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Fishery Harbor Needs Analysis for Fishery Vessel Activities in Ocean Bungus Fishery, West Sumatra Province

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ABSTRACT

The size of the fishery harbor will affect the number of ships that will dock. The purpose of this research is to find out the size of the needs of fishery harbor and find out the depth of the fishery harbor needed for the smooth running of activities at PPS Bungus. Data retrieval is carried out directly in the field, to see the maximum number of ships anchored in the area of the fishing harbor (m^2), the depth of the fishing harbor (m), data on the width, length, and depth of the largest ship (m), maximum ebb in the fishery harbor (m), and squat or height of the moving ship (m). The results of the study concluded that the existing fishing harbor is no longer able to accommodate all the ships that are anchored. The current fishery harbor area is 40,000 m^2 with 348 ships, requiring a fishery harbor area of 458,762.06 m^2.

Keywords: Needs breadth, Depth of the pool, Bungus

1. INTRODUCTION

Indonesia has 11 fisheries management areas (WPP), with 1139 fishing ports (KKP, 2014). Based on the total of all fishing ports in Indonesia, there are six fishing ports with PPS status, while nine other fishing port units are planned to have PPS status in the next 10-20 years. The geographical location of the Bungus Ocean Fisheries Port (PPSB) is in the administrative area of Labuhan Tarok Village, Teluk Kabung (Bungus) District, Padang City, and West Sumatra Province. Position 01º02'15" SL and 100º23'34" EL. Labuhan Tarok Village is located at an altitude of 0-140 m above sea level with an area of 320 Ha, 16 km from the city of Padang. PPS Bungus in the management area is in WPP 572.

Harbor ponds are the main facilities that have a major influence on the function of fishing ports. Research on the feasibility of the port pond area is deemed necessary to estimate the area of the Bungus PPS pond that has been built at this time to be able to balance the number of fishing vessels and the current loading and unloading of ships, especially vessels > 30 GT in Bungus PPS. Forecasting is used as a benchmark for quantitative values to estimate the situation in the next few years. The port pool according to its function is divided into two, namely: 1) the shipping channel is the entrance to the port pool to the pier. Shipping lanes are determined by several factors, including the size of the ship entering the channel (length, width, load, and speed), the direction of the traffic lane, the shape of the channel curve, the braking distance, the ship's turning point, the direction and direction and magnitude of the hydrodynamic forces, and the direction of the ship when it is docked at the pier. 2) Turning pool, namely the area of water for the rotation of the ship. The turntable has a diameter twice the length of the ship.

The purpose of this research is to find out the size of the needs of the port pool and find out the depth of the port pool needed for the smooth running of activities at PPS Bungus

2. RESEARCH METHODS

Methods

Data collection is carried out directly in the field, to see the maximum number of ships anchored, the area of the harbor pool (m^2), the depth of the harbor pool (m), data on the width, length, and depth of the largest ship (m), maximum ebb and flow in the harbor pool (m), and squat or the height of the moving ship (m).

Data Collection

Primary data is data obtained directly from the source, i.e. data obtained from direct

observations such as measuring the depth of the harbor pond, observing ship samples, observing waves in the harbor pool, observing the tides in the harbor pool, observing the condition of the waters directly.

Secondary data is data that is already available by other parties, namely in the form of management documents, books, research journals, articles, magazines, internet and libraries related to the Bungus PPS. Secondary data obtained from PPS Bungus such as logbook data, fishing vessel certificates, and other harbor syahbandar data deemed necessary

Data Analysis

Data analysis was performed by calculating the required pool area, pool depth, largest vessel size, maximum number of vessels anchored, average vessel length, largest vessel length, and largest active vessel width. Calculating the required area of the harbor pool can be calculated using the formula according to Zain *et al.* (2011):

L = lt + (3. N. LOA. B)

lt = 3.14 (1.5 . LOA max)^2

Information:

L	=	Required port pond area (m^2)
Lt	=	area of rotating pool (m^2)
N	=	Maximum number of vessels berthing (unit)
LOA	=	average ship length (m)
LOA max	=	largest ship length (m)
B	=	average ship width (m).

The Need for Deep Harbor Ponds

Calculation of the depth of the harbor pool based on the draft of the ship at full load, tides in the harbor pool, squat or the height of the bow of the ship moving in the harbor pool and the safe distance of the ship's keel to the bottom of the water, then determining the depth requirement of the harbor pool can be calculated using the formula according to Zain *et al.* (2011):

D = dmax + 1/2. H+S+C

Information:

D	=	Pool depth (m)
Dmax	=	Draft of the ship at full load (m)
H	=	Maximum wave height in the pool (maximum 0.5 m)
S	=	Squat or high bouncy ship (m)
C	=	Clearance (safe distance from the ship's keel to the bottom of the water (0.25-1m)
½	=	Constant

Queuing Model Data Analysis

In finding the optimal value for the service system to find the value of service time, the number of queues, and the number of services, you can use these four models, namely (Retnaningsih *et al.,* 2011). M/M/I model or single line queuing model, this model shows customer arrivals with poison distribution and exponential distribution of service time based on the following formula:

1. Intensity level of service facilities
$$p = \frac{\lambda}{\mu}$$
2. The expected average number of customers in the system
$$l = \frac{p}{1-p}$$
3. The expected number of customers waiting in the queue
$$lq = \frac{\lambda^2}{\mu(\mu-\lambda)}$$
4. The time expected by the customer while in the queuing system
$$w = \frac{1}{\mu-\lambda}$$
5. The time expected by the customer while waiting in line
$$Wq = \frac{\lambda}{\mu(\mu-\lambda)}$$

3. RESULT AND DISCUSSION

Bungus PPS Pool Area

From the results of the analysis using the formula Zain *et al*. (2011) the area of the PPS Bungus turntable from the calculation results is 4,144.388 m. This result is obtained by multiplying the length of the largest ship. The maximum number of ships anchored during the January 2022 period is 348 units. The average length of the ship is 49.93 m, the largest ship length is 24.22 m, and the average ship width is 8,777,058 m.

From the current condition of the Bungus PPS ponds and the amount needed for port pools, based on the current needs of the Bungus PPS pond area, which is 40,000 m^2, it is still lacking and is in contrast to the need for ships which should be 458,762.06 m^2.

According Lubis & Mardiana (2011), the area of the harbor pond is very important, because it will affect the smooth running of capture fisheries activities.

Information regarding the needs of the harbor pool needs to be known so that the port pool facilities can function optimally. Based on the calculations that have been done, the area and depth requirements of the port pool can be seen in Table 2.

Table 2. Comparison of the need for area and depth of the pool

No	Facility Type	Current condition	Need
1.	Port Pool Area (m^2)	40,000	458,762.06
2.	Harbor Pool Depth (m)	3	2.75

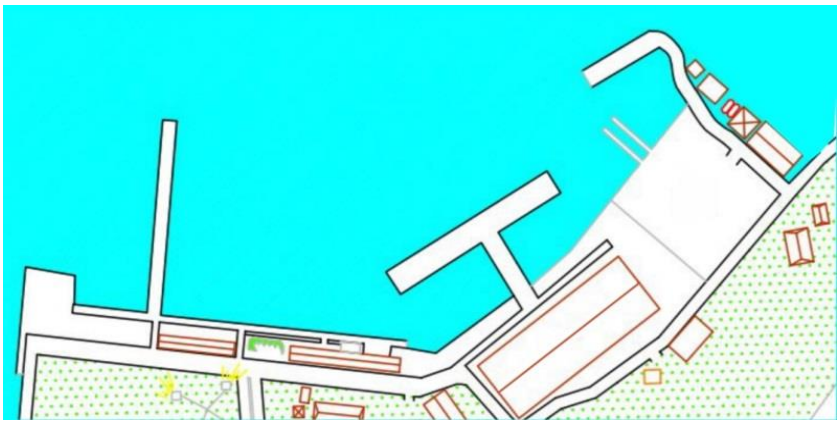

Figure 1. Bungus PPS Pond Sketch

PPS Bungus Pool Depth

The depth of the port pool is currently around 3-7 m, of course, it can still accommodate ships with larger GT sizes, and so there is no need to dredge the port pool. Calculation of the draft on a fully loaded ship with the Tiar Jaya 01 sample of 0.5 m and a wave height of 0.5 m, a squat or nod of the ship is 1 m. The clearance or safe distance to the bottom of the water is 1 m, the depth of the Bungus PPS pool is needed of 2.75 m, so it was concluded that the depth of the harbor pool does not yet need to be dredged.

Queuing Model Data Analysis

M/M/I model or single-line queuing model. This model shows that customer arrivals have a poison distribution and service times have an exponential distribution (Retnaningsih *et al.*, 2011).

The intensity level of service facilities is equal to 0.48, indicating that the syahbandar service section will be busy serving 48% of the time. While 52% of the time is called idle time, the waiter will use it to rest or do other activities. The expected average number of customers in the system is one ship. This number indicates that the expected average vehicle is one ship. The expected number of customers waiting in the queue is 0.44. The waiting ship is one ship.

The time expected by the customer while in the queuing system is 0.07. The average time a vehicle waits in the system for 5 minutes. The time expected by the customer while waiting in the queue is 0.06. The sum of these numbers indicates that the average time a ship waits in a queue is 4 minutes, with 0.48 units of ships queuing.

4. CONCLUSION

The results of the research that has been carried out, that the existing pond is no longer able to accommodate all the ships that are anchored, the required pool area is 458,762.06 m^2, and the total area of the harbor pool that has been built is 40,000 m^2. The depth of the harbor pond at Bungus PPS is 3-7 m, the depth of the harbor pond at Bungus PPS is 2.75 m, and the overall depth of the harbor pond is sufficient.

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