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Infrastructure Development of the Hunua Ferry Port of Maluku Province in Indonesia

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Abstract: *The problem of the Maluku Islands Province are sea and ferry transportation facilities and infrastructure, the city of Ambon as the centre of government, the growth of various aspects of life in Maluku Province is the distribution artery to and from other regencies and cities so that safe, comfortable facilities and infrastructure are needed. Hunimua Port is one of the oldest ports in Ambon City which serves the Hunimua – Waipirit to round-trip route to Seram Island. This study analyses the operational performance of services, utilities and priorities for the development of Hunimua port infrastructure using the Analytics Hierarchy Process method which is reviewed based on the Passenger Service Standards. The results show that the priority of infrastructure development can be carried out on the level of comfort by improving passenger terminal facilities and maximizing the stacking field or waiting area for motorized vehicles before boarding the ship and taking into account the effective time of loading and unloading vehicles on the number of vehicles at the Hunimua port.*

Keywords: *Ferry transportation, Port, Pier, Infrastructure*

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I. Introduction

Maluku province consists of 1,340 islands, there are 225 inhabited islands, sea transportation facilities and ferriages are important as a link between islands. Efficient and effective transportation is determined by connectivity chains or nodes that function as composition, connection, exchange and decomposition, especially in intermodal transportation [1]. To support safe and comfortable transportation facilities, seaports and crossings are needed as the lifeblood of the movement of people and goods between islands and beaches. Currently, Maluku province has 30 ferry ports with 58 ship lanes within Maluku province and 4 ship lanes between Maluku provinces [2].

The Hunimua ferry port serves routes within the Maluku Province with the category of a commercial port that connects the Ambon Island ferriage from and to Seram Island. The problem of this port infrastructure in its operations is to meet the requirements of safety, security, reliability/regularity, comfort, convenience/affordability and equality in accordance with the public service obligations of transportation service providers in this case carried out by the Port Business Entity [3] so that the handling of the operation and maintenance of infrastructure port is carried out periodically.

A port is an area that has infrastructure facilities and infrastructure to support activities that meet operational requirements [4]. Hunimua ferry port was built in 1980, pier capacity 500 GT, loading and unloading type e*mbankment wharf*, causeway size 15x6 meters, pier length 50 meters, dolphin pier type, number of breasting dolphin 2 units, mooring dolphin 2 units and pool depth 5 meters [5] . The land side consists of delivery and pickup parking areas, passenger waiting rooms, passenger ticket counters, vehicle ticket booths, passenger vehicle parking areas, rest areas, offices, prayer rooms, toilets, kiosks, parks and passenger corridors entering and leaving the port, so that modernization and port rehabilitation is very influential on the development of port development [6].

The development of the Hunimua ferry port on the land side area refers to the Ferry Transport Service Standard [7], the development of the Hunimua port which has been charged to the Port Business Entity which must pursue profit or profit so that port development needs to be carried out regularly by providing a priority scale for port infrastructure development in accordance with community needs.

II. Research Methods

This research is located at Hunimua – Ambon Ferry Port, Liang Village, Salahutu District of Middle Maluku Regency. Located on a provincial road on the island of Ambon (see in Fig. 1) on the north side there is Liang beach as one of the locations for marine tourism on the island of Ambon, the research uses the Analytic Hierarchy Process (AHP) method. .

Figure 1. Research Location

Primary data is carried out by direct observation as well as detailed documentation of the physical port, especially the land side area, questionnaire data distributed to respondents, publication data published by the private sector or professional government which is their duty and responsibility to be disseminated to the public. Secondary data sourced from the company of ASDP Indonesian Ferry Ambon Branch, Maluku Provincial Transportation Service and other responsible data sources.

Data analysis was carried out with Service and Utility Operational Performance Analysis at Hunimua Port, based on Utility Indicators. To measure the extent to which port facilities and supporting facilities are used intensively

Based on the Regulation of the Director General of Sea Transportation [8] the analysis parameters are as follows:

i. Pier Usage Rate / Berth Occupancy Ratio (BOR),
ii. Yard Occupancy Ratio (YOR), the ratio between the number of use of the stacking field
iii. Waiting Time (WT) is the time the ship waits for mooring services, pilotage or delay services [9],
iv. Approach Time (AT) is the time used during piloting services [9]
v. The ratio of the working time of the ship at the mooring (ET/BT) is the ratio of the amount of time ready for operation (Effective Time) with the time to dock (Berthing Time)
vi. Ton/Gang/Hour (T/G/H) is the number of tons of goods unloaded/loaded in one working hour by each labor gang (TBKM) [8]

Based on the results of the Analytic Hierarchy Process [11], it can be seen that the priority of developing Hunimua port infrastructure is based on the results of questionnaires from various government agencies and academics. The priority stages of Hunimua port infrastructure development are as shown in Table 1.

Table 1. Criteria-Alternative Relationship Code

Criteria:		**Alternative:**	
Code	Ministry of Transportation of the Republic of Indonesia, No. 39 of 2015 (Passenger Service Standards for Ferriage)	Code No.	Ministry of Transportation of the Republic of Indonesia, No. 51 of 2004 (Operation of Ferry Ports)
1	Safety	1	Passenger terminal
2	Security	2	Weighing of loaded vehicles;
3	Reliability/regularity	3	Passenger way in/out the ship 'gangway'
4	Convenience	4	Offices for government activities and services
5	Convenience/Affordability	5	Fuel storage facilities (bunkers)
6	Equality	6	Water, electricity and telecommunications
		7	installations
		8	Access roads and/or railways

		9	Firefighting facilities
		10	A place to wait for motorized vehicles before boarding the ship
		11	Office areas to support the smooth operation of port services
		12	Waste storage area
		13	Business facilities that support ferry port activities
		14	Port development area
			Other public facilities (worship, park, green line and health)

III. Result And Discussion

Based on data obtained at Hunimua port, Hunimua port operational services serve the Hunimua – Waipirit route with the status of Commercial Track in Maluku province with a trajectory of 11.5 miles, ships operating on this route are 5 ships, namely KMP Terubuk, KMP Inelika, KMP Tanjung Koako, KMP Roka Tent and KMP Dolosi with a weight of 322 GT. up to 1,148 GT.

The parameters used in calculating the operational performance of the Hunimua ferry port are as in Table 2.

Table 2. Operational performance of Hunimua port services

No.	Parameter	Operational Performance Analysis Method
1	BOR Jetty (Jt)	75%
2	*Yard Occupancy Ratio* (YOR)	6,58 %
3	*Waiting Time* (WT)	- 10 minutes
4	*Approach Time* (AT)	15 minutes
5	*Ship Working Time Ratio at Mooring (ET/BT)*	100 %
6	Loading and Unloading Flow Performance *Ton/Gang/Hour* (*T/G/H*)	0,75 *Ton/Gang/Hour*

Source: Analysis results, 2021

Comparison of operational standards with analysis results according to Hunimua port performance standards is presented in Table 3.

Table 3. Standard operational and factual field

No	Parameter	Unit	Performance Standard	Performance Value	Performance Achievements
1	WT	Hour	1	-10 minutes	Good
2	AT	Hour	2	15 minutes	Good
3	ET/BT	%	70	100	Good
4	T/G/H	Ton	20	0,75	Low
5	BOR	%	70	75	Good
6	YOR	%	75	6,58	Low

Source: Decree of the Director General of Sea Transportation [10}

Port Infrastructure Development

The development of Hunimua port infrastructure can be carried out with several priority alternatives according to the AHP analysis with the Expert Choice application as in Table 4.

Table 4. Hunimua port infrastructure development priorities

Development Criteria	Infrastructure Alternative (Code)	Priority order of Infrastructure Development (Expert Choice)
1. Safety Aspect	2. (2) 5. (8) 3. (5) 6. (10) 4. (7)	Hunimua port facilities or infrastructure that need to be developed are firefighting facilities
2. Security Aspect	1. (1) 7. (8) 2. (3) 8. (9) 3. (4) 9. (10) 4. (5) 10. (12) 5. (6) 11. (13) 6. (7)	Hunimua port facilities or infrastructure that need to be developed are water, electricity and telecommunications installations
3. Aspects of Reliability/ regularity	1. (1) 7. (8) 2. (2) 8. (9) 3. (3) 9. (11) 4. (4) 10. (12) 5. (5) 11. (13) 6. (6) 12. (14)	Hunimua port facilities or infrastructure that need to be developed are water, electricity and telecommunications installations with an inconsistency value of 0.02.
4. Comfort Aspect	1. (1) 6. (9) 2. (3) 7. (11)	Hunimua port facilities or infrastructure that need to be developed are passenger terminals

	3. (4) 8. (12) 4. (6) 9. (14) 5. (7)	
5. Aspects of convenience/ affordability	1. (1) 5. (12) 2. (3) 6. (14) 3. (4) 4. (7)	The Hunimua port facility or infrastructure that needs to be developed is the passenger terminal
6..Equality Aspect	1. (1) 4. (9) 2. (3) 5. (12) 3. (7) 6. (14)	Hunimua port facilities or infrastructure that need to be developed are the waiting areas for vehicles before boarding the ship

The results of the priority analysis of infrastructure development of basic and supporting facilities to determine the important criteria in the development of Hunimua port are as in Table 5.

Table 5. Priority for infrastructure development according to passenger service standards

Criteria	infrastructure alternatives	Infrastructure Development Priority Results (Expert Choice)
Development of Hunimua Ferry Port Infrastructure	1. Safety aspect 2. Security Aspect 3. Aspects of Reliability/regularity 4. Comfort Aspect 5. Aspects of convenience/ affordability 6. Equality Aspect	With an inconsistency value of 0.01, the criteria for the convenience aspect are very much needed in the priority of developing Hunimua Port infrastructure

IV. Conclusion And Recommendation

The operational performance of Hunimua Port, such as Waiting Time, Approach Time, Effective Time/Berthing Time and Berth Occupancy Ratio is relatively good. The priority of infrastructure development can be done on the aspect of comfort by improving passenger terminal facilities

In an effort to increase the effectiveness of services to the public, users should accelerate the construction or rehabilitation of passenger terminals, maximize the stacking area, namely a waiting area for motorized vehicles before boarding the ship, and the provision of loading and unloading equipment and weighing equipment to calculate the weight of vehicles that will get on and off the ship.

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