

Analysis of the Utilization Level of Port Facilities at Belawan Ocean Fishery Port (PPS)

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Abstract: Belawan Ocean Fishery Port (PPS) is one of the largest fishing ports in North Sumatera. PPS of Belawan aims to increase the income of fishing communities through the provision of fishing port facilities and infrastructure. The study aims to analyze the level of utilization of basic, functional, and supporting facilities at the PPS of Belawan and to determine the condition of these facilities. The method used in this study was survey method. The data collected in the study were primary data in the form of interviews with several informants whose daily activities are related to port facilities, namely basic facilities, functional facilities, and supporting facilities. This primary data is used to analyze the condition of port facilities at the PPS of Belawan. Meanwhile, to analyze the level of utilization of port facilities, the data collected is secondary data, namely data related to the number, size and availability of facilities taken from data at PPS of Belawan. The data analysis used was descriptive, namely explaining the condition of port facilities and the level of utilization of port facilities from several facilities that can be calculated systematically. The results of the study indicate that PPS of Belawan facilities that can be calculated for their utilization level are still not utilized with the utilization level analysis showing a very low percentage, while the condition of all facilities needed at the ocean fishing port, which are divided into basic facilities, functional facilities, and supporting facilities, are in fairly good condition, and can support port operations quite well. Current conditions in the field through field surveys show that there are several facilities whose utilization level is not optimal and whose condition is not good, such as the harbor pool, dock, and fish auction place.

Keywords: *facilities, condition, utilization*

1. Introduction

Belawan Ocean Fishery Port (PPS) is one of the largest fishing ports in North Sumatera. It has an important role in capturing fisheries activities and their marketing. PPS of Belawan is in a strategic position, namely located between the East Coast Waters of Sumatera (Malacca Strait), the Waters of the Indonesian Exclusive Economic Zone (ZEEI) and the South China Sea, and is an entry point for economic activities of several countries in Asia [1].

This port is the only Type A fishing port on the East Coast of Sumatera, PPS of Belawan aims to increase the income of fishing communities by providing fishing port facilities and infrastructure, developing fisheries tourism and encouraging fisheries industry businesses. PPS of Belawan is equipped with fish landing and fish auction places that have very good prospects as a place to market fish in North Sumatera both for local marketing and for export. The development of PPS is needed to support the business and development of the fisheries economy, especially in supporting the development of the fisheries industry both upstream and downstream, so that the utilization of fisheries resources will be achieved in a balanced, even and proportional manner.

In other words, the development of PPS of Belawan aims to provide convenience for service users and fishermen in developing their businesses, so that it will increase income through business effectiveness and efficiency which in turn will improve their standard of living and welfare. Optimal fishing port operations require the support of port facilities that support the running of port activities [2]. Regulations stipulate that a port requires facilities consisting of basic facilities, functional facilities and supporting facilities [3]. PPS of Belawan has an influence in supporting the capture fisheries business in the province of North Sumatera. The availability of good fishing port facilities will support the running of port services. According to [4], fishing ports equipped with good facilities such as docks, fish auction places, cold storage, fuel filling places, ship repairs, and sanitation and clean water facilities will greatly support fishermen's productivity. This is because fishing activities and distribution of catches become faster, safer, and more efficient [4]. A similar opinion also emphasized that the availability of complete port facilities can reduce operational costs and increase the selling value of catches through good post-harvest handling [5]. Conversely, if the condition of the

fishing port facilities is limited, then port services will be less than optimal. Several by [1] shows that the level of utilization of several fishing port facilities at PPS of Belawan is still not optimal, there are several facilities that have been utilized but not optimally and some are not utilized. Regarding the latest conditions of the port facilities reviewed in the field, there are some that are not good, such as the port pool which is experiencing shallowing which has an impact on reducing the smoothness of ship activities that will leave and enter the port area. Some facilities are also underutilized, such as the fish auction place. This study aims to analyze the condition of port facilities and the level of utilization of port facilities at PPS of Belawan. So, it is necessary to conduct research with the title analysis of the level of utilization of port facilities at the PPS of Belawan. The results of this study are expected to be information material for continuous evaluation in the optimal management of PPS of Belawan.

2. Material and Methods

2.1. Materials

The substance of this research material is the PPS of Belawan. Specifically for the level of utilization of fishing port facilities that are the objects of research are port land, shipping lanes, jetty, port ponds, drainage, fish auction places, port administration offices, clean water supply, electrical installations, fishermen's meeting halls, guard posts, and sanitation facilities.

2.2. Methods

The method used in this study is the descriptive survey method. The descriptive survey method is a method of collecting as much data as possible regarding factors that support research in this case are aspects of fishing, then analyzing these factors to find their role in the level of utilization of basic and functional facilities of the PPS of Belawan [6]. The survey was conducted through interviews with 30 respondents who in their daily lives are related to port facilities, including 10 managers of the PPS of Belawan, 8 fishermen from fishing vessels, 7 fishermen from fish transporters, 5 traders.

2.3. Data Analysis

Quantitative analysis is used in this study. Specifically, quantitative analysis is used to examine the theories found to define the problem. To analyze the level of utilization of several facilities that can be calculated systematically PPS of Belawan. Analysis of the level of facility utilization using the formula.

$$P = \frac{Up}{Ut} \times 100 \%$$

Description:

P = Utilization Level (%)

Up = Size of facilities utilized (m²)

Ut = Size of available facilities (m²)

Several basic and functional facilities before calculating the level of utilization use a formula that is calculated mathematically because in the use of facilities there are several factors that can affect the level of utilization of these facilities. After the utilization level values for all facilities, both basic, functional and supporting facilities, are obtained, they are then grouped based on the level of utilization of these facilities as shown in Table 1.

Table 1. Port facility utilization level category [7]

No	Utilization Rate	Category
1	≥ 80% - 100%	Very high
2	≥ 65 - <80%	High
3	≥ 50%	Medium
4	<50%	Low

The facilities are:

a. Main Facilities

1). Shipping Lane

To calculate the depth of the shipping lane, the calculation basis is used with the formula [8].

$$D = d + s + c$$

Description:

D : Depth of shipping channel (m)

d : Largest ship draft

s : Squat or vertical movement of ship due to waves (max tolerance = 0.5 m)

c : Clearance or free space between ship keel and bottom of waters (m)

2). Pier

According to the Directorate General of Fisheries, the length of the pier can be calculated using the following formula [9].

$$L = \frac{(l+s) \times n \times a \times h}{u \times d}$$

Description:

L : Length of Pier (m)

l : Average ship length (m)

s : Distance between ships (m)

h : Ship's time at the pier (hours)

d : Average fishing trip time (hours)

n : Average number of ships using the pier day

a : Average ship weight (tons)

u : Daily fish production

3). Port Pond

The formula for finding the area of the port pond is as follows [9].

$$L = Lt + (3 \times n \times l \times b)$$

Description:

L : Area of the harbor pool (m²)

Lt : Area for turning ships (m²)

n : Maximum number of ships anchored

l : Average length of ship (m)

b : Width of the largest ship (m)

b. Functional Facilities

1). Fish Auction Place

The area of the auction building can be calculated using the formula [10].

$$S = \frac{n \times p}{r \times a}$$

Description:

S : Area of the auction building (m²)

n : Average production per day

a : Ratio between auctions and auction buildings

p : Capacity factor of space to production (tons)

r : Frequency of auctions per day

For the analysis of facility conditions, it is done descriptively. The data used for this analysis is the data from interviews with research respondents. Interview data of respondents' score answers using a 5-level Likert scale, namely very poor (score 1), poor (score 2), sufficient (score 3), good (score 4) and very good (score 5). The interview results scores are then tabulated, and the results are interpreted based on the scale set out in table 1.

Table 2. Scale of Facility Conditions

No	Interpretation of condition	Score scale
1	Very poor	1
2	Poor	2
3	Sufficient	3
4	Good	4
5	Very good	5

3. Results and Discussion

3.1 Fisheries Conditions at PPS of Belawan

The fisheries conditions at the PPS of Belawan show quite significant developments, despite facing several challenges. As one of the main centers of fisheries activities in the North Sumatera region, PPS of Belawan plays an important role in supporting the fisheries sector, both in terms of fishing, processing, and distribution to domestic and export markets. According to the 2024 PPS of Belawan annual report, production and production value each month are unstable, due to several factors that influence both the weather which affects the departure of ships.

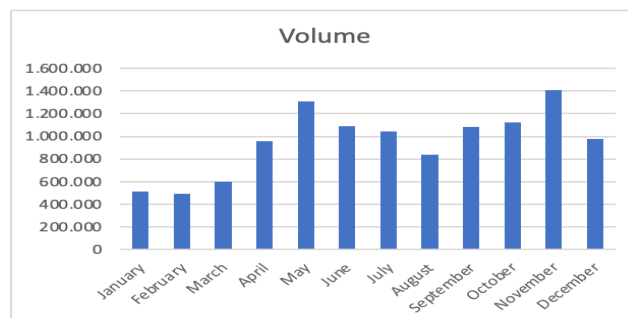


Figure 1. Diagram of Fisheries Volume at PPS of Belawan

Based on the diagram above, the highest productivity or fishing results were in November with a catch of 1,057,572 kg and the lowest was in February with a catch of 492,626 kg. The production value is influenced by the fish market with different fish prices, because the catch results are different each month.

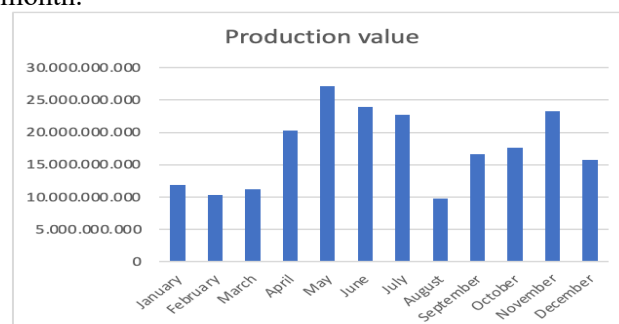


Figure 2. Diagram of Fisheries Production Value at PPS of Belawan

Based on the diagram above, the highest production value is in May with a production value of Rp. 27,110,887,500 and the lowest in August with a production value of Rp. 9,818,139,700. The productivity results are due to differences in the operation of ships that depart to catch fish. According to previous research conducted at PPP of Lempasing, fluctuations in the amount of fish production can be influenced by several factors, namely the number of fishing vessels operating at the fishing port, the number of fishermen, the number of fishing gear, and weather conditions in the waters. Fishery production in a fishing center can increase along with the increase in the number of fishing vessels, the number of fishing gear and the number of fishermen conducting fishing operations. Meanwhile, fishing operations can only be carried out if the weather conditions in the waters are good. If the weather conditions in the waters are in bad conditions such as high waves and high rainfall, then fishing operations cannot be carried out. This will affect the number of fish caught landed at a fishing port [11].

3.2. Number of Ships at PPS of Belawan

From the diagram above, it can be concluded that the most active ships were in November, namely 399, and the lowest in February, namely 202. The

frequency of ship visits was the highest in May, namely 677, and the lowest in February, namely 266. Ship visits and activities affect fish production, where the more active and visiting ships allow for greater catches [12].

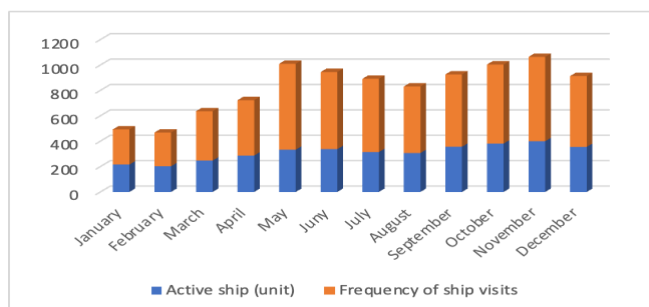


Figure 3. Number of Ships and Ship Visits at PPS of Belawan

Table 2. Utilization level analysis

No	Facilities	Available Size/Volume	Utilized Size/Volume	Utilization Rate (%)	Category
A. Main Facilities					
1	Port Area Size (m ²)	367.000	351.700	95,83	Very high
2	Depth of Navigation Channel (m)	4	4	100,00	Very high
3	Wharf Length (m)	1.228	158,55	12,91	Low
4	Harbor Basin Area (m ²)	1008	106	10,52	Low
5.	Width of complex road (m ²)	4837	4837	100,00	Very high
6.	Drainage Area (m ²)	1489	1489	100,00	Very high
			Average	63,85	Medium
B. Functional Facilities					
1	Fish Auction Area (m ²)	800	425	53,13	Medium
2	Port Administration Office Area (m ²)	200	200	100,00	Very high
3	Clean Water Supply (unit)	1	1	100,00	Very high
4	Electrical Installation (unit)	1	1	100,00	Very high
			Average	88,28	Very high
C. Supporting Facilities					
1	Fishermen's Meeting Hall Area (m ²)	150	150	100,00	Very high
2	Security Post Area (m ²)	20	20	100,00	Very high
3	Area of the Sanitation Facility (m ²)	50	50	100,00	Very high
			Average	100,00	Very high
			Total Average	82,49	Very high

According to Permen KP No. 8 of 2012, ocean fishing ports have technical operational criteria, namely, having mooring facilities for fishing vessels measuring at least 60 GT, a dock length of at least 300 m, with a pool depth of at least minus 3 m, able to accommodate at least 100 fishing vessels or a total of at least 6,000 GT and utilizing and managing land of at least 20 ha.

3.2.1. Main Facilities

Port land is the entire area used in the port to support all activities. The area of the PPS of Belawan port land is 367,000 m². The results of calculations in the field, the utilization rate of the port land is 93.53%. For shipping lanes, the utilization rate can be

3.2 Utilization level analysis

Table 2 shows that each level of utilization of facilities available at PPS of Belawan is different. Facilities that can be calculated the level of utilization using mathematical formulas or using other factors that affect the level of utilization of these facilities are only a few facilities, namely shipping lanes, docks, harbor ponds and fish auction places. Other facilities are calculated the level of utilization directly by comparing the frequency of available facilities with the facilities used or utilized. The results of the calculation of the level of utilization of these port facilities show that the average level of facility utilization is very high, namely 82.49%. This result is in line with previous research conducted by Siahaan et al. in 2016.

calculated using the formula. The largest ship draft at PPS of Belawan is 2 meters, the vertical swing is 0.5 meters, then the distance between the ship's keel and the bottom of the water is 1.5 meters, so the calculation of the utilization rate is 100% or stated as optimal.

PPS of Belawan has a pier length of 1,128 meters, the average number of ships mooring at the pier is 50 per day with an average ship length of 22 meters and an average ship weight of 66 GT, which produces an average catch of 31 tons per day. Based on the results of data calculations in the field, the utilization rate was obtained as 12.91%, which is below 100%, while the utilization rate for the dock is not optimal. The PPS of Belawan port basin has an

area of 1,008 m². Because the port basin is shallow, no ships dock in the port basin. The average length of the ship is 22 meters, and the width is 6 meters, so the calculation result of the utilization rate is 10.51% which means it is very far from 100% and shows that the utilization rate of the port basin is not optimal. The results of this study show something different from the research conducted in 2016 by Siahaan et al. this is influenced by several factors such as the number of ships, type and size of ships [13]. For complex roads and drainage, there is no formula that can calculate the utilization rate specifically and mathematically, so to find out the utilization rate of these facilities, namely by directly comparing the available facilities with the facilities utilized or used by users of these facilities. Complex road and drainage facilities get a utilization rate of 100%, by comparing the available facilities with those used.

3.2.2. Functional Facilities

The fish auction place at PPS of Belawan is 800m². The average daily catch is 31 tons with the use of the building between the auction place and the auction building being 1 and the auction frequency per day being 2. Based on the results of calculations in the field, the utilization rate of the fish auction place at PPS of Belawan is 97.90%, which means that the fish auction place at PPS of Belawan is not optimal. Meanwhile, for administrative office facilities, electrical installations, and clean water supply, the utilization rate is calculated by comparing the available facilities with the facilities used or utilized, so that the utilization rate of the three facilities is the same, namely 100%. The results of this study are in line with those conducted by Yuspardianto who stated that the condition of functional facilities at PPS of Belawan is very good [14].

3.2.3. Supporting Facilities

The supporting facilities available at PPS of Belawan whose utilization rate was analyzed are the fishermen's meeting hall, guard post and toilet. The utilization rate of supporting facilities is obtained by comparing the available facilities with the facilities used or utilized by the users of the facilities. So that the utilization rate of the three supporting facilities at

PPS of Belawan is 100%.

3.3. Facility condition analysis

Analysis of the condition of existing facilities at PPS of Belawan was conducted using a questionnaire involving 30 respondents who were directly related to the use of the facilities. The condition of the facilities greatly affects port operations, if the condition of the facilities is very bad, it means that operational activities will certainly be hampered, and vice versa if the condition of the existing facilities is good and adequate, it will support the operation of the port properly and smoothly.

From the table above, it shows that the average condition of port facilities in PPS of Belawan is sufficient, the main port facilities that are in sufficient condition are port land with a percentage of answers of 73.33%, docks 60.00%, port pools 66.66%, complex roads 86.66%, and drainage, and shipping lanes whose conditions are sufficient with a percentage of 50.00%. This shows that although these facilities can still be used, there are several aspects that need improvement or maintenance to function optimally. For functional facilities, several facilities are in good and sufficient condition.

For functional facilities, some facilities are in good and sufficient condition. For good condition there is a port administration office with a percentage of 66.66% and clean water supply with a percentage of 50.00%. This indicates that the management of port administration has been carried out well, and the clean water supply is also in good condition. And for sufficient condition there is a fish auction place and electrical installation with a percentage of 86.66% and 50.00%. Supporting facilities consisting of three, namely the fishermen's meeting hall which is in good condition and the percentage is 93.33%, the guard post with sufficient condition and the percentage is 73.33% and the MCK with sufficient condition also with a percentage of 70.00%, which means that these facilities are still functioning well, although they may require some repairs or improvements. Likewise, with the MCK, which is in sufficient condition with a percentage of 70.00%, indicating that these cleanliness and sanitation facilities still meet sufficient standards to support operations at the port.

Table 3. Facility condition analysis

Table 5: Facility Condition Analysis							
No	Facilities	Frequency (%)					Condition
		Very Poor	Poor	Satisfactory	Good	Very Good	
A. Main Facilities							
1	Port Area	0,00	13,33	73,33	10,00	3,33	Satisfactory
2	Navigation Channel	0,00	0,00	50,00	46,66	3,33	Satisfactory
3	Wharf	0,00	6,66	60,00	26,66	6,66	Satisfactory
4	Harbor Basin	0,00	33,33	66,66	0,00	0,00	Satisfactory
5.	Complex Road	0,00	0,00	86,66	13,33	0,00	Satisfactory
6.	Drainage System	0,00	0,00	86,66	13,33	0,00	Satisfactory
	Average	0,00	8,89	70,00	18,89	2,22	Satisfactory
B. Functional Facilities							
1	Fish Auction Site	0,00	0,00	86,66	13.33	0,00	Satisfactory
2	Port Administration Office	0,00	0,00	66,66	6,66	26,66	Good
3	Clean Water Supply	0,00	0,00	43,33	50,00	6,66	Good
4	Electrical Installation	0,00	0,00	50,00	43,33	6,66	Satisfactory
	Average	0,00	0,00	61,67	28,33	10,00	Satisfactory
C. Supporting Facilities							
1	Fishermen's Meeting Hall	0,00	0,00	3,33	93,33	3,33	Good
2	Security Post	0,00	0,00	73,33	23,33	3,33	Satisfactory
3	Sanitation Facility	0,00	6,66	70,00	20,00	3,33	Satisfactory
	Average	0,00	2,22	48,89	45,56	3,33	Satisfactory

4. Conclusion

Based on the research it can be concluded that overall utilization of port facilities is not optimal (average 82.49%). Several basic and supporting facilities have been utilized optimally, but there are still important facilities such as docks and port pools with very low utilization rates. The condition of port facilities is generally sufficient, with some in good condition such as the administration office and meeting hall. However, there are still many facilities that require repair to support port operations optimally.

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