

General Arrangement and Lines Plan of Grant Fishing Vessels by Ministry of Marine Affairs and Fisheries Based in Sukabumi, Indonesia

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Abstract

The large fisheries potential in Sukabumi Regency must be supported by the existence of fishing vessel to increase the production of catch in Sukabumi Regency. Therefore, Ministry of Marine Affairs and Fisheries has launched a grant vessels assistance program for fishermen who are members of the Joint Business Group. The perfection of fishing vessels, both in terms of design and construction are absolutely necessary, because it will affect of catchers, safety, and work comfort while at the sea. This research aims to find out general arrangement and lines plan of grant vessel by Ministry of Marine Affairs and Fisheries based in Sukabumi Regency. The research was conducted in August 2019 and January 2020 at 4 coastal sub-districts in Sukabumi Regency, namely Cisolok Sub-district, Pelabuhanratu Sub-district, Ciemas Sub-district and Ciracap Sub-district. The method used is a survey method with two stages, the first stage is data collection through primary data collection by measuring the dimensions of fishing vessel directly and interviews, the second stage is data analysis. Data were analyzed descriptively. Research results show that grant vessels of 3 GT and 10 GT have different general arrangement. Grant vessel with size of 10 GT has a more complete general arrangement because have a larger size, and size of 3 GT have an outrigger to addition a stability of ship. Grant vessels with size of 3 GT and 10 GT have the same lines plan, namely the bow section of fishing vessel had a V-Bottom hull, while the midship to the stern of the fishing vessel had a U-Bottom hull.

Keywords: Basic design, Main dimension, Measurement, Pelabuhanratu, Sukabumi regency.

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I. INTRODUCTION

Sukabumi Regency is one of regency in West Java that has a large fisheries income, in 2015 Sukabumi Regency produced fish production of 13.790.420 kg with a value of Rp. 285.838.924900 and an average increase every year [1]. The large potential of capture fisheries in Sukabumi Regency must be supported by fishing vessels to support fishing operations. Sukabumi Regency is one of the regions that received a grant vessel from Ministry of Marine Affairs and Fisheries . In order to increase fishing operations in Sukabumi Regency, Ministry of Maritime Affairs and Fishery had launched one of the programs, namely grants vessel for fishermen who are members of the Joint Business Group.

Fishing vessels are one of the catching units that are main key in carrying out fishing activities. Fishing vessels are useful as transportation that brings all fishing units to fishing ground areas, and brings them back to fishing base [2]. The perfection of fishing vessels, both in terms of design and construction are absolutely necessary, because it will affect catchers, safety, and work comfort while at sea [3]. This is due to several considerations, among others; shipbuilding objectives, water factors, and ship design [4]. The design and construction of the main dimensions of a ship that affect the capacity, stability, maneuverability ship resistance while the ship is conducting fishing operations [5].

Line plan is a very important ship design drawing, where the line plan will greatly influence other ship design drawings such as general arrangement, profile construction, midship section, stability calculations and others drawing [6]. Cross-sectional measurements are carried out with a certain station distance so that a three-dimensional hull pattern is formed, with this method the hull can be reconstructed into a line plan drawing [7]. After getting line plan drawing, then a general plan for the ship is made [8]. These two things are the first steps in making fishing vessels so that they can be used properly by fishermen in fishing operations.

The facts on field are that grant vessels from Ministry of Marine Affairs and Fisheries to fishermen have yielded unsatisfactory results. Therefore, it is necessary to conduct a study on the design of grant vessels

by Manistry of Marine Affairs and Fisheries that is reviewed from the general arrangement and lines plan so that the work program of ministry can be realized in improving capture fisheries products and fishermen’s welfare.

II. MATERIAL AND METHODS

2.1 Research Location

The research location was carried out in Sukabumi Regency, West Java, with the object of research being the fishing vessels by Ministry of Marine Affairs and Fisheries. Selection of research locations based on the area that received the grant vessel. Grant fishing vessel is spread across 4 coastal sub-districts in Sukabumi Regency, namely Cisolok Sub-district, Pelabuhanratu Sub-district, Ciemas Sub-district and Ciracap Sub-district.

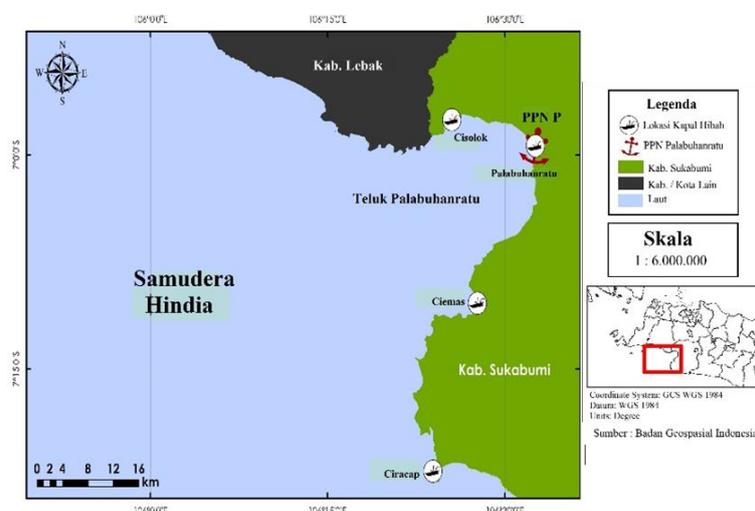


Figure 1: Research Location

2.2 Research Method

This research was carried out by a survey method using case studies. The research was conducted in two stages, the first stage is data collection by measuring directly on the ship and interviews a fisherman. The second stage is to analyze data. The data used is by measuring of length over all (LOA), breadth (B), depth (D) and length water line (LWL) and these data will be processed with a shipping application to draw general arrangements and lines plans of ship.

2.3 Data Analysis

General arrangement and lines plan of ship were analyzed descriptively. The data obtained was inputted into Microsoft Excel and then translated by translating data calculations into basic programming language using Auto Cad software to get a general arrangement of the ship and Maxsurf software to get a lines plan. Lines plan of ship consist of body plan, sheer plan, and the half breadth plan.

Dimension ratio comparisons consist of length and breadth (L/B), length and depth (L/D) and the ratio of breadth and depth (B/D) then compared with the standard operating method in Indonesia which refers to Iskandar and Pujiati [9]. Comparative values for fishing vessels in Indonesia can be seen in Table 1.

Table 1: Value of Fishing Vessel Dimension Ratio

Operation Methods	L/B	L/D	B/D
Static gear	2,83-11,12	4,58-17,28	0,96-4,68
Encircling gear	2,60-9,30	4,55-17,43	0,56-5,00
Towed/Dragged Gear	2,86-8,30	7,20-15,21	1,25-4,41
Multipurpose gear	2,88-9,42	8,69-17,15	0,53-6,09

Source : Iskandar & Pujiati 1995

III. RESULT AND DISCUSSION

3.1 Dimention Ratio

There are 79 units of grant vessels from Ministry of Marine Affairs and Fisheries that have been granted from 2017 to 2018 in Sukabumi Regency, 78 units of 3 GT and 1 unit of 10 GT. Grant vessels are spread across 4 coastal sub-districts in Sukabumi district, namely 12 units of 3 GT in Cisolok Sub-district, 32 units of 3 GT in Pelabuhanratu Sub-district and 1 unit of 10 GT, 12 units of 3 GT in Ciemas Sub-district and 22 units of 3 GT in Ciracap Sub-districts. Grant vessel was made in Jepara with the basic material of mahogany

covered with fiberglass. The samples of grant fishing vessels studied were 40 units with static gear vessels method. The results of the calculation of the main dimension ratio of grant fishing vessels based on the results of the value of length, breadth and depth are presented in Table 2.

Table 2: Main Dimensions Ratio of Grant Fishing Vessel

Main Dimentions Ratio	Reference Value of Static Gear (Iskandar Pudjianti 1995)	Average Value of Grant Ship
L/B	2,83-11,12	7,69
L/D	4,58-17,28	12,69
B/D	0,96-4,68	1,65

The value of L/B ratio in ship design is used to analyze the movement and speed of a ship. L/B ratio of grant vessels have an average of 7,69 close to the maximum value. This shows that grant vessels are indicated to have poor maneuverability but have relatively high ship speeds. A smaller of L/B ratio value, the ship has a good maneuverability and slow speed, and vice versa [10].

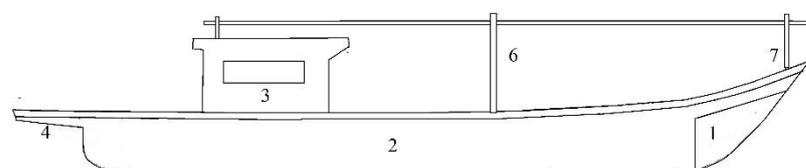
The value of L/D ratio is used to analyze the longitudinal strength of a ship. L/D ratio of grant vessels have an average of 12,69. Based on this value, it shows that grant vessel has a good longitudinal strength, meaning that the ship is not prone to breaking during use and can withstand the thrust of the waves being hit by the ship. A small L/D value results in a large longitudinal strength requiring large engine power [11].

The value of B/D ratio is used to analyze the stability and propulsion of the ship. L/B ratio of grant vessels have an average of 1.65 close to minimum value. This shows that grant vessels have a poor stability, therefore grant vessels with size of 3 GT are equipped with outriggers that function to maintain the stability of the vessels when carrying out fishing operations. Decreasing value of B/D ratio will result in poor stability but the propulsion stability will increase [12].

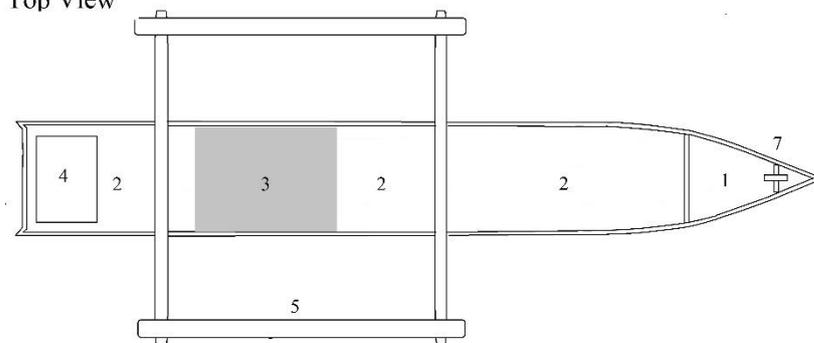
3.2 General Arrangement

General Arrangement is used to plan the required space according to the ship's functions and equipment [13]. General arrangement fishing vessel is viewed from the top and side view. Good placement of spaces will give fishermen the flexibility to work on the ship, this also affects the stability and safety of work on the ship [14]. The sample of 3 GT size fishing vessel studied was KM Nelayan 2018-399, while the sample of 10 GT size fishing vessel was KM. Nelayan 2017 - 822. Pictures of general arrangement of grant vessels can be seen in Figures 2 and 3.

Side View



Top View



Information :

1. Ballast Room
2. Catch & Fishing Gear Room
3. Equipment Room
4. Engine Stand
5. Otrigger
6. Mast
7. Anchor Rope Poles

LOA : 11,20 m
Bmax : 1,44 m
Depth : 0,88 m

Figure 2: General Arrangement of KM.Nelayan 2018-399

General arrangement of 3 GT grant vessel is not regulated according to fishing vessel arrangements in general, but is regulated according to fishermen's needs. Grant vessel of 3 GT has a length over all (LOA) of 11,20 m, breadth (B) of 1,45 m and depth (D) of 0,90 m. A small size means that grant vessel does not have a

deck, hatch and engine room. Grants fishing vessel of 3 GT has undergone modifications made by fishermen, namely by adding boards arranged parallel from the bow to the stern to be used as a deck as a foothold for fishermen to carry out fishing operations and as a place for fishermen to store their fishing gear and catch. In addition, grant fishing vessel of 3 GT was modified by fishermen with the addition of outriggers. This is adjusted to the condition of the ship which have bad stability when carrying out the fishing operation. Outrigger is an additional means of stability on the ship [15].

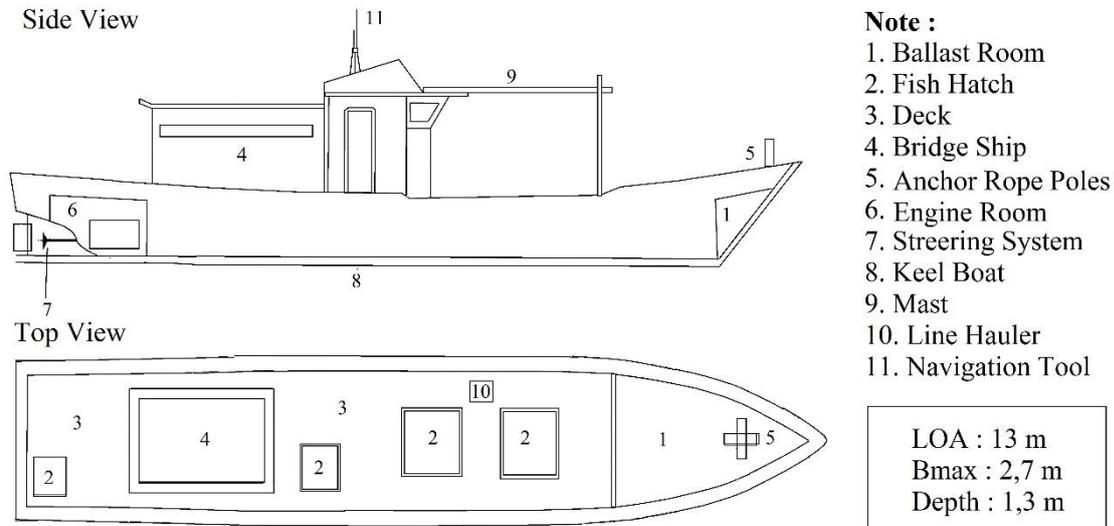


Figure 3: General Arrangement of KM. Nelayan 2017 - 822

General arrangement of 10 GT grant vessel has more complete parts. This grant vessel has a length over all (LOA) of 14 m, breadth (B) of 2,7 m and depth (D) of 1,3 m. Grants vessel of 10 GT is equipped with an engine room, a bridge ship, a ship steering system consisting of a propeller to move the ship forward and backward and a rudder to steer the ship a right and left. In addition, grant vessel of 10 GT has a hatch that is used to store catches, and a line hauler to assist fishermen during the hauling process. Grant vessel is equipped with a navigation device consisting of global positioning system (GPS) and Marine Antenna. The ship navigation and communication systems are absolutely necessary for safety and supervision. Using of communication tools and equipment has a lot to do with coordination in fishery activities [16].

3.3 Lines Plan

Lines plan is the main function as a guideline in ship building where the lines plan is divided into 3 parts, namely a profile plan, a half breadth plan , and a body plan [17]. Drawing the lines plan aims to see the shape of the hull to be designed. The position of the ship to be measured is that the ship is on land (beach), in an upright position (seen using a water pass), and there is no physical damage to the ship [18]. The ship line plan under study is generally divided into 10 ordinates along the length of the ship's hull with the same distance for each ordinate. The bow height is used as zero ordinate in the measurement of the profile plan because it is the tallest part of the main body of the ship. The lines plan for the grant vessels can be seen in Figures 4 and 5.

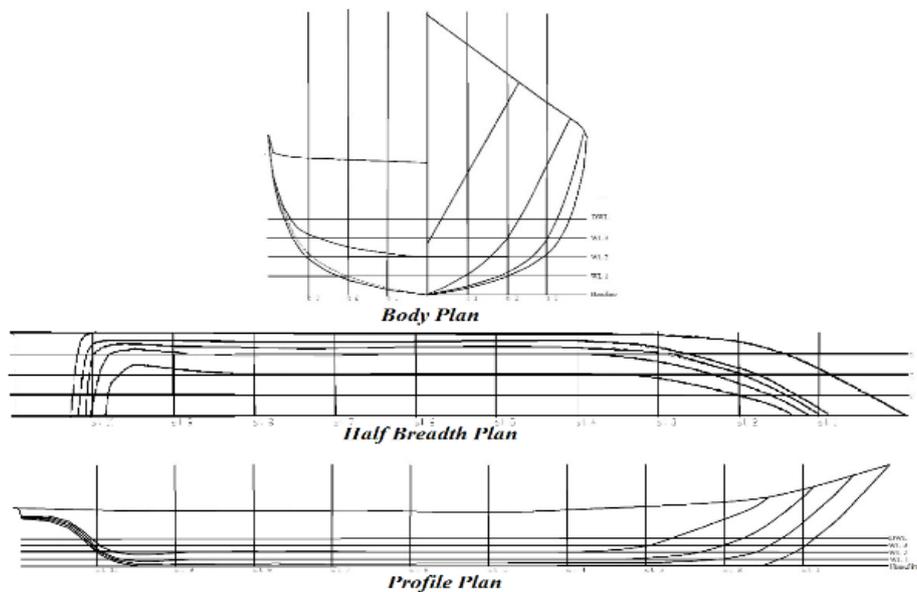


Figure 4: Lines Plan of KM. Nelayan 2018-399

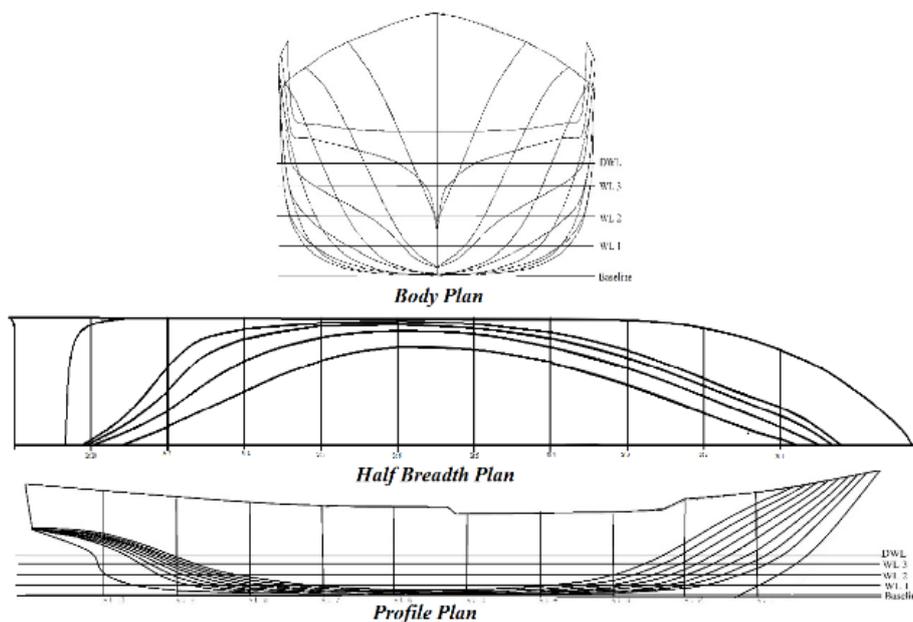


Figure 5: Lines Plan of KM. Nelayan 2017-822

Based on the lines plan drawings, grant vessel of 3 GT ad 10 GT have the same hull shape, namely the bow section is V-Bottom and the stern section has a U-Bottom shape. The shape of V-bottom bow serves to split the water mass maximally so that the ship has high speed to catch fish schools, and the U-bottom shape at the stern can maintain ship stability [19].

IV. CONCLUSION

Dimension ratio of grant vessels in Sukabumi Regency has a value that is included in the dimension ratio of Indonesian ships based on the operating method according to Iskandar & Pujiati (1995). Grant vessels of 3 GT and 10 GT have a different general arrangement , where the size of 10 GT has a more complete section than the size of 3 GT. The measurement results of lines plan measuring of 3 GT and 10 GT grant vessels show that those ships have the same hull shape, namely the bow section has a V-Bottom hull and the stern section has a U-Bottom hull.

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