

## Dynamic System Model of Beach Tourism Management in Hukurila Village, Ambon

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DOI: <https://doi.org/10.24922/eot.v12i1.126128>

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### Article Info

Submitted:  
January 20<sup>th</sup> 2025  
Accepted:  
March 25<sup>th</sup> 2025  
Published:  
March 30<sup>th</sup> 2025

### Abstract

One of the leading tourist objects in Ambon, Indonesia, is the beach tourism of Hukurila Village. The potential of coastal, fisheries and marine resources and community support are the important assets in its beach tourism. Behind the potentials there are still shortcomings, and they are necessary to improve. An important question to study is how is the model for managing beach tourism in Hukurila Village, Ambon? The survey was conducted on a sample size determined from tourists, tourism area managers, and the village's government through incidental sampling and snowball sampling techniques. Data were analyzed by using the system dynamic model method with seven supporting methods. The results showed that: a dynamic system model for managing beach tourism in Hukurila Village, Ambon can be built from data of the number of tourist visits, the carrying capacity of the area, the carrying capacity of tourism utilization, the suitability of beach tourism, the economic value of tourism, and the willingness to pay of tourists. Simulation and validation of the model show that all data or variables used are valid. The model is dynamic and produces four policy programs that is: increasing the number of tourists visits every year, increasing the quality and quantity of tourism products continuously according to the carrying capacity of the area or the carrying capacity of utilization, gradually increasing tourist tariffs, and making a breakwater in the coastal tourism area. Assistance is needed in implementing policy programs so that the mission of becoming a sustainable tourism village can be realized in Hukurila Village.

**Keywords:** model; dynamic; management; tourism; beach

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### INTRODUCTION

#### Background

Hukurila village is located in Leitimur Selatan District, Ambon and has 12 tourism sites, namely Pantai Hukurila

(Tihulessi), Goa Bawah Laut, Taman Laut, Batu Palungku, Bati Anging, Pantai Wailaring, Pantai Seu, Air Terjun, Kolam Yarden, Tanjung Ha'or, Batu Ajam, and Kabun Buah (Badan Pusat Statistik Kota Ambon, 2021). The number of these tourist

objects is the highest compared to any other villages in Ambon City. The potential for beach tourism in Hukurila Village is inseparable from the potential of the fisheries and marine resources. Sahetapy et al., (2019) stated that the coral reefs in Hukurila Village contained 192 species of reef fish from 78 genera and 26 families, consisting of 71 target species, 103 major species, 18 indicator species, and two endemic species (*Neoglyphidodon crossi*, *Cirrhitilabrus solorensis*), while the status of coral reefs in the coastal waters of Hukurila Village is good or in healthy criteria. These coral community ecological indices are very important, as a basis for planning and developing diving and snorkeling tourism in the coastal waters of Hukurila Village (Sahetapy et al., 2021).

The potential of these resources is supported by the participation of Hukurila Village community in managing and developing the tourism. Sahureka et al., (2016), revealed that the "Nine" tourism awareness group together with the Village Government were involved in drafting management plans, making tourism development decisions, implementing activities, providing facilities and accessibility. Local community participation is important in relation to tourism sustainability efforts, including protection of the environment and benefits for people's welfare (Fatimah, 2015).

Behind the potentials, there are still deficiencies in tourism management in Hukurila Village. Lelloltery et al., (2020) stated these shortcomings include: limited promotion, limited community knowledge, limited accessibility and facilities, and lack of service and marketing capabilities for tourism actors at the village level. In addition, Sahetapy et al., (2019) specifically revealed that there was still limited supervision of the use of coastal land, reef fish resources and tourism activities in coral reef areas. This weak oversight has a negative impact on the quality of coral reefs and the existence of reef fish resources. These weaknesses in management have put beach

tourism in Hukurila Village in 4th place (321 tourists) under Liang Beach (405 tourists), Namalatu Beach (383 tourists), and Pintu Kota Beach (337 tourists) based on the number of tourist visits from 2014 to 2015 on Ambon Island (Fakih et al., 2017).

Increasing the number of tourist visits to the beach in Hukurila Village is necessary. Increasing the number of it will increase the income of the people of Hukurila Village. According to Ramadhany & Ridlwan (2018), increasing tourist visits to tourism regions has a positive effect on people's income, due to the increasing demand for goods and services so that jobs are created for the community. An increasing in the number of tourists visiting the beach tourism in Hukurila Village can be initiated by forecasting the number of visits for the future time period and must be adjusted to the carrying capacity of the area.

The income of people in Hukurila Village from beach tourism can be seen from the economic value of it. According to Purwanto (2013), the total economic value of ecotourism in Banyuwangi District contributes 31.7% to the average regional domestic product and small businesses in the tourism sector contribute 15.2%. This similar method through the travel cost method can be used for the economic assessment of beach tourism in Hukurila Village.

Sihasale (2013) stated that the potential of coastal tourism in Ambon City (including beach tourism in Hukurila Village) concerns the biodiversity of the coastal area. The coastal tourism in Ambon provides a spectacular value, so it is not surprising that many foreign and domestic tourists want to come together to this city. However, this potential has not fully become a competitive advantage for local governments and has not been able to make a major contribution to the tourism industry and the regional economy. In supporting the coastal tourism become one of the pillars of the regional economy in a sustainable manner, the beach tourism in

Hukurila Village which part of coastal tourism in Ambon, must be built with a planned and long-term visionary strategy.

For this reason, the questions raised as problems of coastal tourism management in Hukurila Village are how is the condition of the human resources of the managers? How is the perception and number of tourist visits? How is the suitability? How is the carrying capacity? How big is the economic value of the tourist area? How much are tourists willing to pay for its preservation? Based on these questions, an important question arises, namely how is the beach tourism management model in Hukurila Village, Ambon City? Based on these important questions, a study entitled "Dynamic System Model of Beach Tourism Management in Hukurila Village, Ambon" was carried out.

## LITERATURE REVIEW

### Dynamic System Model

Modeling is a process of forming a model of a system. Where the model itself is a representation or picture of the system. A system is a collection of elements that work together to form a specific goal. System dynamics simulation is a continuous simulation developed by Jay Forrester of MIT around the 1960s. It focuses on the structure and behavior of a system consisting of interactions between variables and feedback loops. System dynamics is an approach to studying the dynamics of system behavior.

In the early stages of its development, system dynamics were used to analyze and design policies and to assist in decision making. The stages of developing a system dynamics model start from understanding the system, then the next is problem identification and definition, followed by system conceptualization, model formulation, simulation and validation, policy analysis and improvement, and policy implementation, then returning to the initial stage, namely understanding the system (Suryani et al., 2021).

### Beach Tourism

Tourism activities developed with the concept of marine ecotourism can be grouped based on horizontal zoning, namely beach tourism, marine tourism, and inland water tourism. Beach tourism is a tourism activity that prioritizes coastal resources and coastal community culture such as recreation, sports, enjoying the scenery and climate. Beach tourism consists of two categories, namely recreation and mangrove tourism. Recreational beach tourism activities utilize coastal resources, such as white sandy beaches, mangroves, stretches of beach, scenery, biota, and coastal waters.

Activities that are usually carried out on recreational beach tourism include sunbathing, walking to enjoy the scenery, surfing, swimming, fishing, and other activities (Yulianda, 2019). Beach tourism is one form of coastal area utilization whose activities focus on coastal areas by utilizing coastal natural resources, both in the land area and in the waters. Beach tourism has several categories of tourism activities, one of which is beach recreation tourism (Nugraha & Helmi, 2013). Bibin & Ardian (2020), defines beach tourism as leisure tourism activity and recreational activity carried out in coastal areas and their waters.

### Dynamic Management of Beach Tourism

Strengthening management is needed to overcome deficiencies and weaknesses in the implementation of ongoing tourism activities and anticipate future developments. Evaluation of the implementation of existing activities will identify deficiencies or weaknesses found, resulting in recommendations for problem solving and management improvements. Management recommendations should be dynamic in seeing development needs so that tourism activities can be managed well and dynamically (Yulianda, 2019).

Dynamic system modeling of sustainable tourism development is a system engineering study that can be used to design natural resource management. The results

of prospective analysis and dynamic simulation provide policies that must be accommodated in the management plan, namely investment security, regional zoning, quality of human resources, law enforcement, and economic activity (Rahmatika et al., (2017).

## METHOD

The research used a survey method and referred to quantitative research. It was conducted in the Beach Tourism Area of Hukurila Village, South Leitimur District, Ambon from July to August 2022. This location was chosen purposively with the consideration it is the one and only coastal tourism area in Ambon City that has an underwater cave (under-sea cave) and a marine garden (sea garden).

### Method of Sampling

The population in this study consisted of village government, tourism area managers (BUMNeg Amanhuary), and tourists (local, regional, and foreign) who were related to the management and visitors of beach tourism in Hukurila Village, South Leitimur District, Ambon. Samples from the village government population and tourism area manager (BUMNeg Amanhuary) were determined by snowball sampling technique and saturated sample, while the sample of the tourist population were determined by incidental sampling technique. According to Sugiyono (2017), snowball sampling is a technique that starts with a small number of samples, then enlarges, with the aim of completing the data; whereas incidental sampling is a technique based on coincidence if it is deemed that the person is suitable as a data source.

The number of tourist samples from an unknown population is determined based on the equation by Wibisono (2003) in Riduwan and Akdon (2013):

$$n = \left( \frac{Z_{\alpha/2} \sigma}{\varepsilon} \right)^2$$

where:

$n$  = Number of tourist samples (respondents)

$Z_{\alpha/2}$  = Normal distribution table values 90% confidence level or  $\alpha = 0.1$

$\sigma$  = Population deviation standard.

$\varepsilon$  = error estimation.

By the value of  $Z_{\alpha/2} = 1,645$ ,  $\sigma = 0,244$ , and  $\varepsilon = 0,05$ , then the number of tourists is 64 respondents. The total number of samples from the population is 89 respondents described as follows:

1. Village government officials were 11 respondents from a total population of 11 people.
2. Tourism area managers (BUMNeg Amanhuary personnel) were 14 respondents from 14 people.
3. Tourists were 64 respondents from a previously unknown population.

### Method of Collecting Data

The data collected in this study includes primary and secondary data. Primary data were obtained by direct interviews with respondents through a list of questions (questionnaires) and direct observation. Secondary data were obtained from related agencies (Hukurila Village Government Office) and various sources of literature or scientific publications related to research, through literature study.

### Data Analysis Method

To answer the research objectives, an analysis of the dynamic system model was carried out according to Suryani et al., (2020) with seven stages of analysis, namely: understanding of the system, problem identification and definition, system conceptualization, model formulation, simulation and validation, policy analysis and improvement, and policy implementation. The simulation is carried out by using Microsoft Excel for basic data analysis,

and Powersim Studio 10 for dynamic system modeling. Model validation uses the mean comparison method (Suryani et al., 2020), with the equation:

$$E_1 = \left| \frac{\bar{S} - \bar{A}}{\bar{A}} \right| \times 100\%$$

where:

$E_1$  = average comparison (%);

$\bar{S}$  = the average value of the simulation results (Rp/kg);

$\bar{A}$  = data average value (Rp/Kg);

After having an error rate ( $E_1$ ) of less than 5%, the next step is to check and compare the amplitude variation (% error variance) with the equation:

$$E_2 = \left| \frac{S_s - S_a}{S_a} \right| \times 100\%$$

where:

$S_s$  = model standard deviation.

$S_a$  = Data standard deviation.

If these two conditions are met, where  $E_1 \leq 5\%$  and  $E_2 \leq 30\%$ , then the model built is valid.

The dynamic system analysis is supported by the following analyses:

1. Analysis of the evaluation of human resources who manage BUMDes (Najib et al., 2019)
2. Analysis of the suitability of beach tourism in the recreation category (Yulianda, 2020; Kliskey, 2000).
3. Analysis of the carrying capacity of the area (Yulianda, 2020) and analysis of the carrying capacity of the utilization based on the carrying capacity of the area while considering the percentage of the conservation area (Romadhon, 2013).
4. Analysis of Forecasting the Number of Tourist Visits by using the double exponential smoothing method (Aden, 2020).
5. Analysis of the economic value of tourism by using the travel cost method (Fauzi, 2014).

6. Analysis of willingness to pay by using the contingent valuation method (Fauzi, 2014).

## RESULTS AND DISCUSSION

Beach tourism in Hukurila Village, Ambon City, which is managed by village business entities (BUMNeg Amanhuary) has had several drawbacks until now. The evaluation results show that the human resources who manage it need the improving of:

1. Understanding how to calculate/determine the price of tourism products/services.
2. Understanding of making work schedules, when starting work.
3. Understanding the process of setting work schedules related to determining the time to finish work.
4. Understanding of the marketing network of tourism products/services.
5. Understanding of compiling other administrative records such as a stock book of tourism products/services or records of the number of visitors.

Increasing the five management points of human resources in managing beach tourism in Hukurila Village is needed as part of strengthening the management of beach tourism in this location as a whole. According to Yulianda (2020), strengthening management is needed to overcome deficiencies and weaknesses in the implementation of ongoing water tourism activities. Management recommendations should be dynamic in view of the need for water tourism development efforts, so that water tourism activities can be managed properly in a dynamic manner. Starting from this opinion, it is necessary to analyze the dynamic system model in managing beach tourism in Hukurila Village. The description of the model analysis is adapted to the seven stages of analysis.

## Understanding System

The coastal tourism management system in Hukurila Village was built and based on an understanding of strengthening the management of coastal tourism through the concept of economic valuation of tourist areas. This valuation concept focuses on travel costs.

## Problem Identification and Definition

The problems identified and defined according to the supporting analysis which led to the concept of economic valuation of tourist areas are:

1. Increasing the number of tourist visits per day. This is because there is a large difference between the actual number of visits per day and the carrying capacity of tourist areas.
2. The decline in the economic value of tourism is due to the reduced number of tourist visits, especially during the Covid-19 pandemic.
3. Value of tourists' willingness to pay for the protection/improvement of tourist areas and the amount of value issued for overcoming the reduction in the area of tourism that can be utilized.

While the 2 problems related to the 3 main problems mentioned above are:

1. The parameters for the suitability of beach tourism are: the width of the beach in tourist areas, in the long term is dynamic and has a negative impact, where there is a decrease in the size of the beach width per year due to abrasion.
2. The carrying capacity of dynamic beach tourism, due to the reduced area that can be utilized per year.

## System Design

The dynamic system model for managing beach tourism in Hukurila Village is limited to only answering the five problems identified above within the next decade or 10 years of analysis. Internal variables within the system that affect its performance are: tourism suitability (beach

width), coastal tourism carrying capacity (visitors' ecological potential, unit area that can be utilized, area utilized, travel time), number of tourist visits, surplus consumers (coefficient of travel costs), the number of tourists who are willing to pay, and the average value of the tourists' willingness to pay. While external variables or variables outside the system but affecting the internal performance of the system are the general inflation rate in Ambon City and the cost of making breakwaters.

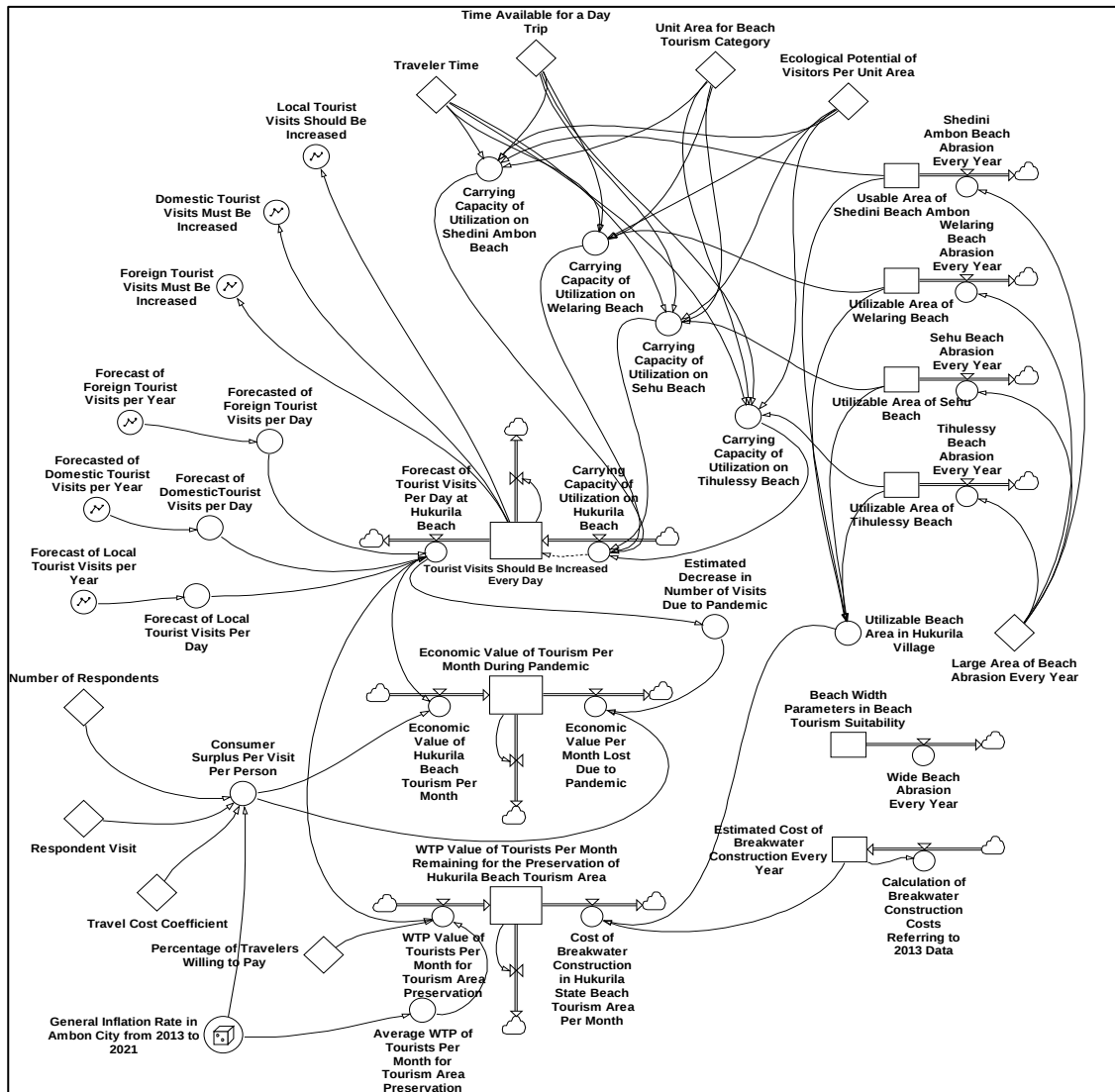
There are three desired outputs in the causal relationship of the dynamic system of managing beach tourism in Hukurila Village, namely: how many visits need to be increased, how much is the economic value of tourism, and how much is the value of tourists' willingness to pay. The output is built from the interrelationship of inputs (internal variables and external variables). For example, the output of the economic value of tourism is obtained from variable data or the number of tourist visits per month multiplied by the consumer surplus node, while the consumer surplus node itself consists of the number of respondents node, respondent visit node, travel cost coefficient node and inflation rate node as the dynamics of consumer surplus. every year.

This relationship is shown from the links (lines and arrows) which can be positive and negative. According to Suryani et al., (2020), nodes represent terms for variables and links represent connections or relationships between two variables. Links marked positive indicate a positive relationship and links marked negative indicate a negative relationship.

The next step in system design is to formulate a policy framework. The intended policy framework is a guideline in decision-making. The decisions to be taken are related to the 5 problems stated above, for this reason the formulation of decision-making guidelines is:

1. The number of tourist visits per day must be increased.
2. The economic value of tourism is lost

- when social restrictions are imposed again during a pandemic.
3. The value of the willingness to pay tourists that can be used for the protection/improvement of tourist areas, for example the construction of a breakwater.
  4. The time period (period) of the beach width parameter can affect the suitability of beach tourism in Hukurila Village.
  5. The decline in the carrying capacity of beach tourism is due to the reduced area of the beach tourism area in Hukurila Village, which can be used annually.



**Figure 1.** Dynamic System Model for Beach Tourism Management (Source: primary data, 2022)

### Model Formulation

The formulation or development of model equations is done in numerical form, which means that all variables or parameters in the model contain numbers to be calculated according to the formula. The dynamic system model for managing beach tourism in Hukurila Village is fully

described in Figure 1. There are three stock and flow diagrams to answer the three main problems identified in managing beach tourism in Hukurila Village. The three stock and flow diagrams depict past, present and future flows, complete with internal and external variables. To answer the fourth problem, related to the

suitability of beach tourism from the beach width parameter, there is only future time flow with the abrasion variable, then to answer the fifth goal it is only calculated in auxiliary (auxiliary variables, which can change values instantaneously) on the increase in stock and flow diagrams the number of tourist visits per day.

### Simulation and Validation

The results of the simulation and validation of the dynamic system model for managing beach tourism in Hukurila Village are described as follows:

#### 1. Number of tourist visits

Simulation of the dynamic system model for managing the number of tourist visits shows that, the number of tourist visits in 2022 is 10 people/day and in the next decade or 2031 there will be 34 people/day, the carrying capacity of tourist areas will reach 3.34 people/day in 2022 and one next decade as many as 3.33 people/day. The difference between these two variables indicates the number of tourist visits that need to be increased, namely in 2022 as many as 3,334 people/day and in the next decade as many as 3,301 people/day. The average number of tourist visits that need to be increased is 11 people/day of foreign tourists each year, 81 people/day of domestic tourists each year, and 223 people/day of local tourists each year. The results of the validation of the dynamic system model for managing the number of tourist visits to the number of tourist visits and the carrying capacity of tourism show that the mean comparison (E1) and error variance (E2) values are less than 5% and 30%, respectively. According to (Suryani, Hendrawan, & Rahmawati, 2020), a dynamic system model is valid if the E1 value is less than 5% and E2 is less than 30%.

#### 2. Tourism economic value

The simulation results of the dynamic system model for managing tourism economic value show that the economic value of tourism in 2022 is IDR 120,424,283/month and in the next decade

or 2031 reaches 454,775,571/month. The lost tourism economic value if (scenario) a pandemic occurs is IDR 106,334,642/month in 2022 and in 2031 reaches IDR 401,566,829/month. The economic value of tourism during a pandemic (with this scenario) is IDR 0/month in 2022 and only reaches IDR 47,567,870/month in 2031. The validation results for the dynamic system model for managing tourism economic value are only carried out on tourism economic value data in 2022, the mean comparison (E1) is 1.3% less than 5%, so the simulation results for the tourism economic value in 2022 are valid.

#### 3. Tourists' willingness to pay

The simulation results of the dynamic system model for managing tourists' willingness to pay value (TWTP) for the management of tourism economic value show that, the value of TWTP in 2022 is IDR 30,223,830/month and in the next decade or 2031 it will reach IDR 114,138,603/month. The scenario for constructing a breakwater in the coastal tourism area of Hukurila Village requires a cost of Rp. 12,407,457/month in 2022 and reaches Rp. 16,966,795/month in 2031. Based on this scenario, the value of TWTP per month decreases over the next decade and the value the remaining TWTP for programs/activities for preserving coastal tourism areas is IDR 0/month in 2022 and reaching IDR 84,916,711/month in 2031. The results of the validation of the dynamic system model for managing the willingness to pay value of tourists (TWTP) are only carried out on data the TWTP value in 2022, the mean comparison (E1) value of 1.3% is less than 5%, so the simulation results for the TWTP value in 2022 are valid.

#### 4. Width of the beach for tourism area

The simulation results of the dynamic system model for managing the width of the beach show that the width of the beach in 2022 is 15 m and in the next decade or 2031 the width of the beach in Hukurila Village, is estimated to be

depleted to only 2.5 m. The results of this simulation are not validated because the data or values used are the results of observations (direct measurements at the research location) and refer to research results of Wattimena & Ayal (2018) that had accuracy and were validated before.

#### 5. Coastal tourism carrying capacity

The simulation results of the dynamic system model for managing the carrying capacity of coastal tourism in Hukurila Village show that the coastal area that can be utilized in 2022 is 33,367 m<sup>2</sup> and in the next decade or 2031 will be depleted to 33,267 m<sup>2</sup>. This condition resulted in a decrease in the carrying capacity of coastal tourism utilization from 2022 as many as 334 people/day and in the next decade 333 people/day. Similar to the results of the simulation of the coastal width in tourist areas, the simulation results of the carrying capacity of coastal tourism are not validated because the data values or numbers used are the results of observations (direct measurements at the research location).

### Policy Analysis and Improvement

Policy analysis and improvement of the coastal tourism management in Hukurila Village was carried out to answer the problems identified in the model development. The dynamic system model for managing coastal tourism in Hukurila Village produces four priority policies, namely:

#### 1. Increasing the number of tourist visits

The simulation results of the dynamic system model for managing the number of tourist visits in the coastal tourism area of Hukurila Village show that up to a decade in the future or in 2031 the number of tourist visits must be increased. This is because the actual and predicted number of tourist visits per day is still very low compared to the carrying capacity of tourist areas. The number of tourist visits that must be increased over the next decade is an average of 301 people/day or an annual average of 315 people/day.

The increase in the number of tourist visits is closely related to the economic value of tourism. The scenario of pandemic conditions in the model and simulation results shows that, if pandemic conditions (phases such as the covid-19 crisis in early 2020) occur in 2022 or in other years up to 2031, there will be a decrease in the average number of visits to 88, 3% per annum. If the pandemic conditions occur in 2025, there will be a decrease in the number of tourist visits by 480 people/month and the number of tourist visits is only 63 people/month.

This will result in a loss of tourism economic value of IDR 245,634,137/month or a tourism economic value during the pandemic in 2025 of only IDR 24,132,253/month or a decrease in the economic value of tourism by up to 90.2% from normal conditions. Afif (2018), argues that a decrease in the number of tourists can affect a decrease in tourism management which results in a decrease in the economic value of tourist areas. This shows that the policy of increasing the number of tourist visits to the beach resort of Hukurila Village is an important priority. Bhaskara et al., (2024) concluded that consistency in observing visitor preferences and global trends is essential to ensure that beach tourism remains a popular destination.

#### 2. Improvement of tourism products

Tourism products are something that is produced according to the needs of tourists from leaving their place of residence until they return (Isdarmanto, 2016). This definition is closely related to the concept of economic valuation of tourism using the travel cost method where there is the term "consumption" cost of environmental services (Fauzi, 2014). Referring to the average tourist travel costs for each visit of IDR 151,276/person, the average percentage of tourist travel costs to tourist sites is 81.3% more than the percentage of the average number of tourist travel costs while at tourist sites of 18.7%. The percentage of the

average amount of tourist travel costs while at the location if converted into rupiah is only IDR 28,281/person/visit. Thus, the manager of beach tourism in Hukurila Village as a producer must increase this cost and the diversity of beach tourism products so the revenue of beach tourism in Hukurila Village will increase.

The policy of increasing the quality and quantity of beach tourism products in Hukurila Village will give a positive impression on tourist perceptions, so that the number of tourist visits will increase and have an impact on increasing the economic value of tourism. According to (Handayani, Mahadewi, & Surata, 2021), one of the strategies for developing tourist areas in increasing the number of visits and economic value is improving quality and developing selected products and tourist attractions by utilizing existing facilities (buildings/buildings) and involving the community. Two types of superior tourism in Hukurila Village, namely marine tourism (snorkeling and diving) and cultural tourism (Tradition of *Antar Sontong*) need to be encouraged and improved to support the management of beach tourism in Hukurila Village. Apart from that, it is also important to increase the intangible tourism product, namely promotion.

### 3. Increasing the tourist rates according to the value of tourists' willingness to pay

The current tariff for beach tourism in Hukurila Village is IDR 2,000/child, IDR 3,000/adult, IDR 2,000/person food vendor, IDR 3,000/driver and 2-wheeled vehicle, IDR 5,000/driver and 4-wheeled vehicle, and IDR 10,000/driver and truck/bus vehicles (Provincial Government of Maluku, 2008), when associated with the objective of environmental preservation/improvement of tourist areas is considered very low. According to Isnain (2015), the determination of entry fees for nature tourism areas is currently not based on economic calculations, so the value issued for the management of natural tourism areas is greater than the value received.

To overcome this, the policy of increasing tourist fares needs to be considered in the management of beach tourism in Hukurila Village, Ambon City. The amount of tariff that must be increased can refer to the average willingness to pay value (EWTP) of tourists of IDR 234,000/person/month (from the calculation of the average tourist EWTP of IDR 233,871/month) or IDR 58,000/person/visit. The tariff of IDR 58,000/person/visit is not much different from the rate of IDR 57,768/visitor, the result of a calculation of the willingness to pay tourists on the Lasiana coast, Kupang City (Pieter, Benu, & Kaho, 2015). If this policy is implemented by beach tourism managers in Hukurila Village, the value of tourists' willingness to pay for the preservation/improvement of tourist areas can be achieved.

### 4. Overcoming the beach width depletion in tourist areas

The term depletion refers to the level/rate of reduction in the stock of non-renewable natural resources (Fauzi & Anna, 2005). Depletion in the width of the beach in tourist areas is closely related to the reduction in beach sand which is the main attraction for beach tourism. The simulation results of the dynamic system model for suitability for beach width management show that if beach area depletion continues until 2026 with a beach width of only 9.4 m, then the score for the suitability parameter for beach width will be only 1. This directly makes the tourist area in Hukurila Village no longer suitable as a coastal tourism area because the IKW value (tourism suitability index) will decrease by 1.82 (in category  $1 \leq \text{IKW} < 2.0$  or not suitable).

Overcoming beach width depletion in the coastal tourism area in Hukurila Village, Ambon City is one of the priorities. The form of countermeasures is by constructing a 975 m long breakwater in the beach tourism area in Hukurila Village, Ambon City. According to Putra (2020), a breakwater is a protective structure that is

able to reduce the height of waves heading to certain areas. The cost of making a breakwater reaches an average of IDR 14,960,914/month. This cost is calculated by considering the general inflation rate in Ambon and the cost of making a breakwater in 2013 amounting to IDR 1,209,560/m<sup>3</sup>. The cost of making a breakwater is referred to Talakua (2013) which calculated the cost of making a breakwater in three villages in Ambon, namely Tawiri, Rutong and Leahari Village. The creation of a breakwater for coastal protection in the tourist area of Hukurila Village not only reduces the rate of depletion of the width of the beach but also reduces the rate of reduction in the overall width of the beach.

The policy of overcoming beach width depletion in tourist areas through the creation of breakwaters can be carried out and the costs can be derived from the value of the willingness to pay tourists visiting the Hukurila beach tour in Ambon City, which averages IDR 14,960,914/month. The excess value of tourists' willingness to pay spent on making breakwaters of an average of IDR 53,488,781/month can also be used to manage (preserve) coastal tourism areas.

### Policy Implementation

There are four important programs that need to be implemented in the management of beach tourism in Hukurila Village in accordance with the four important policies previously recommended in the dynamic system model of beach tourism management in Hukurila Village. The four programs (Table 1) already have targets to be achieved according to policies, timeframes for completion, and sources of funding, or have fulfilled some of the program's characteristics (Tachjan, 2006). This is in line and realistic with one of the missions of Hukurila Village which must be achieved, to become a sustainable tourism village (Goddess of the Moon). Hukurila Village's mission in the field of tourism is one of the directions for policy implementation, while the basic directions for implementing beach tourism management policies in Hukurila Village refer to the four pillars of driving and advocating for the implementation of sustainable tourism in Indonesia, namely: environmentally friendly management, a socially and economically viable economy future, development and maintenance of cultural sustainability, as well as sustainability of environmental aspects (Damanik et al., 2022).

**Table 1.** Implementation of Beach Tourism Management Policy

| Policies                                 | Program                                                                                                                                                                                                                                                                                                                                                           | Executors and Companions                                                                                             | Target Groups                                                                                                                                  |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Increasing the number of tourist visits. | Increasing the number of tourist visits (11 foreign tourists/day, 81 people/day domestically, and 223 local people/day) every year in the next decade, through continuous and integrated tourism promotion activities. Supporting legal documents: Village Regulations or Regional Regulations. Source of cost of tourist tariffs (tourists' willingness to pay). | Executors:<br>BUMNeg Amanhuary<br><br>Companions:<br>Hukurila Village Government and Ambon City Regional Government. | Tourists, BUMNeg Amanhuary, the Government of Hukurila Village, Village community, and the Regional Government (the Government of Kota Ambon). |
| Improvement of tourism products.         | Increasing the quality and quantity of tourism products continuously according to the carrying capacity of the area or the carrying capacity of utilization. Tangible products include: accessibility, homestays, gazebos, relaxing places, telephone/internet networks, boat                                                                                     | Executors:<br>BUMNeg Amanhuary, Hukurila Village Government, Village Community.                                      | Tourists, BUMNeg Amanhuary, Government of Hukurila Village, Village                                                                            |

| Policies                                                     | Program                                                                                                                                                                                                                                                                                                                                                                         | Executors and Companions                                                                                                          | Target Groups                                                                                                                           |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
|                                                              | moorings, toilets, parking areas, areas and culinary options typical of the region, cleanliness of the beach. Intangible products are: service and security. Supporting products from other tourism activities: snorkeling and diving activities, as well as cultural tourism ( <i>Antar Sontong</i> tradition). Source cost of tourist tariffs (tourists' willingness to pay). | Companions:<br>Hukurila Village Government, private parties, Ambon City Government, as well as higher education institutions.     | community, private parties.                                                                                                             |
| Increasing the tourist fares.                                | Increasing tourist fares of IDR 58,000/person/visit gradually every year for the next decade. Legal documents are supported, namely: Village Regulations or Regional Regulations. Sources of BUMNeg Amanhuary, Hukurila Village Government or Ambon City Government.                                                                                                            | Executor:<br>BUMNeg Amanhuary,<br><br>Companions:<br>Hukurila Village Government and Ambon City Government.                       | Tourists, BUMNeg Amanhuary, the Government of Hukurila Village, Village community, and the Regional Government (Ambon City Government). |
| Counter-measures for beach width depletion in tourist areas. | Construction of breakwaters in the coastal tourism area of Hukurila Village, Ambon City, 975 m long in four coastal tourist areas, namely: Tihulesy Beach 421 m, Se'u Beach 225 m, Welaring Beach 128 m, and Shedini Ambon Beach 201 m, in stages over a decade forward. The source of the cost of tourist fares (willingness to pay tourists) and the Ambon City Government.   | Executors:<br>BUMNeg Amanhuary and Hukurila Village Government.<br><br>Companions:<br>Ambon City Government and private agencies. | Tourists, BUMNeg Amanhuary, the Government of Hukurila Village, Village community                                                       |

Source: primary data (2022).

One of the important characteristics that needs to be improved according to the results of the analysis of human resources managing beach tourism in Hukurila Village, Ambon City is the workforce (all administrators in BUMNeg Amanhuary both in terms of quantity and quality - qualifications, expertise and skills) needed. This workforce is the main executor of the implementation of beach tourism management policies in Hukurila Village. To improve and overcome human resource weaknesses as beach tourism managers in Hukurila Village in a short time, BUMNeg Amanhuary needs to be assisted.

Najib et al., (2019) require that assistance is very important for BUMDes business development in order to overcome the main obstacle, namely workers or human resources who are not competent in their field. The companion serves as a

mentor who has entrepreneurial knowledge (tourism economics) and has a tourism market network. In Table 1, apart from the implementer, a companion is also needed in implementing the Beach Tourism management policy in Hukurila Village. Companions or mentors of at least 3 people from the Government of Ambon City in this case the Department of Tourism and Culture, higher education institutions (tourism economists at the nearest higher education institution), and private parties (beach tourism business actors in Ambon).

Policy implementation must also have a target group. According to Tachjan (2006), target groups are people or organizations in society who will receive products and services or whose behavior will be influenced by policies. Table 1 shows a number of people or organizations who will receive products and services for the

implementation of beach tourism management policies in Hukurila Village. The beneficiaries are tourists, the Hukurila Village community, private parties (who become business partners), the Regional Government, the Hukurila Village Government, and especially BUMNeg Amanhuary.

Good and directed management of beach tourism in Hukurila Village can prepare BUMNeg Amanhuary to at least face the dynamics risks caused by the pandemic and changes to the beach tourism area in Hukurila Village. Apart from that, good and directed management of beach tourism in Hukurila village will support the realization of the tourism mission of that village as a sustainable tourism village, or support the Ambon City Government's big tourism vision for 2021-2026 to become an international tourism destination (Pemerintah Kota Ambon, 2021). For this reason, BUMNeg Amanguary as a local institution must be recognized through regional regulations, according to Widhianthini (2017), if the role of local institutions is legitimized through regional regulations, the sustainable tourism village model can be preserved.

## CONCLUSION

The dynamic system model for managing beach tourism in Hukurila Village, Ambon produces four policy programs that need to be implemented: 1). Increasing the tourist visits (11 foreign tourists/day, 81 people/day domestically, and 223 local people/day) every year for the next decade, through continuous and integrated tourism promotion activities; 2). Increasing the quality and quantity of tourism products (both tangible and intangible products) continuously according to the carrying capacity of the area or the carrying capacity of utilization; 3). Increasing the tourist rates of IDR 58,000/person/visit gradually every year for the next decade, and 4). Developing breakwater in stages in the coastal tourism area of Hukurila Village, Ambon

over the next decade. This dynamic system model of tourism management can be adapted to beach tourism areas with recreational purposes by using the six data and two scenarios. Further research entitled the "sustainability of coastal tourism in Hukurila Village" is important to be carried out.

## REFERENCES

- Aden. (2020). *Forecasting the Eksponen-tial Smoothing Methods*. Pamulang Tangerang Selatan: UNPAM Press.
- Afif, T. L. (2018). *Analisis Nilai Ekonomi dan Strategi Pengembangan Wisata Kebun Binatang Bandung*. Bogor: Departemen Ekonomi Sumberdaya dan Lingkungan Fakultas ekonomi dan Manajemen Institut Pertanian Bogor.
- Badan Pusat Statistik Kota Ambon. (2021). *Kecamatan Leitimur Selatan Dalam Angka Tahun 2021*. Ambon: Badan Pusat Statistik Kota Ambon.
- Bhaskara, G. I., Sastrawan, I. G. A., & Yudiastina, I. G. B. A. (2024). Sentiment and Sunsets: Analysing Online Reviews of Kuta Beach in Bali. *E-Journal of Tourism*, 11(1), 76-92. doi: <https://doi.org/10.24922/eot.v11i1.114486>.
- Bibin, M., & Ardian, A. (2020). Strategi Pengembangan Kawasan Wisata Pantai Songka di Kora Palopo. *Edutourism, Journal of tourism Research*, 2(1), 72-78. doi: <https://doi.org/10.53050/ejtr.v2i01.131>.
- Damanik, D., Nasrullah, Purba, B., SN, A., Abdillah, D., Raditya, Salim, M. N, Hamidah, S., Rusata, T., & Faried, A. I. (2022). *Ekonomi Pariwisata: Konsep, Pemasaran dan Pembangunan*. Medan Sumatera Utara: Yayasan Kita Menulis.

- Fakih, M. F., Yuniarno, E. M., & Susiki N, S. M. (2017). Analisa Pola Kunjungan Wisatawan ke Berbagai Objek Daya Tarik Wisata di Pulau Ambon Menggunakan Frequent Pattern Growth. *KINETIK: Game Technology, Information System, Computer Network, Computing, electronics, and Control*, 189-196. doi: <https://doi.org/10.22219/kinetik.v2i3.46>
- Fatimah, S. (2015). Peran Serta Masyarakat Dalam Penataan Ruang Kawasan Wisata bahari di Kecamatan Nusa-niwe Kota Ambon. *Plano Madani: Jurnal Perencanaan Wilayah dan Kota*, 49-65.
- Fauzi, A. (2014). *Valuasi Ekonomi dan Penilaian Kerusakan Sumber Daya Alam dan Lingkungan*. Jakarta: PT. Gramedia Pustaka Utama.
- Fauzi, A., & Anna, S. (2005). *Pemodelan Sumber Daya Perikanan dan Kelautan*. Jakarta: PT. Gramedia Utama.
- Handayani, I. A., Mahadewi, N. M., & Surata, I. K. (2021). Strategi Pengembangan Kawasan Wisata Masceti Gianyar Dalam Peningkatan Jumlah Pengunjung dan Nilai Ekonomi. *TU-LIP: Tulisan Ilmiah Pariwisata*, 4(2), 71-83. doi: <http://dx.doi.org/10.31314/tulip.4.2.71-83.2021>.
- Isdarmanto. (2016). *Dasar-Dasar Kepariwisata dan Pengelolaan Destinasi Pariwisata*. Yogyakarta: Gerbang Media Aksara dan STiPrAm Yogyakarta.
- Isnan, W. (2015). Teknik Perhitungan Tarif Masuk Kawasan Wisata Alam. *Buletin Eboni*, 65-74. doi: <https://doi.org/10.20886/buleboni.5055>
- Kliskey, A. D. (2000). Recreation Terrain Suitability Mapping: A Spatially Explicit Methodology for Determining Recreation Potential for Resource Use Assessment. *Landscape and Urban Planning*, 52(1), 33-43. doi: [https://doi.org/10.1016/S0169-2046\(00\)00111-0](https://doi.org/10.1016/S0169-2046(00)00111-0)
- Lelloltery, H., Hitipeuw, J. C., & Sahureka, M. (2020). The Strategy of Community Based Ecotourism Development in the Protected Forests of Sirimau Mountain, Ambon city. *Jurnal Hutan Tropis*, 8(1), 23-35. doi: <http://dx.doi.org/10.20527/jht.v8i1.8155>
- Najib, M., Putra, A. S., Hernawan, A. K., Setyono, K., Safitri, S. N., & Putri, A. D. (2019). *Bumdes: Pembentukan dan Pengelolaannya*. Jakarta: PUSDATIN BALILATFO Kementerian Desa, Pembangunan Daerah tertinggal dan Transmigrasi Republik Indonesia.
- Nugraha, H. P., Indraja, A., & Helmi, M. (2013). Studi kesesuaian dan daya Dukung Kawasan Untuk Rekreasi Pantai di Pantai Panjang Kota Bengkulu. *Journal of Marine Research*, 2(2), 130-139. doi: <https://doi.org/10.14710/jmr.v2i2.2474>
- Pemerintah Kota Ambon. (2021). *Rencana Induk Pembangunan Pariwisata (RPPAR) Kota Ambon*. Ambon: Pemerintah Kota Ambon.
- Pieter, J., Benu, F., & Kaho, M. R. (2015). Valuasi Ekonomi Ekowisata Terhadap Pengembangan Objek Wisata Kawasan Pesisir Pantai. (Studi Kasus Jasa Lingkungan Non-Market Sumberdaya Alam Objek Wisata Pesisir Pantai Lasiana Kecamatan kelapa Lima Kota Kupang Provinsi NTT. *Jurnal Ilmu Lingkungan*, 13(1), 55-64. doi: <https://doi.org/10.14710/jil.13.1.55-64>

- Purwanto. (2013). Valuasi ekonomi Ekowisata Dengan Model Travel Cost dan Dampaknya Terhadap Usaha Kecil Pariwisata. *Jurnal Manajemen dan Kewirausahaan*, 15(1), 89-102. doi: <https://doi.org/10.9744/jmk.15.1.89-102>
- Ramadhany, F., & Ridlwan, A. A. (2018). Implikasi Pariwisata Syairah Terhadap Peningkatan Pendapatan dan Kesejahteraan Masyarakat. *Muslim Heritage*, 3(1), 147-164.
- Romadhon, A. (2013). *Optimasi Pemanfaatan Pulau-Pulau Kecil Berbasis Daya Dukung Bagi Peruntukan Wisata*. Bogor: Institute Pertanian Bogor.
- Rahmatika, A., Kusumastanto, T., & Sadelie, A. (2017). Manajemen Pengembangan Kebijakan Wisata Bahari di Kawasan Ekonomi Khusus Mandalika Lombok Tengah: Studi Kasus Pantai Kuta. *Jurnal Manajemen*, 21(3), 381-397. doi: <https://doi.org/10.24912/jm.v21i3.258>.
- Sahetapy, D., Selanno, D., & Tuhumury, N. (2019). Potency of Reef Fish in the Coastal Waters of Hukurila Village, Leitimur Selatan District of Ambon City. *Triton: Jurnal Manajemen Sumberdaya Perairan*, 15(2), 46-57. doi: <https://doi.org/10.30598/TRITONvol15issue2page46-57>
- Sahetapy, D., Siahainenia, L., Selanno, D. A., Tetelepta, J. M., & Tuhumury, N. C. (2021). The Status of Coral Reef at Hukurila Village Coastal Waters. *Triton: Jurnal Manajemen Sumberdaya Perairan*, 17(1), 35-45. doi: <https://doi.org/10.30598/TRITONvol17issue1page35-45>
- Sahureka, M., Lellotery, H., & Hitipeuw, J. (2016). Implementasi Pengembangan Ekowisata Berbasis Masyarakat di Hutan Lindung Gunung Sirimau Kota Ambon. *Jurnal Hutan Pulau-Pulau Kecil*, 1(2), 128-135. doi: DOI:10.30598/jhppk.2016.1.2.128
- Sihasale, D. A. (2013). Keanekaragaman Hayati di Kawasan Pantai Kota Ambon dan Konsekuensi Untuk Pengembangan Pariwisata Pesisir. *Journal of Indonesian Tourism and Development Studies*, 1(2), 20-27.
- Suryani, E., Hendrawan, R. A., & Rahmawati, U. E. (2020). *Model dan Simulasi Sistem Dinamik*. Yogyakarta: Deepublish.
- Tachjan, H. (2006). *Implementasi Kebijakan Publik*. Bandung: AIPI dan Puslit KP2W Lembaga Penelitian Unpad.
- Talakua, W. (2013). Economic Valuation of Mangrove Forest Ecosystem in the Coastal Area of Ambon City. *Triton: Jurnal Manajemen Sumberdaya Perairan*, 9(1), 47-57.
- Wattimena, J. D., & Ayal, M. R. (2018). Analisis Perubahan Garis Pantai Desa Rutong Kota Am. *Jurnal Teknik Sipil*, 14(2), 105-200. doi: <https://doi.org/10.28932/jts.v14i2.1796>
- Widhianthini. (2017). Effectiveness of Local Institutions as The Basis of Sustainable Tourism Village. *E-Journal of Tourism*, 4(1), 13-18. doi: <https://doi.org/10.24922/eot.v4i1.30164>
- Yulianda, F. (2020). *Ekowisata Perairan Suatu Konsep Kesesuaian dan Daya Dukung Wisata Bahari dan Wisata Air Tawar*. Bogor: IPB Press.