The Study of Tourism Infrastructure Development in Amahusu Beach

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***Abstract*— The utilizing the annual Darwin-Ambon Yacht Race (DAYR) agenda has determined Amahusu Village, Nusaniwe District as a beach tourism destination in Ambon. In the coastal area of Amahusu obviously required infrastructure supporting coastal tourism. It is hoped that this development can increase the growth of gross regional domestic product (GRDP) for the Ambon City government. This study aims to analyze the characteristics of the coastal area of Amahusu Village, find the concept of supporting infrastructure for coastal tourism in Amahusu Village and obtain the value of the growth of the Gross Regional Domestic Product (GRDP) of Ambon City. This research method is a case study with analytical techniques using Mavic pro 2 camera to measure coastal topography, Admiralty method to obtain sea level type and elevation, Windrose Software to obtain wind speed and direction, Shore Protection Manual method to obtain wave characteristics and regression equation to obtain the value of GRDP. The results showed that the characteristics of the Amahusu beach had coral reefs, the coastline was parallel to the shoreline and made protection from storms, tidal currents for coastal tourism. The concept of Amahusu beach infrastructure is segmented into three integrated segments with technical considerations with a conservation perspective. The projected value of Ambon City's GRDP in 2021-2026 will increase gradually between 3-8%.**

Keywords*— *Infrastructure, Beach Tourism, Gross Regional Domestic Product (GRDP)

I. INTRODUCTION

Indonesia is an archipelagic country that geographically consists of ± 70% sea and ± 30% land, this can be said that coastal and coastal areas will be an option for the implementation of national development. The tourism sector is the government's focus for infrastructure development in line with the increase in foreign tourist visits to Indonesia which has increased by 21.88% over the past four years, by Tourism Minister Arief Yahya (Kompas.com, 24/6/2019). Law number 27 of 2007 concerning the Management of coastal areas and small islands also stipulates that local governments are obliged to prepare management plans for coastal areas and small islands that are implemented in government activities, development, and services to the community.

Ambon City is administratively located on the island of Ambon and is a coastal city with beautiful bays and has bay and coastal areas with a long coastline and has diverse resources such as biological and non-biological resources, artificial resources, and environmental services. As the capital of Maluku province, the city of Ambon has developed into a city of services and trade and a center of government activity and has a strategic role as a developed, organized and sustainable coastal city, Amahusu Village in Nusaniwe District is designated as a destination or tourist destination by utilizing the annual Darwin-Ambon Yacht Race (DAYR) agenda, https://travel.kompas.com/read/. Along with these developments, it is necessary to develop coastal tourism infrastructure that is in accordance with its coastal characteristics and is also expected to increase the value of gross regional domestic product (GRDP) growth for the city of Ambon.

Previous research on the study of tourist perceptions on the attractiveness of the Darwin-Ambon sailboat race in Amahusu village, Ambon city, it is necessary that the attributes of cleanliness of coastal and marine areas (cleanliness areas) are seen as not meeting tourist expectations because they have not been managed optimally, [1] On another thing, the influence of Darwin-Ambon Yacht Race promotional costs on the number of foreign tourist visits in the city of Ambon, needs a policy strategy of the Ambon city government regarding promotional costs, [2]. Next by [3][4][5][6], on planning strategies and development of tourist attractions, it is necessary to manage the business of objects and tourist attractions (tourist attractions) based on the community in each village, indicating the need to provide tourist facilities such as homestays, cottages, restaurants, and traders as well as education on the development of marine tourism. By the author's observation, how is the concept of supporting infrastructure for coastal tourism according to the characteristics of the Amahusu village coastal area and what is the value of gross regional domestic product (GRDP) growth for the city of Ambon. This research aims to find the concept of supporting infrastructure for coastal tourism in accordance with the characteristics of the beach in the Amahusu region and obtain the growth value of the gross regional domestic product (GRDP) of Ambon City [7][8][9].

II. METHODS

This type of research is survey research, whereas by its method case studies are an empirical inquiry that investigates phenomena in the context of real life, whenever the boundaries between phenomena and contexts are not firmly visible and where multiple sources of evidence are utilized. This study was carried out in the coastal area of Amahusu village with coordinates of 128o10'00" BT and 3o44'05" LS with an area of 800 Ha, in Figure 1. The primary data used were topographical surveys and study area boundaries using the Drone Type Mavic 2 Pro tool and manual tidal measurements with a measuring tub at

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observation intervals every hour, for 1 month and photos of damage phenomena. Secondary data include: daily wind data for 2011-2020 by BMGK Pattimura Ambon Meteorological Station, p eta engineering geology and bathymetric map of Ambon 2009, by BAPPEKOT Ambon and GRDP data for 2016-2020, Central Bureau of Statistics Maluku. Figure 2, The data analysis used in this study includes: topographic and geological analysis to determine the elevation and layout of the building to be placed. Tidal analysis and the Admiralty method to determine the type of tides and sea level elevations in buildings. Wind data analysis using Windrose Software to determine the dominant wind speed and direction is then made wave forecasting based on bathymetric data using the Shore Protection Manual method. Frequency analysis using the Gumbel distribution method (Fisher-Tippet Type I) to predict significant wave height for the determination of plan waves in buildings. Value analysis on infrastructure concepts with regression equations to obtain GRDP value addition.

Figure 1. Research area map (sorce: google earth, 2021)

Figure 2. Research flow chart

III. Result and Discussion

The topography of the slope of the underwater slope of the Amahusu coastline varies between 0-10 m with a coastline length of 3622 m. Limitation of the study area is 127 m x 594 m with the coastline boundary to the sea varying between 30-70 m at a seawater depth of 0-5 m. Current conditions there are supporting facilities and infrastructure such as offices, highways along the coastline, wooden piers, concrete piers and green areas as the finish line for the implementation of the annual DAYR agenda and the starting line of the boat rowing competition (belang) between districts/city villages as the annual agenda of the Ambon city Anniversary, in Figure 3.

Figure 3. Existing conditions of the study site

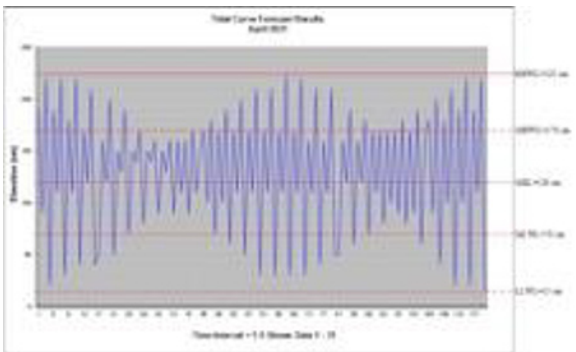

Figure 4. Tidal curve of study location

Figure 5, the average wind friction stretch for 10 years in the Amahusu coastal area shows that the dominant average wind voltage of UA ranged from 4.19 - 4.37 m/sec occurred in 2012 - 2014 in the West direction. Extreme wave analysis extrapolated up to a 50-year period will occur a representative wave height between Hs = 0.77 m-0.86 m.

During its passage to the coast, the wave height and wave direction change due to the influence of refraction and siltation processes and rupture waves at a depth of H = 1.07 m, then a planned rupture wave on the Amahusu coastline is obtained Hb=1.14 m with a wavelength L=31.21 m occurs at a depth of d=5 m with a seafloor slope m = 0.05, in Figure 6. Water level elevation plans, planned based on tides, wave setups and global warming, in Figure 7.

a. Tidal

   From the tidal measurement data obtained several elevations of the water level, namely MHWL: + 1.70 m; MSL: +1.20 m and LLWL: + 0.15 m.

b. Rising water level (wave set up)

   the set up of the wave is calculated by the equation (25), with the value of Hb = 1.14 m; obtained Sw = 0.82 m.

c. Water level drop (wave set down)

   the set down of the calculated wave is calculated by the equation (26), with the value Hb = 1.14 m; obtained Sb = 0.04 m.

d. Sea level rise due to global warming (SEA LEVEL RISE, SLR) is estimated for 2050 at 0.30 m.

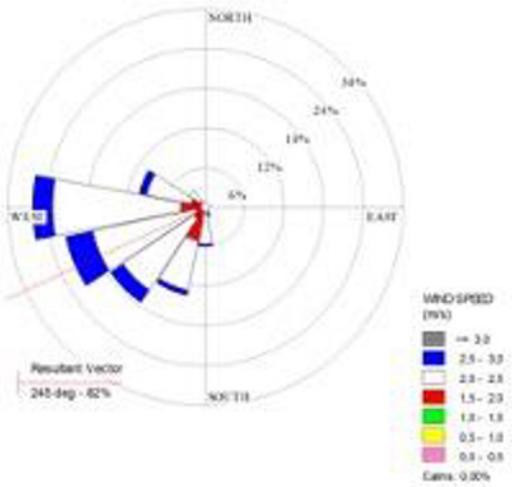

Figure 5. Average wind roses in 2011-2020

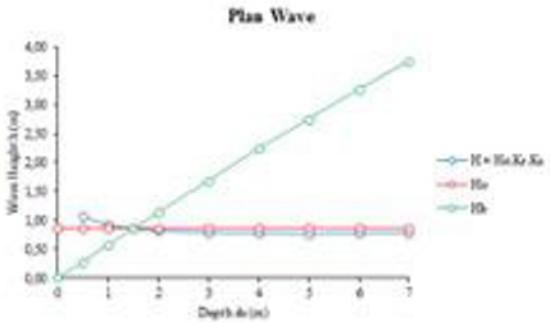

Figure 6. Wave of plans at the study site

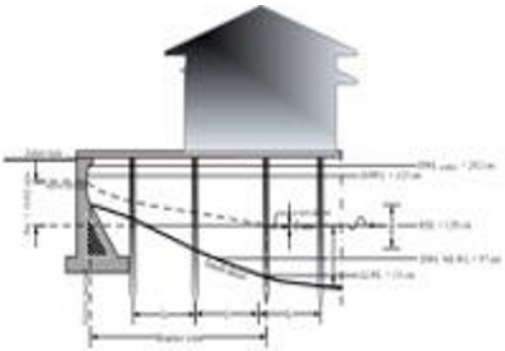

Figure 7. Planned water level elevation in the building

The concept of coastal infrastructure is carried out with technical changes including; soil mechanics, foundations, engineering mechanics, material mechanics, and conservation-minded implementation, then the location of the Amahusu coastal pariwisa infrastructure is sequestered into three parts including; the first segment, with a coastline length of 531.78 m and a plan area of 42,277 m2, in Figure 8. The second segment with a coastline length of 79.59 m and a plan area of 2,871 m2, in Figure 9. The third segment of the coastline length is 494.44 m and the plan area is 31,782 m2, in Figure 10. Amahusu's coastal infrastructure (IP) concept is shown in Table 1.

Figure 8. Segemen 1 Amahusu beach tourism infrastructure

Figure 9. Segemen 2 infrastructure of Amahusu beach tourism

Figure 10. Segemen 3 Amahusu beach tourism infrastructure

TABEL I Amahusu beach tourism infrastructure

Code	Infrastructure (IP)
IP 01	Hotels and restaurants
IP 02	Office diving
IP 03	Diving pier
IP 04	Transports
IP 05	Swimming pool, and drying
IP 06	Parker land and driveway
IP 07	Beach shops and highways
IP 08	Speedboat docks and highways
IP 09	Green area & homestay space

The number of tourist visits in Ambon city experienced fluctuations from 2016-2019 an average of 42.02%, while the Gross Regional Domestic Product (GRDP) of Ambon city in 2016-2019 averaged 7.28%, in 2020 it decreased by 6.89% due to the Covid 19 pandemic disaster, the Central Bureau of Statistics of Maluku 2021.

Studies of the development of Amahusus coastal infrastructure include; swimming pools and parking lots, daving piers, daving offices, hotels and restaurants, beach shops, boat transportation and parking lots will be a marine tourism attraction, supported by professional tourism human resources in providing excellent service and measurable promotions will attract tourists to contribute to the GRDP of Ambon city. Ansis is projected that in 2021-2026 there will be a proposed increase in Darwin-Ambon foreign tourist visits by 20-75% per year. The Gross Regional Domestic Product (GRDP) of Ambon City in 2021-2026 experienced a gradual increase of between 3-8%.

IV. Conclussions

First, the Amahusu coastal area is characterized by coral reefs, coastal areas that are parallel to the coastline and are made protected from storms, tidal currents for coastal tourism. Second, the Amahusu coastal infrastructure concept is segregated into three segments that are integrated with conservation-minded technical infrastructure. Finally, the value of Ambon City's Gross Regional Domestic Product (GRDP) in 2021-2026 has increased gradually between 3-8%.

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