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Original Research

Identification Shipyard Model Suitable for Kutaraja Fishing Port in Aceh, Indonesia

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Abstract

The development of a shipyard model requires careful planning and must consider other related sectors. This study focuses on oceanography and environmental aspects in developing a shipyard in the Kutaraja Fishing Port. This study aims to identify the suitable shipyard model for Kutaraja Fishing Port based on the oceanography, environmental, and location in the waters around Kutaraja Fishing Port. The model was then visualized using Autocad software. The model was developed based on measurements of oceanography parameters, including current, depth, wave, wind, tide, and sediment. Meanwhile, the environmental parameters used in this study were temperature, salinity, pH, dissolved oxygen (DO), benthos, and plankton. The result shows that the suitable shipyard model to be developed in Kutaraja Fishing Port is the multifunction model. This model is a combination of three types of docking facilities, which are slipway, graving dock, and floating dock.

Keywords: Kutaraja Fishing Port, shipyard, oceanography, environment, multifunction

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Introduction

A modern shipyard industry development requires strong financial support. Therefore, a careful planning, from choosing suitable location to material flow, is crucial to determine the facilities that will be provided in a shipyard. The modern shipyard planning needs to consider several aspects that are related to the purpose and objective of the shipyard to ensure the shipyard development in the future. The shipyard needs to be located in the port area for easy access to material supply and close to the human resources that will directly influence the shipyard performance. Another important factor that need to be taken into consideration is the type of ship docking. Type of ship docking is determined by ship size, docking establishment cost, effective and efficient operational system, and easy and low cost maintenance [1].

Oceanography factors highly influence the suitable location for shipyard industry development in a port. Those factors are current, depth, wind, wave, tide, and sedimentation [2]. Moreover, some aspects are crucial for shipyard development, i.e., current speed, wind, and wave height that can interfere with the exiting and entering process of a ship to the docking pool. These factors also determine the sedimentation level, which can cause pool silting. The water quality is the water condition measured by its physical and chemical parameters. It also shows the relative water requirements for water biota and humans [3]. Intensive human activities, including marine services such as fishing ports, and other coastal activities, such as settlements, industry, businesses, and ponds, are polluting the water, thus lowering the water quality in the area [4].

A modern shipyard industry requires integrated logistic planning. This requirement is because this shipyard industry needs to handle highly complex shipbuilding. A modern shipyard will govern a larger and heavier shipbuilding process than a traditional or semi-modern shipyard. It is required to synchronize all shipyard resources based on the production program to ensure an efficient and effective shipbuilding process [5]. Most modern shipyard industries implement modular construction concepts in shipbuilding. Modular construction derived from lean production idea. The modular construction model aims to minimize the residuals from the material used for shipbuilding and improve the value based on consumer requests. On the other hand, traditional shipbuilding seeks to reduce the budget and increase effectiveness. The modular construction model is more time efficient than traditional shipbuilding [6].

A semi-modern shipyard industry implements the PWBWS (Product Oriented Work Breakdown Structure) concept, the same as the modern shipyard industry. The PWBWS concept divides ship production into three work classifications. The first classification is hull construction, outfitting, and painting. The second classification is based on the interim product, for example, the product between the fabrication workshop, assembly workshop, and the workshop itself. The third classification is based on the three production aspects to ensure efficient monitoring practices. The production aspect is also divided into three categories. The first

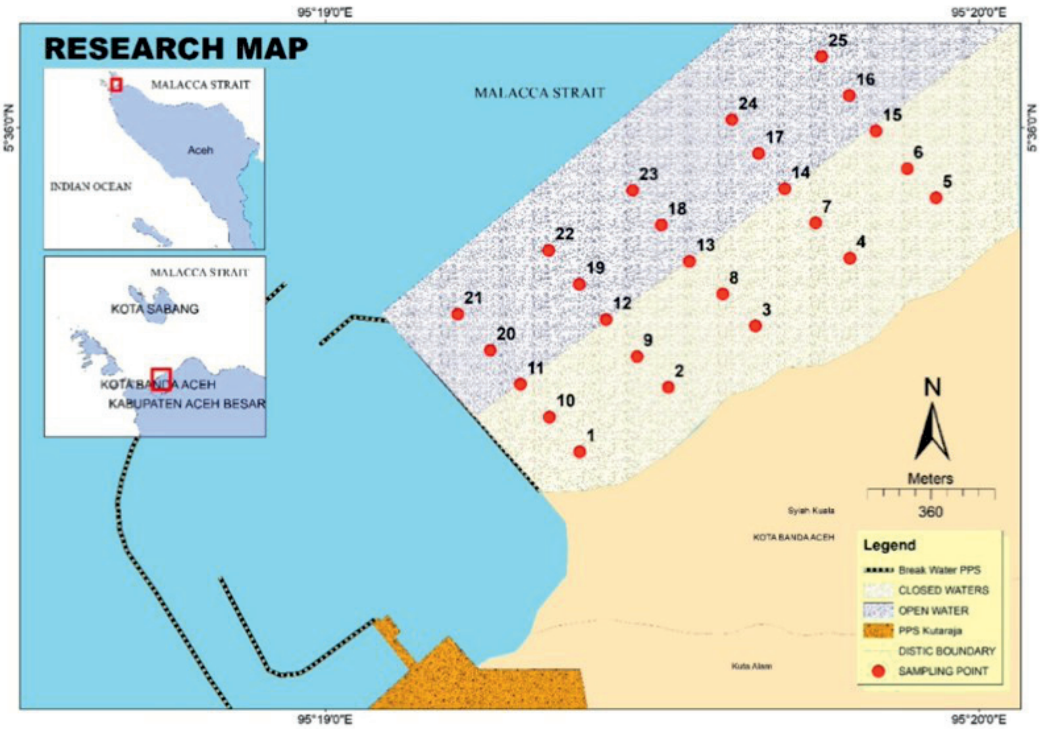


Fig. 1. Sampling points map [2].

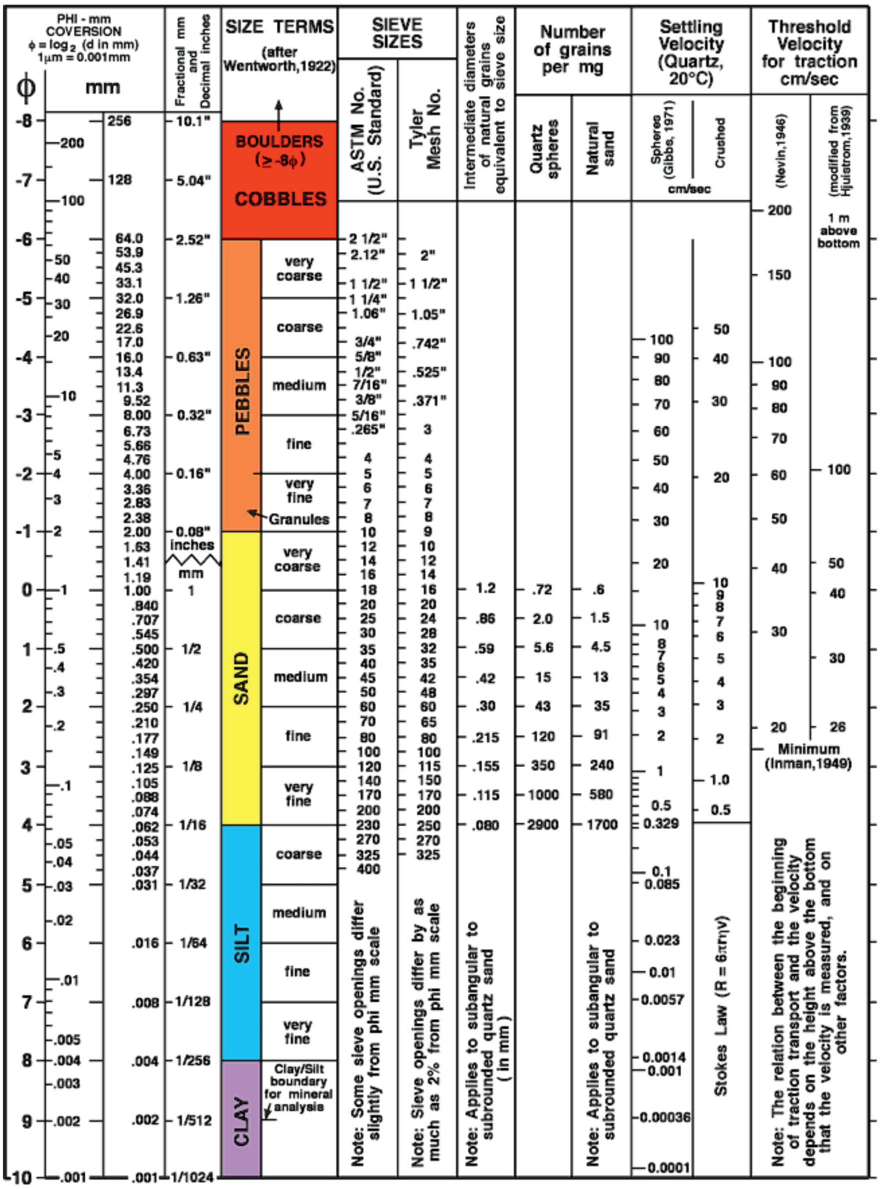


Fig. 2. Wentworth (1922) scale grain size classification.

production aspect, zone, is a means to facilitate planning. The other two aspects are the problem area and stage, where the working processes are divided, starting from material to handing the ship to the owner [7].

Hadiansyah and Pribadi [8] explain that there are three main types of shipyard facilities: The first is Slipway is the main shipyard facility to raise and lower the ship using rails. There are two types of slipway, a transverse slipway for side launching and a longitudinal slipway for end launching. The soil contour information is derived from the topography and bathymetry survey. The second is Graving Dock is a ship docking facility with a pond-shaped that has been dredged, coated with concrete construction, and equipped with a watertight door. And the third is Floating Dock is a structure with sufficient dimension, strength, displacement, and stability to lift a ship from the water using the buoyancy force.

A dry dock is divided into a hydraulic system mainly used for pool dock and floating dock and mechanic system where the slipway forms part together with boat lifter and straddle. This facility is always built based on a three-way system to ensure the entire weight of the ship is centered in the middle, the ship's keel. The outrigger method is used for lateral stability [9].

As a large-scale port, Kutaraja Fishing Port is expected to provide optimal services in operational activities, especially for capture fishing activities, including shipyard. A shipyard is one of the crucial elements in the shipyard industry for building and repairing ships. Ship repair is the second most important aspect, with around 40% of the entire operating budget in sea shipping organizations allocated for maintenance [10]. Furthermore, the shipyard industry is one of the main drivers that improve the shipping sector and regional income [11]. Unfortunately, the shipyards available around the Fishing Port are still traditional and on a small scale. This research aims to identify a suitable shipyard model to be developed in the Kutaraja Fishing Port based on oceanography, environmental, and location study around the Kutaraja Fishing Port. Therefore, with this shipyard model, PPS Kutaraja is able to provide optimal service in all aspects of fishing activities.

Experimental

The research was conducted from December 2020 - March 2021. The study area was at the Kutaraja Fishing Port and Laboratory of Marine and Fisheries Faculty, Syiah Kuala University. The distance between sampling points was 120 m vertically and 310 horizontally.

The data collected to model this multifunction shipyard includes oceanography (current, depth, wind, wave, tide, and sediment) and environmental (pH, dissolved oxygen, temperature, salinity, benthos, and plankton) parameters in the Kutaraja Fishing Port. Then based on the data, an analysis of the appropriate shipyard model was carried out to be developed at PPS Kutaraja.The data was then used to formulate the multifunction model. Visualization of this shipyard model was done using Autocad software. The sampling points for oceanography and environmental parameters are depicted in the figure below.

Tide, wind, current, and wave data for the past three years were collected from the Meteorology, Climatology, and Geophysical Agency. The water depth data were collected by emitting waves from the echosounder/fishfinder to the waters. A grab sampler was used to collect samples by plugging it into the water substrate and stored in the sampling bag. As much as 100 gr of the water was sampled with three replications per point. The samples were then dried and sieved using a dry sieve and measured based on the Wentworth scale.

The next step was analyzing the tide data using Ms. Excel software to show the fluctuating pattern throughout the past five years. Current and bathymetry were visualized in QGIS, while the wind data was analyzed with WRP Plot.

Water quality was measured based on pH, temperature, dissolved oxygen, and salinity. Temperature and dissolved oxygen were measured using the DO meter (Lutron YK-2005WA; Taiwan), pH using the pH meter digital (ATC pH-2011; Romania), while salinity data was collected using the Salinometer (HANNA; United States). The data were analyzed and visualized using QGIS software.

Results and Discussion

The result of the oceanography and environmental parameters analysis are as follow:

Table 1. Oceanography parameters.

Parameters	East season		East-west transition season 1		West season		East-west transition season 2		High average	Low average
	High	Low	High	Low	High	Low	High	Low		
Current (m/s)	0,5	0,1	0,13	0,01	0,5	0,01	4,5	0,05	1,41	0,04
Bathymetry (m)	12	1	15	1	15	1,5	16	1,5	14,50	1,25
Wind (m/s)	5	0	2	0	10	0,05	8,7	0,05	6,43	0,03
Wave	2	0,07	1	0,08	1,5	0,05	1,5	0,06	1,50	0,07
Tide	-1,5	-0,38	1	0,5	1,5	0,5	1,8	0,09	0,70	0,18
Sediment	17 (Fine sand)	1 (Medium sand)	12 (Fine sand)	6 (Coarse find)	15 (Fine sand)	5 (Very fine sand. coarse fine)	15 (Fine sand)	5 (Very fine sand. coarse fine)	Fine sand	Medium sand

Oceanography

The result shows that the high average current recorded throughout the four seasons is 1.41 m/s, with the lowest current rate of 0.04 m/s (Table 1). The average depth is 14.50 m, with the shallowest point of 1.25 m. The wind speed recorded in the past year ranges between 0.03 to 6.43 m/s. The average wave ranges between 0,07 to 1,50 m. The average tide throughout the four seasons is 0.70, with the lowest height of 0.18. Fine sand type sediment dominated the area each season, while the medium sand type was only found in the east monsoon. The sediment types are fine sand (1/8-1/4 mm), very fine sand (1/16-1/8 mm), coarse sand (1/2-1 mm), and medium sand (1/4-1/2 mm). Factors that highly influence the development of shipyard slipways and graving dock types are current speed, wind speed, tides, and waves. Meanwhile, depth, current speed, wind speed, tides, and waves affect the floating dock type.

Environmental

An increase in water pH is caused by the intensive carbon dioxide production in the atmosphere due to anthropogenic activities and then absorbed by the waters [12]. The pH for the past year ranges from 7.66 to 6.60. This value is suitable for multifunction shipyard development because it does not interfere with aquatic organisms. This condition is aligned with [13], which mentioned that the normal range of the ocean is between 6.5 to 9.0. The pH condition is crucial in determining the use value of water for the survival of the organism and other use. It is influenced by several factors such as photosynthesis activities, temperature, and the anion cation availability in the water. pH is the degree of acidity commonly used to understand the acidity or basicity values of water. Water is categorized as acid if the pH value is under 7; if the pH value is higher than 7, it is categorized as basic [14]. Precipitation and waste entering the water will highly influence the acidity and basicity of water, which is supported by [15], who stated that change in pH is affected by precipitation, land influence such as estuary, and waste. Dissolved oxygen recorded for the past year ranges from 8.66 to 7.45. The higher the photosynthesis rate by macroalgae, the more intense use of oxygen; thus, the oxygen concentration in the water decreases [16].

Salinity is defined as a result of geological conditions influenced by the atmosphere [17]. The average salinity recorded for the past year ranges between 33.45 and 32.75 part per thousand (PPT). [18] stated that salinity constantly changes every season, with the minimum value reaching 30.0 0/00 and the highest value reaching 35.0 0/00. The higher the salinity level, the faster the corrosion rate. This condition is affected by the global water salinity level commonly traversed by ships, with a salinity level of around 3%-4% [19]. The highest temperature for one season is 31.08ºC, while the lowest temperature is 28.23ºC. This condition may be influenced by material inputs derived from various intensive economic activities in Kutaraja Fishing Port. Temperature is one of the factors that are crucial for marine life because it affects the marine organism's metabolic activities and development [16].

Between the east monsoon and east-west transition season, the average benthos abundance ranges from 2.14 to 3.18 ind/l. The benthos diversity index ranges between 1.68 and 2.40, which indicates medium diversity. Kutaraja Fishing Port has a high uniformity index ranging from 0.79 to 0.93. The dominance index ranges between 0.34 and 0.48, which explains that it has low benthos dominance.

Benthos organisms are important biological indicators of environmental changes, chemical pollution, and benthos abilities to absorb and gather various compounds, especially heavy metals [20]. This study found that *Anodontia edentula* dominated the area throughout the four seasons. *Anodontia edentula* is a species under the Lucinidae family that prefer mangrove areas and can be consumed and has a high economic value as one of the primary sources of protein [21]. *Anodontia edentula* is also commonly used as a biological indicator of the mangrove ecosystem [22]. *Cerithideopsilla triele* is a species with a medium-sized and conical-shaped shell that uses the mangrove ecosystem as its habitat [23]. *Melanoides tuberculata* is a freshwater snail that prefers a sandy or muddy substrate habitat [24]. *Nassarius globosus* and *Nassarius livescens* belong to the gastropod genus, which commonly lives in a sandy habitat [25].

The average plankton abundance between the east monsoon and east-west transition season ranges from

Table 2. Environmental physical-chemical parameters.

Physical-chemical parameters	East season		East-west transition season 1		West season		East-west transition season 2		High average	Low average
	High	Low	High	Low	High	Low	High	Low		
pH	8,23	7,18	7,8	6,7	7,3	6,25	7,3	6,25	7,66	6,60
Dissolved oxygen (mg/L)	9	7,02	8,7	7,6	8,7	7,8	8,24	7,38	8,66	7,45
Salinity (ppt)	33,4	31,7	33,8	34,5	33,8	32,9	32,8	31,9	33,45	32,75
Temperature (ºC)	30	27,5	31,5	28,2	31,9	29,1	30,9	28,1	31,08	28,23

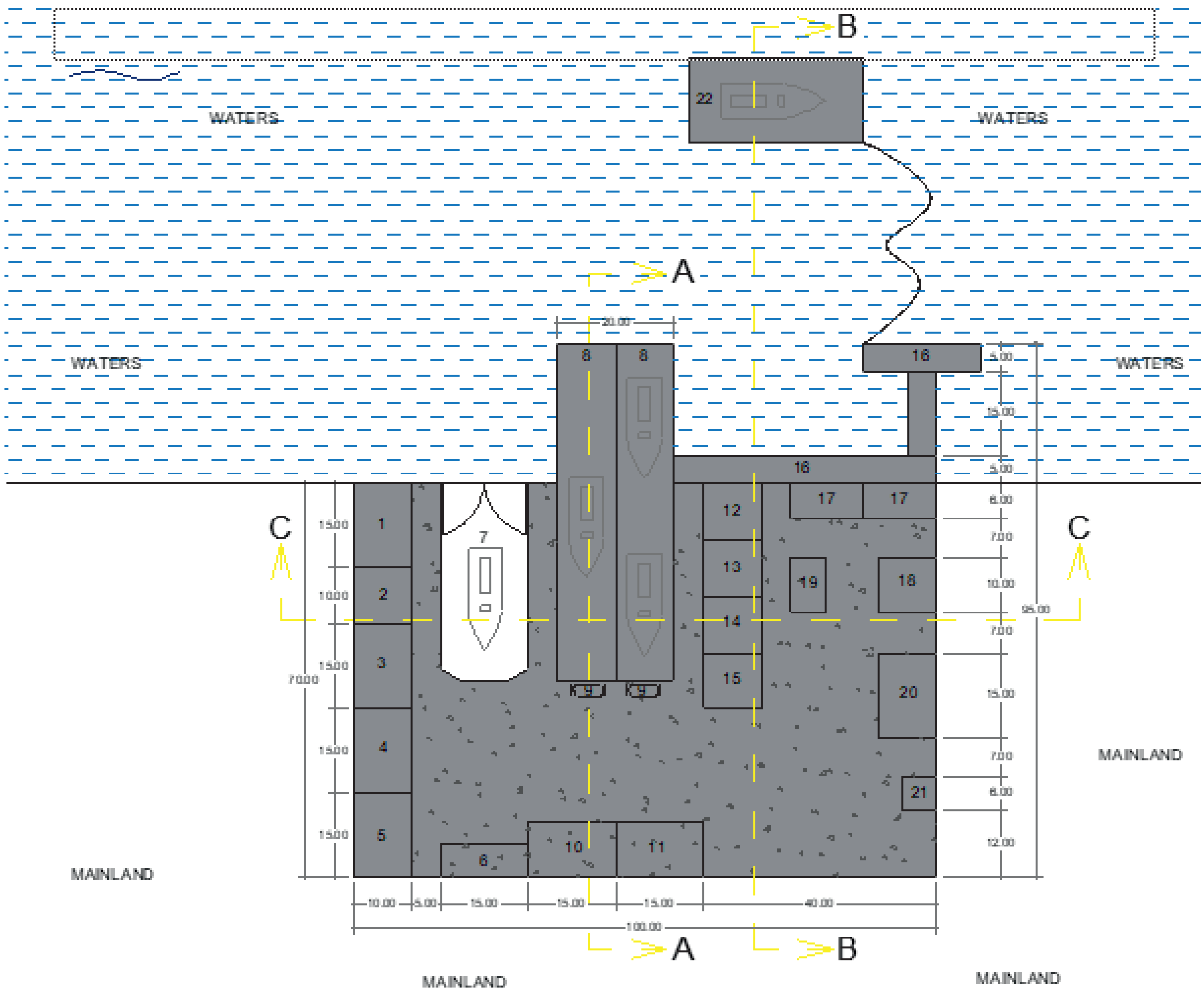
Table 3. Environmental biological parameters.

Biological parameters	East season		East-west transition season 1		West season		East-west transition season 2		High average	Low average
	High	Low	High	Low	High	Low	High	Low		
Benthos										
Density (ind/l)	2,57	1,64	4,08	2,19	3,17	2,33	2,88	2,41	3,18	2,14
Diversity (H')	2,3	1,5	2,8	1,8	2,3	1,2	2,2	1,1	2,40	1,68
Uniformity (e)	1	0,9	1	0,95	1	0,9	0,7	0,4	0,93	0,79
Dominance	0,3	0,15	0,2	0,1	0,3	0,1	0,4	0,2	0,48	0,34
Composition	*Anodontia edentula*	*Cerithideopsilla triele*	*Anodontia edentula*	*Melanoides tuberculata*	*Anodontia edentula*	*Nassarius globosus*	*Anodontia edentula*	*Nassarius globosus*	*Anodontia edentula*	*Nassarius globosus*
Plankton										
Density (ind/l)	0,84	1,02	0,87	0,007	1,34	1,06	1,48	0,51	1,13	0,65
Diversity (H')	1,65	0	1,75	0,7	1,8	0,59	1,6	0,9	1,70	0,85
Uniformity (e)	1	0	1	0,9	1	0,8	1,1	0,9	1,03	0,65
Dominance	1	0,1	0,5	0,15	0,5	0,15	0,5	0,1	0,75	0,29
Composition	*Aulacesoria* sp	*Anabaena apirides, Scenesdesmus* sp	*Gonium* sp.	*Scenesdesmus* sp.	*Gonium* sp.	*Synadra* sp.	*Gonium* sp.	*Anabaena apirides*.	*Gonium* sp.	*Anabaena apirides, Scenesdesmus* sp.
Abundance (ind/l)	75	19	66	19	66	19	58	19	66,25	19,00

0.65 to 1.13 ind/l. The plankton diversity index ranges between 0.85 and 1.70, indicating medium diversity. The Kutaraja Fishing Port has a relatively stable ecosystem which is explained by the uniformity index score of 0.65-1.03. It also has low dominance of plankton, with dominance index ranges between 0.29 and 0.75 and an abundance index of 19-66.25 ind/l.

Plankton is the primary biomass contributor and crucial for the marine ecosystem's productivity and sustainability [26]. It also has a vital role and can be used as a biological indicator [27]. Changes in the plankton community will affect the marine environment due to its ability to perform as a bioindicator to monitor the marine environment (Bassey, 2019) [20]. [28] stated that plankton is a microorganism with a tolerance limit to the environment. Furthermore, it also plays an essential role in the marine ecosystem's function and productivity through nutrient influence, is very sensitive to environmental changes, and is able to respond to environmental disturbances such as nutrient loading [29]. It also plays an essential role in stabilizing the pool ecosystem, increasing dissolved oxygen, and lowering toxic gas such as ammonium, nitrite, hydrogen sulfide, methane, and carbon dioxide [30].

The existence of phytoplankton *Aulacesoria* sp. and *Synadra* sp. indicates that the marine environment



Description:
1. Warehouse for storage of remaining raw materials
2. Electrical workshop
3. Paint Workshop
4. Mechanical workshop
5. Raw material storage warehouse
6. Design and mold workshop
7. Graving dock
8. Slipway
9. Winch
10. Assembling area
11. Repair area
12. Auxiliary machining workshop
13. Master machining workshop
14. Wood warehouse
15. Fiberglass warehouse
16. Jetty
17. Mess
18. Mushalla
19. Canteen
20. Main office
21. Guard post
22. Floating dock.

Fig. 2. The shipyard model.

is rich in organic materials (eutrophic) [31]. *Anabaena apirides* is a blue alga that can perform nitrogen fixation from the air to ammonium [32]. *Scenesdesmus* sp. can be used as raw material for biodiesel [33]. *Gonium* sp. dominates the waters in Kutaraja Fishing Port. It belongs to a group of phytoplankton that can produce chlorophyll in the freshwater ecosystem. This species can rapidly reproduce in heavily or mediumly polluted water [34].

The location for the development of the shipyard which is on the side of the Kutaraja PPS can be categorized as feasible to develop into a shipyard. This is supported by the condition of the oceanographic factors of the waters that have been studied which have very suitable conditions. The results of measurements of relatively stable currents and bathymetry of waters with a qualified depth. Wave heights and wind speeds are categorized as stable as well as high tides and sediment patterns that do not endanger the continuity of the development of the shipbuilding industry at the Kutaraja Ocean Fishery Port, Banda Aceh. In addition, it is also supported by the conditions of the aquatic environmental factors that have been studied have very suitable conditions. The measurement results of relatively stable physico-chemical parameters as well as qualified aquatic biological parameters for the development of the shipbuilding industry at the Kutaraja Ocean Fishery Port, Aceh.

The analysis based on oceanography, environmental, and location aspects in Kutaraja Fishing Port shows that the suitable shipyard model in this area is a multifunction shipyard model. In Fig. 2 describes the multifunction shipyard model was developed by combining three existing shipyard types, which are slipway, graving dock, and floating dock. Besides the three docking-type facilities, this shipyard model also includes supporting facilities and operational support for the shipyard industry. Those facilities consist of four warehouses, six workshops, a winch, an assembly area, a repair area, a jetty, a mess, a canteen, a prayer room, the main office, a checkpoint, and a modular. The construction of a multifunctional shipyard and its facilities adjusts to a land area of 500x500 meters.

In the construction of a new ship, a dock facility with a slipway type is the most important thing to build [35]. Generally, slipway is the most cost-effective drydocking method for small vessels. The slipway facilities cover 30% of the entire ship launching system, and 60% of it has been utilized as a ship production facility since the ’60s [36]. This multifunction shipyard has two slipways with a length reaching 60 meters and 10-meter width each and is located next to the graving dock. The launch of the ship uses a cradle. The ship will be seated on the cradle starting from the waters then will be pulled using a winch. This is similar to statement [37]. In addition, there are two types of drydocking methods, each of which is used according to the needs of the ship and operator. Both are graving dock and floating dock.

According to [38], there are several aspects that must be considered before determining the drydocking method that will be chosen both for repair or maintenance of old ships and for building new ships, including:

1. The main purpose of drydock. This means whether the drydock selected is only suitable for repairing old ships or building new ships.
2. Dimensions, weight, and complete characteristics of the ship to be serviced.
3. Pay attention to the effect of placement
4. The possibility of future expansion.

Graving docks are built lower than ground level, this type of drydocking method consists of a fixed basin built into the ground at the water’s edge. This basin has a gate at the end of the water’s edge, which will be closed after the intended ship is navigated into the basin, after which the gate is closed. Meanwhile, the water in the basin is pumped out so that the ship can settle in the block. Next the bottom will be prepared for dry work. The door on the graving dock is designed with a sliding system. This is done in order to reduce the water pressure when the door is closed. A Graving dock is a dry-docking facility that consists of a long entrenchment, side walls, a half-circled end wall, and a floor. It also has an open-end space equipped with doors that serve as a place for ships entering and exiting the dock [39]. In this multifunction shipyard, the graving dock was designed with a 35 meter length and 15 meter width.

A floating dock is a construction building assembled from one or more parts (compartments) that are watertight on the sides and open at both ends. This construction can be submerged by filling the section

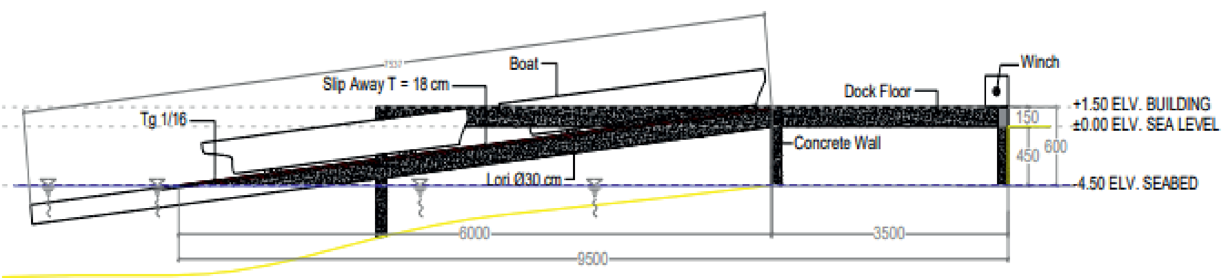


Fig. 3. Slipways (in mm).

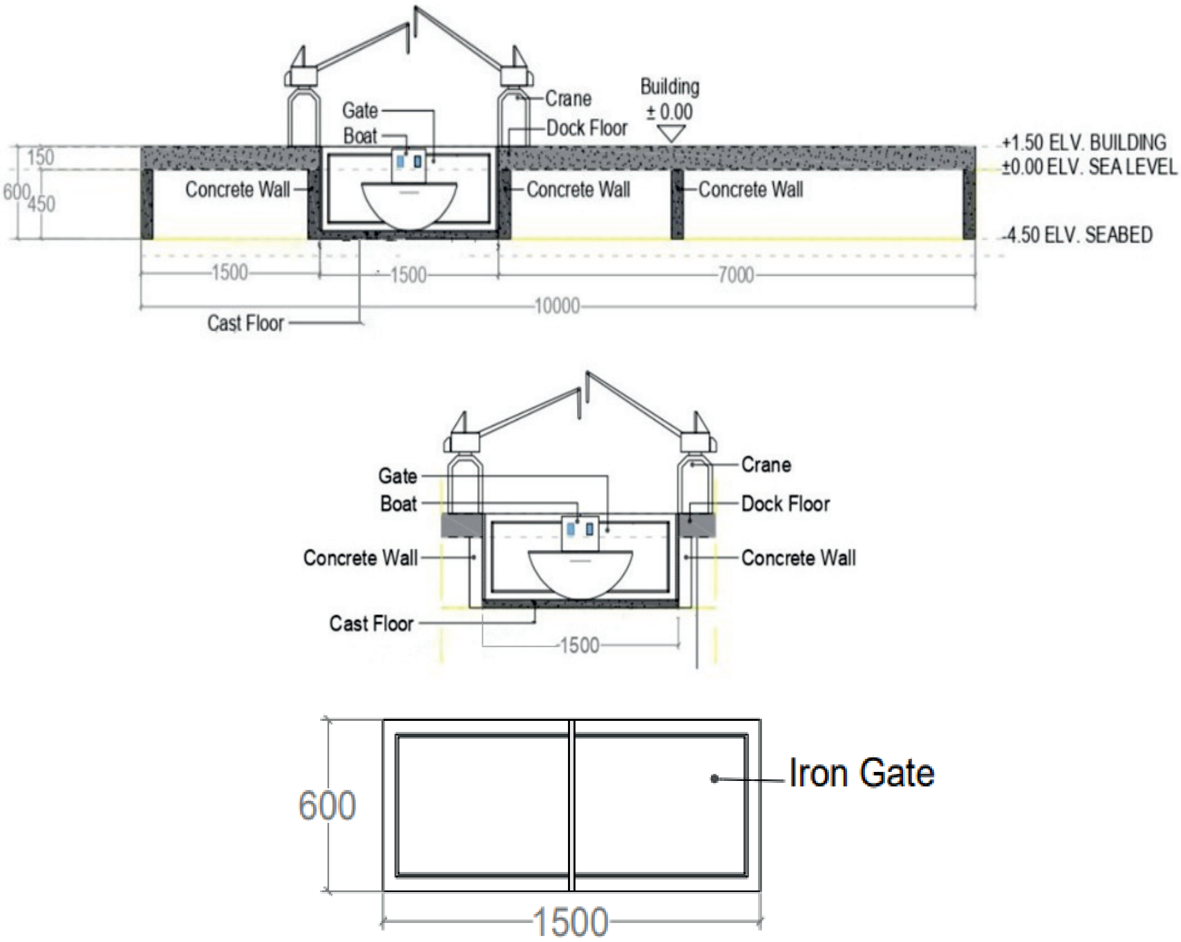


Fig. 4. Graving dock (in mm).

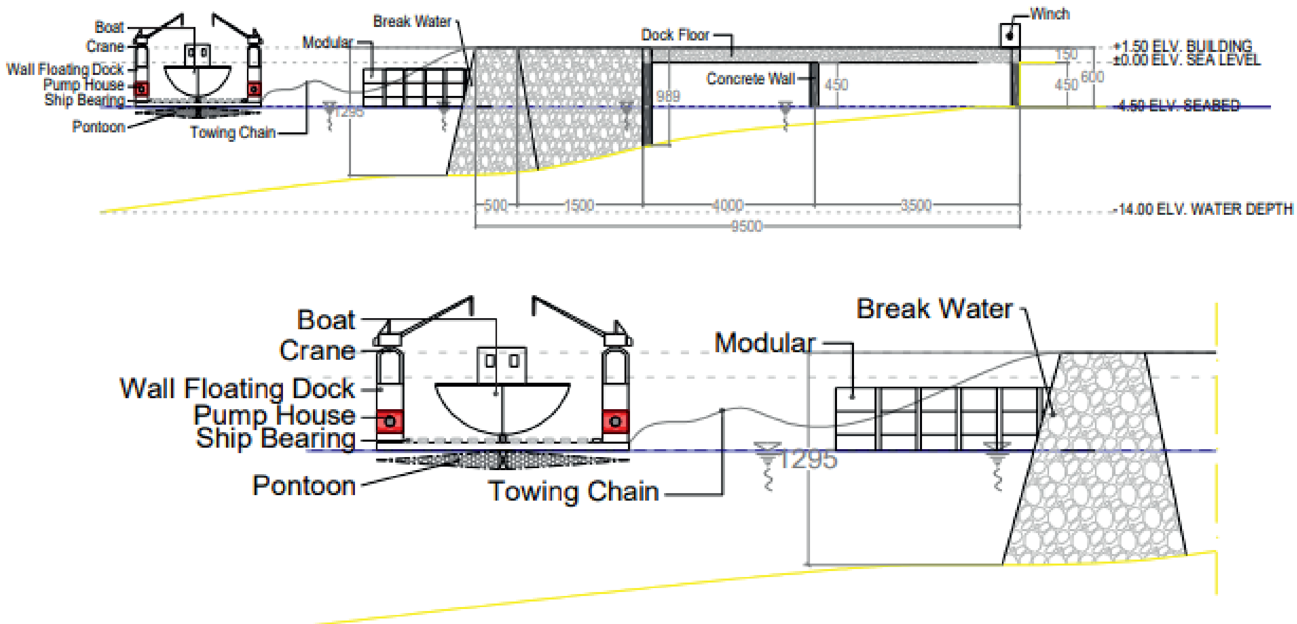


Fig. 5. Floating dock (in mm)

(compartment) with water, so that the ship can enter the dock. After the position of the ship is appropriate, the water in the compartment will be pumped out. Thus the dock building will float again [40]. In general, the main factor in designing a floating dock is not much different from graving. What distinguishes it from the construction of the floating dock ignores the influence of the ground, and prioritizes structural stability when sailing and serving ships.

The floating dock can control its movement in all directions. This is because the floating dock is a motorized unit, so it can be moved wherever needed and looks like an incomplete rectangular tube. The shape is intentionally made to be able to display its U shape and can make it easier for each of its parts to float easily.

The floating dock facility is a floating dry dock consisting of pontoon and wing walls with dimensions, stability, and strength to hold the forces that occurred on the floating dock during the ship docking operation. Pontoon is the main body support for ship lifting using floating force. The presence of the wings on the wall holds the stability when the pontoon is submerged [41]. The floating dock was designed with a length of 30 meters and a width of 15 meter. The elevation of -14.00 was set referring to the depth of the water.

This modern shipyard will also be equipped with warehouses to store raw materials, wood, fiberglass, and raw material wastes. The raw material warehouse and the raw material waste storage that will be built have the same dimension, 15 meters in length and 10 meters wide. Raw material warehouse serves to store raw materials for ship production. The warehouse for storing the remaining raw materials serves to store the remnants of the ship's production raw materials, either the results of repairs or the results of building new ships. Raw materials that can be stored are raw materials that are still suitable for use to support further ship production activities. Meanwhile, the wood and fiberglass warehouses will have the size of 10 meters in length and 10 meters wide. Wood warehouses and fiberglass warehouses are used to store wood and fiber raw materials.

The workshops serve as ship maintenance, repair, and component replacement facilities. These workshops will include electric, paint, mechanical, design and mold, auxiliary machining, and main engine workshops. The electric workshop will have a size of 10 meters long and 10 meters wide. Electrical workshops are used to support activities related to the installation of electrical installations on ships. The paint and mechanical workshops will have a dimension of 15 meters long and 10 meters wide. The paint workshop serves as a place for painting parts of the ship. Meanwhile, the mechanical workshop functions as a place for inspection of ship defects or damage, both new ships and old ships. The design and mold workshop will have a length of 15 meters and a width of 6 meters. The design and mold workshop is used as a place for making or planning or designing the design of a ship or ship mold that is being built. Meanwhile, the auxiliary machining and main engine workshops will have a size of 10 meters long and 10 meters wide. Auxiliary machinery workshops and main engine workshops are used as repair places for ship engines, both main engines and auxiliary engines. The dimensions and locations of the warehouses and workshops can be seen in Fig. 2. The warehouses and the workshops will be built close to the docking area to facilitate the new ship production and the old ship repair.

A winch is a tool for pulling or dragging weight horizontally using wire or rope. In this shipyard model, there will be four winches units divided into two slipways. The assembly area will be used to arrange some parts of the ships. Meanwhile, the repair area will be built for repairing some parts of the ships. The assembly and repair areas are designed to have a dimension of 15 meters in length and 15 meters in width. A Jetty is a coastal protection structure located perpendicular to the coastal area to protect it from sedimentation and abrasion. Occasionally, it can also serve as a place for boats to lean [42]. Jetty is designed with a size of 20 meters long and 5 meters wide.

The mess, canteen, prayer room, main office, and checkpoint are included as the supporting facilities of the shipyard industry. There will be two units of messes, 10 meters long and 6 meters wide each. The mess will be used as a temporary place to stay for the shipyard workers and also for visitors. The canteen is designed with a dimension of 12 meters long and 10 meters wide. The canteen serves as a place for employees to gather during breaks, while the prayer room will have a size of 10 meters long and 10 meters wide. The main office will serve as the central administration and management of the multifunction shipyard, with a size of 15 meters in length and 10 meters in width. Meanwhile, the checkpoint will have a dimension of 6 meters long and 6 meters wide. The modular or floating pontoon is a floating device that has buoyancy; thus, it effortlessly floats and can hold the weights on it. Furthermore, its flexible structure can extend like piers in general [43]. This multifunction shipyard will have a modular of 30 meters in length.

The multifunction shipyard model was chosen due to its advantages, such as can reduce the ship production and repair time, can lower the ship queue, and can optimize the ship production and repair process. The layout design for the shipyard is vital to create a comfortable and orderly, facilitate the maintenance of the entire shipyard's facilities and infrastructures, minimalize operational spending, and improve the management efficiency of the facilities in the shipyard.

Conclusions

The shipyard model that is feasible to be developed at PPS Kutaraja is the multifunctional type. It is obtained based on the results analysis of the oceanography such as currents, water depths, waves, winds, tides and sediments and environmental parameters which includes temperature, pH, salinity, dissolved oxygen (DO), plankton, and benthos. in the Kutaraja Fishing Port shows a positive result; thus, it is suitable for a multifunction shipyard development. This shipyard model combines three docking facilities, i.e., slipway, graving dock, and floating dock. A multifunction shipyard consists of multiple facilities, which are four warehouses, six workshops, a winch, an assembly area, a repair area, a jetty, a mess, a canteen, a prayer room, the main office, a checkpoint, and a modular.

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Conflict of Interest

The authors declare no conflict of interest.

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