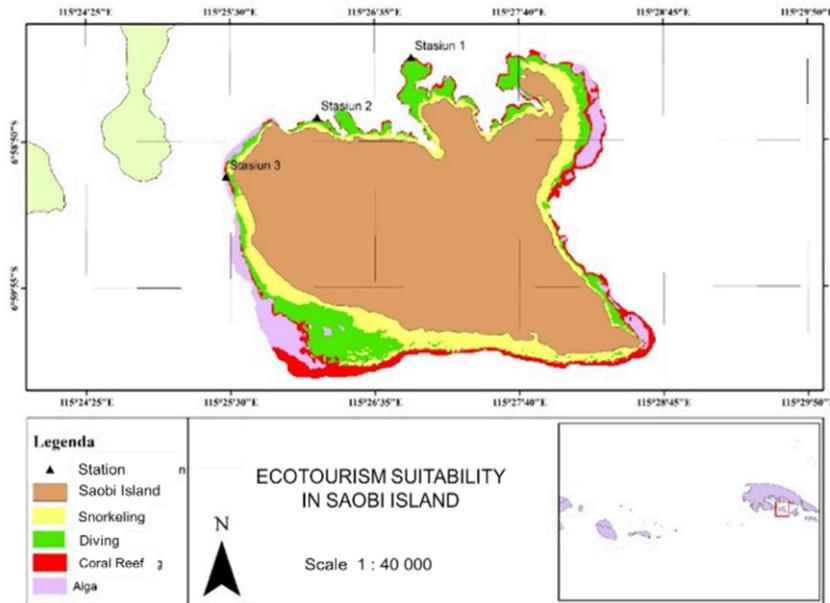
Where PeC is permittance; ImA is island management authority; LaO is land ownership; IsA is island appropriation; InDs is investment incentive and disincentive system

$Infrastruktur \text{ Index } (II) = (RoT \times 0,06) + (RoQ \times 0,09) + (AvCw \times 0,14) + (AvL \times 0,17) + (AvP \times 0,14) + (CoT \times 0,14) + (Pfs \times 0,09) + (FsF \times 0,10)$

Where RoT is road type; AvCw is availability of clean water facilities; AvP is port / dock / jetty availability; Pfs is public facilities and social facilities; RoQ is road quality; AvL is electricity availability; CoT is communication transmission; FsF is fuel supply facilities.

$Sosio \text{ Economic and Culture Index } (SI) = (HiV \times 0,10) + (ToP \times 0,09) + (PoD \times 0,10) + (Ral \times 0,12) + (LeP \times 0,10) + (IcL \times 0,08) + (EvR \times 0,10) + (IsS \times 0,12) + (CuT \times 0,07) + (EdL \times 0,07) + (HiC \times 0,05)$

Where HiV is historical value; PoD is population density; LeP is local economic potential; EvR is economic value of resources; CuT is culture and tradition; HiC is historic sites and cultural attractions; ToP is total population; Ral is potential area ratio; IcL is income level; IsS is island security; EdL is percentage of education level.



**Figure 2.** Ecotourism Suitability in Saobi Island

### 3. Results and Discussion

Ecotourism activities are a complex process in which there are interactions between tourists, the community and resources (Farrell and Twining-Ward 2004). One possible impact of ecotourism activities on ecosystems in the Saobi Island region is the change in land use and the cover as natural capital assets (Figure 5). These changes will affect the carrying capacity in the Saobi Island region. For this reason, in developing ecotourism activities in the area of small islands, an assessment of social, ecological and economic conditions is needed.

#### 3.1 Tourism Suitability

Ecotourism activities are recreational activities that utilize the potential of coastal resources and the marine waters environment which are carried out around the coast and offshore, such as swimming, sunbathing, diving, snorkelling and scoping in mangrove forests. In addition to utilizing the potential of coastal and marine resources (Antonio, Nogués- 2019), coastal ecotourism activities in small islands are also related to the utilization of the potential of

human resources possessed through the values of *culture*. Determination of coastal suitability is done by scoring the parameters that support tourism activities per category and the suitability of the cultural values of the local community. The results of the suitability analysis of ecotourism in the Saobi Island region shown in Figure 2.

#### Diving Ecotourism

Coral reefs and other objects can be used as attractions for diving ecotourism. Coral reefs in the Saobi Island region at a depth of 2 meters to 6 meters (Figure 3 and Figure 4). Coral reefs can grow well to a maximum depth of 40 meters to 60 meters, depending on the level of water transparency. Dive ecotourism activities on Saobi Island, have suitable level ( $2,0 \leq TSI < 2,5$ ), covering an area of 379.000 m, based on six parameters (Figure 2). Furthermore, Saobi Island has a good biophysical condition for diving ecotourism activities with limiting parameters are coral coverage and life forms (Table 3).

Dive ecotourism as a tourism object based on natural objects is very dependent on environmental conditions (Uyarra et al., 2009).

**Table 3.** Diving Ecotourism Suitability

Parameter	Unit	Weight	Score	Value
Coral coverage	%	0.375	2	0.75
Water brightness	%	0.150	3	0.45
Coral depth	m	0.150	3	0.45
Life form	sp	0.135	2	0.27
Coral fish	sp	0.120	3	0.36
Current	cm.s <sup>-1</sup>	0.07	3	0.21
TSI (Tourism Suitability Index)				2.49



**Figure 3.** Coral Reef Life form at 4 m depth

**Table 4.** Snorkeling Ecotourism Suitability

Parameter	Unit	Weight	Score	Value
Coral coverage	%	0.375	2	0.75
Life form	sp	0.145	2	0.29
Coral fish	sp	0.140	2	0.28
Water brightness	m	0.100	3	0.30
Coral depth	m	0.100	3	0.30
Current	cm.s <sup>-1</sup>	0.070	3	0.21
Coral width	m	0.070	3	0.21
TSI (Tourism Suitability Index)				2.34

Opportunities for the development of diving tourism on Saobi Island are supported by coral reefs ranging from 40% - 70%, water conditions and interesting cultural conditions of the community. Furthermore, diving tourism development planning is supported by the availability status (budget) of ecosystem services. Saobi Island has ecosystem services in the form of aesthetics, biodiversity, culture, economy, the sustainability of life, learning, recreation and spiritual can still be fulfilled in natural capital assets in the form of coral reefs, mangroves, fields, settlements, open land and vegetation.

The coral reef ecosystem is one of the attractions of a small island, as a tourist attraction. The condition of coral reef ecosystems presented coral coverage and life form will produce attractive underwater scenery from coral reefs and marine life. The opportunity to enjoy the beautiful marine landscape from the coral community has made diving ecotourism activities become increasingly attractive for tourists (Davenport and Davenport, 2006). Furthermore, at the same time, this is an opportunity for Saobi Island to take advantage of the coral reef ecosystem.

The biggest threat from the sustainability of coral reef ecosystems on Saobi Island is ornamental fishing activities using cyanide and as building construction materials. Related to this, management efforts are needed to maintain the condition of coral reefs so that it becomes an attraction for diving tourism.

Diving tourism has also caused damage to coral reefs. Damage to coral reefs done accidentally by divers, by kicking coral colonies using fins, stepping on and holding benthic organisms, but the most damage was due to fins being kicked by divers (Priskin J, 2001). In general, damage to coral reefs due to diving tourism depends on the type of coral. Branching corals are most susceptible to diving tourism

**Figure 4.** Coral Reef Life form at 2 m depth

activities due to their fragile but rapidly recovering. These conditions indicate the intensity of diving tourism affects the coral community and geomorphological structure as well as the vulnerability of coral reefs (Platong et al., 2000). Coral reefs damage also affects the decrease in fish abundance, increased mortality or fish relocation of to alternative habitats. The response of certain fish differs depending on the dependence on corals, as a spawning ground, feeding ground and nursery ground. Corallivorous fish groups are the most affected fish species (Wilson et al., 2006).

#### Snorkelling Ecotourism

Snorkelling ecotourism has similarities with diving tourism, for example, coral reef ecosystems as an attraction. A different parameter is the depth of the reef. Snorkelling ecotourism requires that coral reefs be found at depths of 1-3 meters (Yulianda, 2019). This makes this snorkelling tour known as skin diving. Beside coral depth, other parameters are life forms, water brightness, coral fish, coral depth and coral width. The result of the analysis is presented on Table 4.

The suitability analysis results show Saobi Island has a suitability class for snorkelling tourism (TSI = 2,34) covering an area of 88.100 m, with limiting factors in coral-covered and life forms (Table 4). In general, coral-covered and life forms on Saobi Island are in the range of 25% - 65% and the majority life forms are *Acropora tabulate*, *Acropora branching*, *Branching branching* and *Coral massive*.

Snorkelling tourism is very dependent on the existence of coral reef ecosystems at shallow depths compared to diving tourism. The depth and width of coral reefs for snorkeling tours, is needed to provide the maximum opportunity to enjoy the beauty of coral reefs. The recommended depth for snorkeling tourism

**Table 5.** Small Island Investment Index (SIII) on Saobi Island

Indicator	Score	Weight	Index
Natural Resources (NI)	3,90	0,40	1,56
Governance (GI)	3,60	0,30	1,08
Infrastructure (II)	3,50	0,20	0,70
Social Economic and Culture	3,53	0,10	0,36
SII			3,70



**Figure 5.** Land Use on Saobi Island

ranges from 1-3 meters (Yulianda, 2019). At that depth, tourists can clearly observe the beauty of coral reefs. Saobi island at a depth of between 1 - 5 meters have a fairly extensive coral reef with coral reefs from *Acropora sp*, *Porites sp*, *Galaxea sp* and *Platygyra sp* and ornamental fish species *Epinephelus sp*, *Chaetodontoplus sp*, *Hereochus Chaetodon*, *Zanclus*. The existence of coral reefs is supported by water conditions that have a brightness of up to 4.95 meters.

With a broader expanse of coral reefs more tourists have more opportunities for adventure while enjoying the beauty of coral reefs. Snorkeling. Snorkelling tourism also allows tourists who are not advance in diving can still enjoy the beauty of coral reefs with simple diving equipment such as snorkel masks, semi-dry snorkel tubes and fins can also be equipped with flotation vest. Simplify of snorkelling tourism make the coral reef ecosystem more likely to be disturbed, due to being stepped on, sediment suspension and coral branching broken by tourists who are not yet proficient in diving (Musa, 2002). Furthermore, the level of physical damage to coral reefs is consistent with the number of tourists (Rodgers and Cox, 2003). How to overcome this problem Roman et al. (2007) suggested creating a snorkeling track that involves community participation. The snorkeling track will keep tourists on the path with a certain safe distance that has been made, thereby reducing the possibility of coral reefs being trampled or damaged. The depth of the snorkeling track at a depth of 2 meters to minimize contact fins with the water base. Other management to overcome to coral reefs damage due to snorkelling tourism is to make artificial coral as an alternative spot. Making an artificial reef is intended to divert the pressure and impact of snorkelling tourism activities.

### 3.2. Feasibility Investment of Tourism

A small island assessment illustrates the feasibility of a small island for ecotourism investment. This assessment contains several indicators that predominantly affect the entry of investors. These indicators are natural resource factors, both environmental services, biological and non-biological resources, governance factors, infrastructure quality factors, and socio-economic and cultural factors of the local community. All of these indicators are very dominant in influencing investment in small islands.

Saobi Island has a category feasible (SIII = 3,70) to support ecotourism investment activities. It means that Saobi Island is an island priority for ecotourism investment, but needs to an improvement on the factors that affect index value so it can raise the status of the island to be very feasible (Table 5).

Natural resource-based investment criteria and geographic strategies are criteria that contain resources as main capital, attractiveness and strategic location of the island. This criterion is a criterion for High-Value Island Region to support investment (Adrianto et al, 2011). It is complemented by land suitability criteria for marine ecotourism e.g diving, snorkelling and beach tourism category by Yulianda (2019). Within the existing criteria, an assessment of natural resources and a geo-strategy is made to assess island by island.

Policies to support small island ecotourism investments can be used by local governments and communities to prepare investors for entry to small islands. The basis for making this policy is to evaluate the parameters and indicators that have been set. Parameters with large weights are the dominant factors that will affect the feasibility of small islands to be targeted for investment or not. Therefore these parameters must be the



**Figure 6.** Port Facilities on Saobi Island

government attention focus policymaking. With the policies taken it is expected to improve the assessment of small islands to make small islands ready for investment. Based on the evaluation, some policies can be taken in improving the ecotourism investment index are:

#### A. Development and improvement accessibility quality

Accessibility is the ability of the region to connect with other regions. The high regional accessibility can be a potential for the development of small islands (Spillanis et.al, 2012). According to Umardiono (2011) accessibility includes physical access and market access. Physical access depends on the existence of infrastructure related to transportation including information about travel routes, arrival and departure schedules from one object to another. Whereas market access is measured based on time or length of trip, costs incurred by tourists and distance travelled. Accessibility development is needed to promote a small island area. This is also needed to increase investment attractiveness and make it easier for investors to enter the small islands. Observations indicate that good accessibility has been built by the government (Sumenep Regency) for the Kangean Islands, but in the case of Saobi Island, the government has not yet made a good accessibility system. This also happens in other small islands in Indonesia.

#### B. Settlement of land ownership status

Factors supporting investment flows into a country, such as security guarantees, political stability and legal certainty, appear to be a problem (Susana and Antonio 2008). There are three categories in land use and ownership, namely state land, communal land (customary land or communal land), and private land (individual or corporate) (Umardiono, 2011). Uncertainty of land ownership is a form of legal uncertainty that often occurs on small island. This is indicated by the many islands in dispute and does not have a clear legal status. Based on data in the field, Saobi Island is an island that has no chance of conflict.

Local governments must make efforts to provide legal certainty by encouraging the legalization of land in small islands by issuing land ownership certificates and regulation of small islands in the spatial plans because policies in regulating spaces on small islands will determine the success of ecotourism development.

#### C. Basic infrastructure development

Basic infrastructure in small islands is an influential factor in investment (Naderi, 2014). Basic infrastructure on a small island can increase attractiveness for investors. Basic infrastructure can be facilitated by the government e.g jettie and telecommunications facilities (Figure 6). Jettie on each island is a primary need to support accessibility.

Jetty on a small island will make it easier to reach the island. Telecommunications infrastructure is also very important in supporting investment activities on the island. the construction of telecommunications facilities will open access to information in the small island area. telecommunications technologies and virtual facilities make small islands throughout the world can be connected directly. Ecotourism investment has the same characteristics as other tourism investments that require facilities and infrastructure (Bjarnason, 2010).

#### D. Reinventing culture and local traditions

Isolation makes small island communities have different characteristics. The culture that belongs to one island community is different from the people on other islands. The traditional habits of the local people are one of the priceless assets of ecotourism. Scarcity, uniqueness and cultural values contained therein are attractions to visit. Some islands which are long enough to be isolated will produce unique cultural forms (Pungeti, 2012).

Culture is considered as a habit, so it is not recognized as a cultural potential that can be an attraction of the island. Based on information from the public, there is no culture or customs that become tourist attractions. The absence of culture is due to Saobi Island having a small degree of isolation, so relations with outside communities are very smooth. As a result, local wisdom is less attention. Therefore the local government and the local community should be able to explore the local wisdom that once existed in the community of small islands.

#### E. Improvement of education level

Human resources are a supporting factor for investment on the small island. One obstacle to investment is related to human resources (Ismail, 2014). Human resources are a guarantee of quality labour availability in an area. Such is the case with small Island in general, where the quality of human resources is low. This also happened to human resources on Saobi Island.

Population on this island is dominated by elementary school level graduates. Therefore the government must have a program to improve the quality of human resources in a small island of at least a high school graduate.

#### 4. Conclusion

Saobi Island has natural resource conditions such as coral reef ecosystems and oceanographic conditions that are suitable for the development of diving and snorkelling tourism. Infrastructure condition, governance, socio-culture makes Saobi Island a suitable place for tourism investment. Improvement management needs to do are improving accessibility quality, land ownership, infrastructure availability, reinventing cultural-local tradition and improving human resource quality.

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