Facility Utilization Study Fish Landing Base Dumai Riau Province

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Abstract

This study aimed to analyze the utilization study of Dumai Fish Landing Base facilities in Riau Province. This research was conducted in March 2023 at the Fish Landing Base (PPI) in Dumai City, Riau Province. The methods used in the study were surveys and interviews. The results showed that the fishing gear used by fishermen at PPI Dumai were gillnet, longline, sondong, and kurau net. The high percentage of utilization of dock facilities is about 545,45% and the port pool area is 139,98%, which means that the port pool area has exceeded highly utilized, while the utilization rate of the port pool depth is 87,5%, which means that it can still be utilized more optimally by fishermen. The utilization rate of the PPI Dumai auction building facility is 72,98%, which means that the auction building has exceeded being highly utilized.

1. Introduction

According to data from the Fish Landing Port of Dumai City, Riau Province (2019), PPI Dumai, which is located in Pangkalan Sesai Village, has the potential for marine resources because it is directly opposite the Malacca Strait and is a port that has a function to facilitate production, processing, and marketing of production products and as a center for the development of fishermen in Dumai City.

The fishing gear used by PPI Dumai fishermen include sondong, gill nets, rawai, and splints produce different catches that have economic value, while the most widely used fishing gear is gill nets. Utilization of port facilities is an activity to use available facilities that are expected to balance usage with facilities so that facilities are well utilized and activities at the port can run accordingly (Yernis, 2021).

PPI Dumai is a type D port and the only one in Dumai City so many fishermen who are not only from Dumai City land their catches at PPI Dumai because the facilities are relatively complete but not yet well utilized. PPI Dumai has had a relocation development plan since 1998, its construction was carried out in 2000 with two stages of development, namely the first stage of making port ponds, sheet piles, PPI buildings, and several functional facilities and other supporting facilities while in the second stage making concrete roads, ice factories, cold storage, and docks.

PPI Dumai has a relatively long pier but it can slow down the loading and unloading activities of the fishing fleet because maintaining the quality of the catch must be done quickly and timely and efficiently, to accommodate the catch of local fishermen and outside the city of Dumai, the capacity of the PPI Dumai market lot is not sufficient which causes many fishermen to land their catch outside PPI Dumai, and for cold storage facilities it has not been utilized properly because the catch of fishermen is immediately used up on the same day.

Therefore, it is necessary to research the level of utilization of existing facilities at PPI Dumai to find out how much the level of utilization of existing facilities is and provide information to further improve the utilization of facilities at PPI Dumai.

2. Methodology

2.1. Time, Place, and Materials

This research was conducted in March 2023 at the Fish Landing Base (PPI) of Dumai City, Riau Province. While the materials used in this study are questionnaire sheets.

2.2. Method

There are several stages of data collection in this research, namely; 1) Data collection on the general condition of the study, 2) Conducting interviews/questionnaires with fishermen and related parties, 3) Measuring the facilities of the Fish Landing Base, and 4) Documenting and tabulating the data obtained during the research.

The data collected in this study are primary data and secondary data. Primary data is obtained by making direct observations of facilities and activities at PPI Dumai and distributing questionnaires to fishermen as sources. While secondary data collection is obtained from related agencies and literature.

2.3. Data Analysis

Technical analysis is used to calculate the size requirements of facilities at PPI Dumai based on activities in the port. The analysis used is the Pianic formula (1999) to analyze the dock and the Directorate General of Fisheries formula (1991) to analyze the port pool based on existing conditions at PPI Dumai. The formula used is as follows:

2.3.1. Pier Length

The length of the mooring jetty is calculated by the Pianic formula *in the* Directorate General of Fisheries (1991), namely:

$$L=\frac{(n.\ Lu.TS.\ S)}{(Dc.T)}$$

$$Lu=1{,}1\times LOA$$

Where:

L = Required pier length (m)
N = Number of operating fleets (units)
TS = Service time required (hour)
S = Irregularity factor
Dc = Cruise return period (days)
T = Time available for service (hour)
LOA = Length of sample ship (m)

While the length of the loading dock is calculated using the Pianc (1999) formula, namely:

$$L=\frac{(n.\ Lu.Q.\ S)}{(Dc.U.T)}$$

$$Lu=1{,}1\times LOA$$

Where:

L = Required pier length (m)
N = Number of operating fleets (units)
Q = Landed catch (tons)
S = Irregularity factor
D = Cruise return period (days)
T = Time available for service (hour)
LOA = Length of sample ship (m)

2.3.2. Harbor Pond

The harbor pond area is calculated using the formula of the Directorate General of Fisheries (1981), namely:

$$L=Lt+(3.N.LOA.B)$$

$$Lt=3{,}14\left(1{,}5.LOA_{max}{}^{2}\right)$$

Where:

L = Harbor pond area $(m)^2$
Lt = Area of the pool for turning the ship/turning *basin* $(m)^2$
N = Maximum number of vessels docked each day (units)
LOA = Average ship length (m)
LOA_{max} = Largest ship length (m)
B = Average ship width (m)

Calculating the depth of the harbor pool is:

$$D=dmax+\frac{1}{2}.H+S+C$$

Where:

D = Depth of pond (m)
dmax = Largest ship *draft* (m)
H = Maximum wave height in the pond (maximum 0.5 m)
S = Squat (sailing ship swing height in m)
C = Clearance (safe distance of the ship's keel & bottom of the water in m) which is between 0.25 to 1 m)

2.3.3. Fish Auction

To calculate the area of the fish auction site based on the needs of fishermen is

$$S=\frac{Ni.\ P}{R.\ a}$$

Where:

S = Area of the auction building $(m)^2$
Ni = Total catch per day (tons)
P = Room factor (m^2 / ton)

R = Frequency of auction (how many times it occurs in a day)

A = Comparison of the auction room to the auction building

2.3.4. Utilization Rate Analysis

To determine the level of facility utilization, the formula was used:

$$\text{Utilization rate} = \frac{\text{Up}}{\text{Ut}} \times 100\%$$

Where:

Up = Required size

Ut = Available size

If from the calculation obtained: i) Utilization percentage > 100%, the level of facility utilization exceeds optimal conditions; ii) Percentage of utilization = 100%, the level of facility utilization reaches optimal conditions; iii) Utilization percentage <100%, the level of facility utilization has not reached the optimal level, and iv) The results of the analysis obtained are then discussed descriptively by comparing related literature

3. Result and Discussion

Fishing ports are equipped with various facilities. These facilities consist of basic facilities, functional facilities, and supporting facilities. However, not all facilities are owned by a fishing port, depending on the type and needs of the port itself. Basic facilities are facilities that are needed for the safety of shipping and also anchorage, mooring, and loading and unloading so that ships are safe in and out of the port. Functional facilities are facilities that function to increase the use value of the main facilities by providing services that can support activities at the port. Port operational activities such as loading and unloading, operation of fishing boats, and handling of fishery products will not run without functional facilities, supporting facilities are facilities that indirectly increase the role of the port or the actors get the comfort of doing activities at the port. The types of facilities available at PPI Dumai are still very limited. Regarding the area and condition of the facilities can be seen in the following Table 1.

Based on calculations made on several PPI Dumai facilities, the available size and required size can be presented (Table 2)

Table 1. Types of facilities and their sizes in PPI Dumai

No.	Facility Type	Size	Conditions
1	Basic Facilities		
	Port Pond Area	17.000 m^2	Good
	Port Pond Depth	2 m	Good
	Pier Length	227 m	Good
2	Functional Facilities		
	Auction Room Area	324 m^2	Good

Table 2. Calculation results of several facilities at PPI Dumai

No.	Facilities	Size		Utilization Rate
		Available	Needed	
1	Pier Length	227 m	343,24 m	151,21 %
2	Port Pond Area	17.000 m^2	13.002,88 m^2	76,49 %
3	Port Pond Depth	2 m	1,75 m	87,5 %
4	Area of TPI (Fish Auction Place)	324 m^2	32,53 m^2	10,04 %

3.1. Pier Length

Dock facilities are the main facilities found in every fishing port including PPI Dumai which is used where ships moor to carry out activities to fill supplies and unload fish catches, and there is no separation between loading docks and unloading docks. The things that influence determining the needs of the dock at PPI Dumai are the number of operating fleets (n) in 1 day, the length of service time provided by PPI Gaung (T), the shipping period of each trip per day (DC) and the irregularity factor (s) are things that influence the calculation of the loading dock needs (Yahya *et al*., 2012).

The overall available dock length at PPI Dumai is 227 m and the required dock length is 343.24 m. This result is obtained from the

length of the large-size gillnet fishing gear dock, which is 16,34 m, the length of the medium-size gillnet fishing gear dock, which is 14,23 m, the length of the small-size gillnet fishing gear dock, which is 74,25 m, the length of the small size longline fishing gear dock, which is 67,32 m, the length of the large size sondong fishing gear pier, which is 39,6 m, the length of the medium size sondong fishing gear pier, which is 39,11 m, the length of the small size sondong fishing gear pier, which is 81,68 m, and the length of the kurau fishing gear pier, which is 10,73 m.

The length of the available pier comes from the length of the small jetties on the right and left sides of the pier. Regarding the number of ships that carry out activities at the dock, the port should add fenders and bolder on the right and left sides of the dock or build small jetties in the main part of the dock so that the dock can accommodate ship activities properly. Dock operational activities at PPI Dumai are still carried out by the port starting from mooring permits and unloading catches. From the analysis carried out, it was obtained that the utilization rate of the dock facility was 151,21%, this means that the dock was more than highly utilized. Therefore, it is necessary to find a solution in the form of increasing service hours for fishermen's activities to facilitate activities at PPI Dumai so that it can accommodate the entire fleet that carries out its activities every day.

3.2. Port Pond Area

The Port pond facilities are also very important to consider in the management of fishing ports. The harbor pond is the water area of the fishing port for the entry of ships that will dock at the dock, its function is as a place for the shipping channel which is the entrance to the harbor pond to the dock and as a ship turning pool, meaning the water area for rotating ships. Silting the harbor pond is a major problem for ships entering the dock. The total harbor pool area available at PPI Dumai is 17.000 m² and the required harbor pool area is 13.002,88 m.

From the analysis conducted, the utilization rate of the port pond area is 76,49%. Based on the results of the calculation, it can be seen that the depth of the existing port pool does not meet the needs at PPI Dumai, because the utilization rate of the port pool itself has not reached the optimum.

3.3. Port Pond Depth

In determining the port pool depth requirements, this is influenced by the value of the ship's vertical motion (G) to get the value of the ship's motion (G) the largest ship draft value (d) is required in PPI Dumai, the largest ship draft value (d) is taken from the largest ship weight in PPI. In addition to vertical motion, the characteristics of the bottom of the water also affect the requirements of the depth of the pool (H) of the port, where the characteristics of the bottom of the PPI Dumai waters are muddy, then the value of the freedom space (C) used is 0,25m. Measurement accuracy (P), 0,5 revenue space (S), and dredging tolerance (K) are set at 0,25 m each according to (Suherman, 2010). The overall harbor pond depth available at PPI Dumai is 2 m and the required harbor pond depth is 1,75 m.

The utilization rate of the port pool depth is 87,5%. Based on the results of the calculation, it can be seen that the depth of the existing port pool does not meet the needs at PPI Dumai, because the utilization rate of the port pool itself has not reached the optimum.

3.4. TPI Area

Determining the area of fish auction needs is influenced by the number of fish landed in one day (Ni), in addition to the total number of fish landed (Ni), for the room factor (P) used at PPI Dumai because of the way the fish are displayed when they want to be landed stacked in 3 layers, then the room factor used is 6 (Ardandi *et al.*, 2013) the number of auctions (R) in one day that occurs at PPI Dumai 4 times, then the value (R) is 4, while the ratio value of the area used for fish places to the total area of the fish auction site (a) is 0,30 (Sawitri, 2022).

PPI Dumai has a fairly large TPI building with a size of 324 m², while the required TPI area is 32.53 m². This result is obtained from the TPI area of large gillnet gear, which is 1 m², the TPI area of medium size gillnet gear, which is 1 m², the TPI area of small size gillnet gear, which is 6 m², the TPI area of small size longline gear, which is 10 m², TPI area for large sondong fishing gear which is 2,67 m², pier length for medium sondong fishing gear, which is 3,47 m², TPI area for small sondong fishing gear, which is 7,8 m², and TPI area for kurau fishing gear, which is 0,6 m².

This building is used to facilitate auctions or marketing activities for fish caught in PPI Dumai. The TPI is in good condition, but the drainage is not functioning properly. It is very disturbing to the fish auction process because this condition affects the quality of the fish. The utilization rate of PPI Dumai's auction building facility is 10.04% and from this value, the TPI port area has not reached the optimal value of 100%. Based on the calculation results, it can be seen that the current TPI utilization rate has not met the needs at PPI Dumai, because the TPI utilization rate itself has not reached the optimum.

4. Conclusion

The utilization rate of dock facilities is 545,45%, which means that the dock has exceeded being highly utilized. The utilization rate of the port pool area is 139,98%, which means that the port pool area has exceeded highly utilized, while the utilization rate of the port pool depth is 87,5%, which means that it can still be utilized more optimally by fishermen. The utilization rate of the PPI Dumai auction building facility is 72.98%, which means that the auction building has exceeded being highly utilized.

PPI Dumai managers are expected to improve facilities and infrastructure, improve the number of PPI Dumai management members and optimize the utilization of available PPI Dumai facilities so that fisheries entrepreneurs will be more confident and interested in cooperating with PPI Dumai which will economically not only have a positive impact on fisheries entrepreneurs and PPI Dumai managers but also for fishermen and communities who live not far from PPI Dumai. Then there needs to be support from the government, especially licensing issues related to the development of PPI Dumai in the future.

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