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Main dimension ratio of ministry of marine affairs and fisheries grant fishing vessels operating in Sukabumi, Indonesia

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Abstract
Sukabumi Regency is one district that has a large fishery income. The large potential of capture fisheries in Sukabumi Regency must be supported by the presence of an adequate fleet of vessels to support fishing operations. In order to increase fishing operations in Sukabumi Regency, the Ministry of Maritime Affairs and Fisheries (KKP) made a program one of which is ship grants. This research was conducted for the characteristics of fishing vessels based on the main dimensions ratio. Research was conducted in August 2019 and January 2020 in 4 coastal districts in Sukabumi Regency, namely Cisolok, Palabuhanratu, Ciemas and Ciracap. The research method used is the survey method. The research was carried out in two stages, the first stage being the stage of data collection through primary data collection by directly measuring ships. The next stage is the analysis of the data conducted comparative descriptive. The results show that KKP grant vessels have an average L/B ratio value of 7,69, an average L/D ratio value of 12,69, and an average B/D ratio value of 1,65. Based on the ratio of the main dimensions of the KKP grant ship in Sukabumi it has the characteristics of motion and has a good ship speed, good elongation strength, good ship propulsion capability but poor stability.

Keywords: characteristics, breadth, depth, fishing vessel, fishing operations, length

1. Introduction
One area on the southern coast of West Java Province that has considerable fishery potential is Sukabumi Regency. Sukabumi Regency has a coastal area that has a coastline of 128.43 km of ocean with a total area of 141,130 Ha. Sukabumi Regency produces fish production which increases every year [1, 2]. The increase in production value is expected to be accompanied by an increase in the welfare of fishermen [3]. This embodiment needs to be supported by an adequate fishing fleet to increase catch production in Sukabumi Regency. One of the KKP programs that focuses on fishermen in Indonesia is ship grants [4]. The program of ship grants from KKP is expected to support the success of fishermen in carrying out fishing operations and the ship can be put to good use by fishermen to increase the production of catches.
The perfection of fishing vessels both in terms of design and construction is absolutely necessary because it will affect the success of fishing operations, safety and comfort while working at sea [5]. Measurement of the main dimensions of the ship is done to determine the ratio of the main dimensions of fishing vessels, where the value of the ratio of lengh, breadth and depth is very important in making or designing vessels that affect the strength, speed and stability of fishing vessels [6]. The availability of the main dimensions can be used in the calculation of the ratio of the main dimensions. This value can be used as a basis for shipbuilding in accordance with fishing gear specifications and local water conditions [7, 24].
Therefore, it is necessary to calculate the ratio of the main dimensions of the ship to determine the characteristics of the ship. Especially the KKP grant ship in an effort to support fishing operations. This research is expected to provide information on the characteristics of grant vessels based on the ratio of the main dimensions operating in Sukabumi Regency.

2. Materials and Methods
Research was conducted in August to December 2019 in Sukabumi District (Figure 1). The object of research is the KKP grant vessels in 4 coastal districts in Sukabumi Regency including Cisolok, Palabuhanratu, Ciemas and Ciracap.

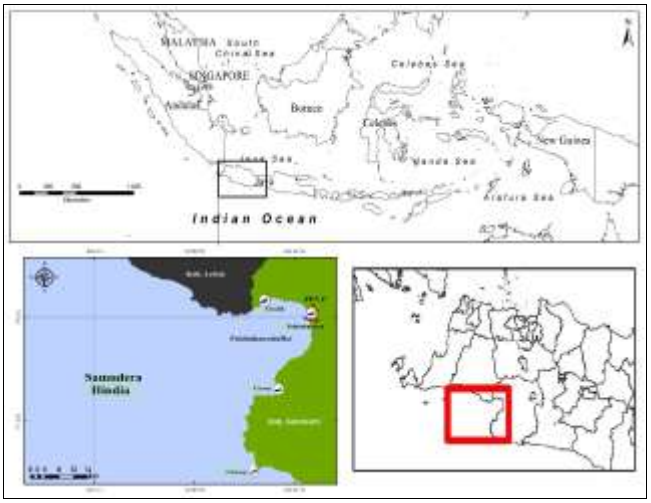

Fig 1: Research location.

This research was conducted by survey method. The research was conducted in two stages, the first stage namely the stage of data collection through primary data collection by directly measuring the dimensions of the ship. The main dimensions of the ship measured consist of length (L), breadth (B) and depth (D). The main dimensions obtained are then calculated based on the ratio of L/B, L/D and B/D [8]. The second step is descriptive comparative data analysis. The results of the calculation of the ratio of the main dimensions are compared with the standard ratio of the main dimensions of operating methods in Indonesia, which refers to Iskandar and Pujiati [9]. The standard main dimensions ratio based on operating methods in Indonesia can be seen in Table 1.

Table 1: The main dimensions ratio of the ship based on the method of operation in Indonesia.

Fishing operation method	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 and Pujiati [9].

3. Results & Discussion

In ship design, the characteristics of the ratio of the main dimensions are important things that must be considered. The ratio of the main dimensions is used in determining the capacity of the ship and can physically know the stability, strength and speed of the ship. Dimension ratio comparison includes ratio between length and width (L/B), ratio between width and depth (B/D) and ratio between length and depth (L/D) [10].

There are 79 units of grant vessels from the Ministry of Maritime Affairs and Fisheries (KKP) that have been granted from 2017 to 2018 in Sukabumi Regency. The ship has a size of 3 GT of 78 units and 10 GT of 1 unit. The ship was made in Jepara with the basic material is mahogany covered with fiberglass. The advantages of fiberglass coated vessels are longer service life, high strength, corrosion resistance, light weight, production costs and maintenance are much cheaper than wooden vessels that are not fiberglass coated, so do not require repetitive repainting [11]. The fishing gear used by the KKP grant ship is a gear with the static gear method, so the results of the calculation of the main dimensions of the KKP grant ship are compared with the ratio of the main dimensions of the ship using the static gear method.

The main dimensions of the 3 GT grant ship have a length of all (LOA or L) of around 11,17-11,23 m with an average of 11,20 m. Breadth maximum (B) ranges from 1,42-1,45 m with an average of 1,44 m. And the value of depth (D) around 0,87-0,90 m with an average of 0,88 m. Meanwhile, the main dimensions of the grant ship with a size of 10 GT have a length of all (LOA or L) value of 14 m, a maximum breadth value (B) of 2,7 m and a depth value (D) of 1,3 m. The characteristics of a 3 GT size KKP grant ship have a slimmer shape compared to a 10 GT size ship. this is seen from the width of the larger ship. The main dimensions of all grant vessels in Sukabumi can be seen in Table 2.

Table 2: Size specifications of the grant ship in Sukabumi.

No.	Ship Name	Ship Size Specifications (m)			GT
		LOA (L)	B	D	
Kecamatan Ciemas					
1	KM. Nelayan 2018 - 077	11,2	1,44	0,87	3
2	KM. Nelayan 2018 - 078	11,22	1,45	0,88	3
3	KM. Nelayan 2018 - 079	11,18	1,44	0,87	3
4	KM. Nelayan 2018 - 080	11,2	1,44	0,87	3
5	KM. Nelayan 2018 - 093	11,23	1,45	0,9	3
6	KM. Nelayan 2018 - 094	11,2	1,44	0,9	3
7	KM. Nelayan 2018 - 095	11,2	1,45	0,87	3
Kecamatan Cisolok					
8	KM. Nelayan 2018 - 097	11,2	1,45	0,88	3
9	KM. Nelayan 2018 - 098	11,2	1,45	0,87	3
10	KM. Nelayan 2018 - 099	11,2	1,45	0,87	3
11	KM. Nelayan 2018 - 100	11,2	1,45	0,87	3
12	KM. Nelayan 2018 - 101	11,2	1,45	0,9	3
13	KM. Nelayan 2018 - 102	11,2	1,45	0,89	3
Kecamatan Pelabuhanratu					
14	KM. Nelayan 2018 - 064	11,18	1,44	0,87	3
15	KM. Nelayan 2018 - 065	11,19	1,44	0,88	3
16	KM. Nelayan 2018 - 067	11,18	1,43	0,87	3
17	KM. Nelayan 2018 - 068	11,17	1,43	0,87	3
18	KM. Nelayan 2018 - 072	11,2	1,44	0,88	3
19	KM. Nelayan 2018 - 073	11,23	1,45	0,87	3
20	KM. Nelayan 2018 -074	11,22	1,45	0,9	3
21	KM. Nelayan 2018 -076	11,22	1,45	0,87	3
22	KM. Nelayan 2018 - 377	11.20	1,44	0,87	3
23	KM. Nelayan 2018 - 378	11,18	1,43	0,87	3
24	KM. Nelayan 2018 - 379	11.18	1,43	0,88	3
25	KM. Nelayan 2018 - 380	11,2	1,44	0,9	3
26	KM. Nelayan 2018 - 381	11,22	1,45	0,9	3
27	KM. Nelayan 2018 - 382	11,23	1,45	0,88	3
28	KM. Nelayan 2018 - 383	11.22	1,45	0,87	3

29	KM. Nelayan 2018 - 384	11,17	1,43	0,87	3
30	KM. Nelayan 2018 - 385	11,18	1,43	0,87	3
31	KM. Nelayan 2018 - 386	11,17	1,42	0,9	3
32	KM. Nelayan 2018 - 387	11,2	1,45	0,87	3
33	KM. Nelayan 2018 - 391	11,2	1,45	0,87	3
34	KM. Nelayan 2017 – 822	14	2,7	1,3	10
Kecamatan Ciracap					
35	KM. Nelayan 2018 -090	11,2	1,44	0,88	3
36	KM. Nelayan 2018 -091	11,2	1,45	0,87	3
37	KM. Nelayan 2018 -092	11,2	1,44	0,88	3
38	KM. Nelayan 2018 -053	11,22	1,45	0,87	3
39	KM. Nelayan 2018 -054	11,23	1,44	0,87	3
40	KM. Nelayan 2018 -055	11,2	1,43	0,88	3
Ship size 3 GT	Minimum	11,17	1,42	0,87	2,43
	Maksimum	1,23	1,45	0,9	2,56
	Rata-Rata	11,2	1,44	0,88	2,48

3.1 L/B Ratio

L/B ratio in ship design is used to analyze the motion, speed and endurance of a ship [12]. The smaller the value of the L/B ratio, the ship has a good boat motion and affect the speed of the ship resulting in slow speed [13]. Based on the calculation results, it is found that the L/B ratio of 3 GT KKP grant vessels has an average value of 7,78 approaching the middle value, while the L/B ratio of 10 GT KKP grant vessels has a value of 4,81 approaching the minimum value. The L / B ratio distribution can be seen in Figure 3.

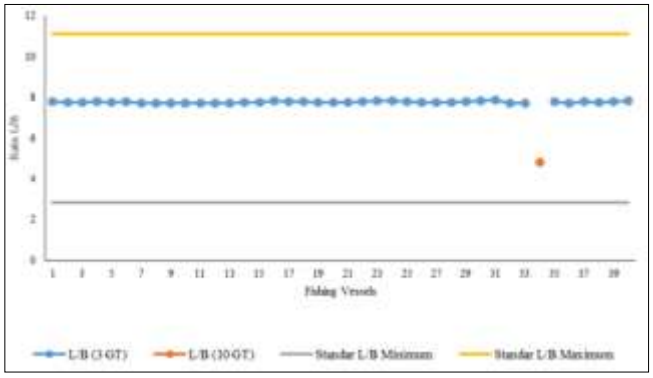

Fig 2: L/B ratio grant vessels KKP in Sukabumi.

Both of these ship sizes are still in the standard dimension ratio value of Indonesia. Vessels of size 3 GT are at the middle value of the standard ratio of Indonesian ship dimensions. This shows that the size 3 GT KKP grant ship has good movement and has good ship speed. Whereas the size of the 10 GT ship actually approaches the minimum value. This shows that 10 GT vessels tend to have better movement but have a slow speed.

3.2 L/D Ratio

The L/D ratio is the elongated strength of a ship [14]. If the value of the L/D ratio is getting bigger, it will have an impact on the weakening of the ship's elongated power [15]. Longitudinal strength of the ship is needed on a ship, because the ship will break the waves in fishing ground [16]. Therefore, elongated strength is needed by the ship. Comparison of length and dsepth of a large ship gives effect to the elongation strength of the ship, so that the ship is not easily broken when getting external forces that work affect the elongated strength of the ship [17].

The distribution of L/D ratio is shown in Figure 4.

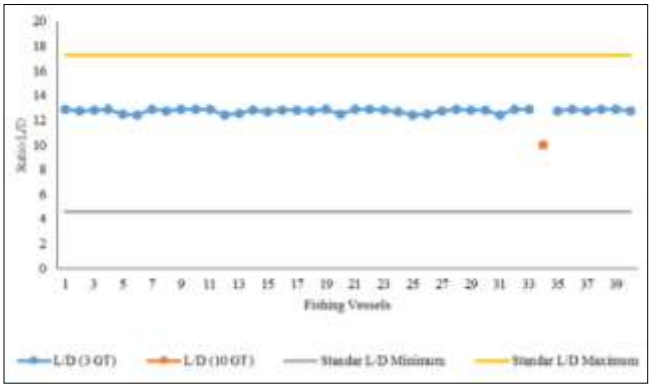

Fig 3: L/D ratio grant vessels KKP in Sukabumi.

The calculation results show that KKP grant vessels of 3 GT and 10 GT sizes have an average of 12,76. This shows that the value of the L/D ratio is within the range of the standard values of the ratio of the main dimensions of Indonesia, but close to the maximum value. This value indicates that the KKP grant ship based in Sukabumi Regency has good elongation strength. That is, the KKP grant ship is not susceptible to breaking when in use and can withstand thrust from waves hit by the ship.

3.3 B/D Ratio

B/D ratio value is the value used to analyze the stability and capability of ship propulsion [18]. The small value of the B/D ratio will result in poor stability but the ship's propulsion will increase [19]. The distribution of the value of the B/D ratio is presented in Figure 5. Based on the calculation results of the KKP grant ship has an average B/D value of 1,65. This value is still in the range of standard dimensions of the main dimensions of ships in Indonesia. However, the B/D ratio of this ship tends to approach the minimum value. This shows that the KKP grant vessels have poor stability but have good ship propulsion capabilities. So that the use of 3 GT size grant vessels has been modified with pumpboat. This is to increase the stability of the ship. Pumpboat is the main stability and mounted of the boat [20]. So that it can be used in fishing operations, in order to strengthen fisheries production [21, 23].

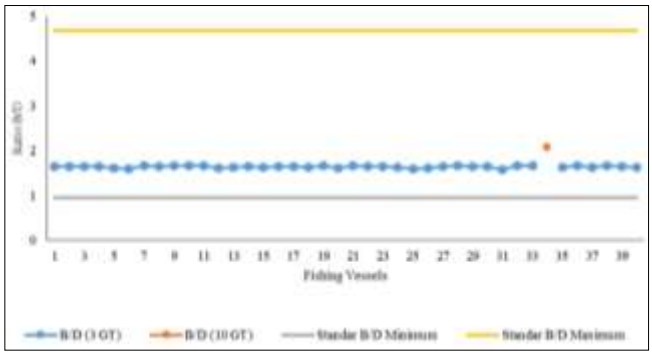

Fig 4: B/D ratio grant vessels KKP in Sukabumi.

4. Conclusions

The value of the dimensions of the L/B, L/D and B/D dimensions of the KKP grant vessels is included in the standard ratio of the main dimensions of Indonesian ships based on the method of operation according to Iskandar & Pujiati [9]. However, the dimension of the B/D dimension of the KKP grant ship is relatively low, so that a 3 GT-sized vessel is modified into a pumpboat to increase the stability of the ship during fishing operations. Thus, based on the ratio of the main dimensions of the KKP grant ship in Sukabumi it has the characteristics of motion and has a good ship speed, good elongation strength, good ship propulsion capability but poor stability.

5. References

1. Ridwan M, Khan AMA, Zahidah, Relationship between Length and Mouth Opening of Skipjack Tuna (*Katsuwonus pelamis*) in the Waters of Palabuhanratu Sukabumi Regency. World News of Natural Sciences. 2020; 30(3):231-241.
2. Rizal A, Andriani Y, Kusumartono FXH, A Strategic Environmental Assessment for Southern Coastal of West Java Province, Indonesia. World Scientific News. 2019; 137(2019):188-209.
3. Yusrizal, Wiyono ES, Simbolon D, Solihin I, Estimation of the Utilization Rate of Fish Resources in the Northern Coast of Java, Indonesia. AACL Bioflux. 2018; 11(6):1807-1824.
4. Maulana M, Apriliani IM, Riyantini I, Iskandar, Suitability of Gross Tonnage of Grant Boat by Kementerian Kelautan dan Perikanan (KKP) based in Pangandaran, West Java, Indonesia. World Scientific News. 2019; 124(2):119-130.
5. Ruddle K. Traditional Community-Based Coastal Marine Fisheries Management in Viet Nam. Ocean & Coastal Management. 1998; 40(1):1-22.
6. Tangke U. Evaluation and Development of Pole and Line Ship Design at Dufa-Dufa Port, North Maluku Province. Journal of Agribusiness and Fisheries. 2010; 1(2):1-10.
7. Papanikolaou A. Ship Design: Methodologies of Preliminary Design. School of Naval Architecture and Marine Engineering, 2014, 69-76.
8. Hardjono S. Identification of Main Dimensional Ratios of Small Feeder Container Ships for the Sea Toll of Indonesia. Transportation Research News. 2016; 28(4):267-276.
9. Iskandar BH, Pujiati S. Technical Performance of Fishing Vessels in Indonesia Area. Department of Fisheries Resource Utilization of FPIK IPB, Indonesia, 1995.
10. Palembang S, Luasunaung A, Pangalila FP. Study Design Multifunctional Fiberglass Fishing Boat 13 GT at the Shipyard CV Cipta Nusantara Bahari Minahasa North Sulawesi. Journal of Capture Fisheries Science and Technology. 2013; 1(3):87-92.
11. Ardhy S, Putra EM. Islahuddin, Fiberglass Boat Fishermen Manufacture in Padang with Hand Lay Up Method. Rang Engineering Journal. 2019; 2(1):143-147.
12. Winyall D, Edwards J, Brown A. 3D Hullform Modeling to Support Naval Ship Design Synthesis and Multi-Objective Optimization. International Ship Design Conference (ISDC), 2012, 1-20.
13. Apriliani IM, Dewanti LP, Khan AMA, Herawati H, Rizal A, Kusnadi NM, *et al*. Fishing Vessel Characteristics with Multipurpose Gear to Support Fishing Operations in the Northen Sea of Java, Indonesia (Case Study in Indramayu). Asian Journal of Fisheries and Aquatic Research. 2020; 6(1):1-8.
14. Kiyoichi Matsumoto, Hiroyuki Uejima, Tatsuo Iwasaki, Yoshiyuki Sano, Hiroshi Sumino. Studies on Regenerated Protein Fibers. III. Production Of Regenerated Silk Fibroin Fiber by the Self-Dialyzing Wet Spinning Method. Journal of Applied Polymer Science. 1996; 60(4):503-511.
15. Aziz MA, Iskandar BH & Novita Y, Study on Traditional Purse Seine Ship Design in Pinrang District (Case Study of KM. Cahaya Arafah). Albacore Journal. 2017; 1(1):069-076.
16. Jeom Kee Paik, Anil K. Thayamballi, Young Il Park, Joon Sung Hwang, A Time-Dependent Corrosion Wastage Model for Seawater Ballast Tank Structures of Ships. Corrosion Science. 2004; 46(2):471-486.
17. Pangalila FPT, Static Stability Fishing Vessel Type Tersanjung the basis of this Lambut in Aertembaga Ocean Fishery Port Bitung North Sulawesi Province. Journal of Fisheries and Maritime Affairs. 2010; 3(1):149-155.
18. Heberley BD. Analysis of the Operational Impacts of Alternative Propulsion Configurations on Submarine Maneuverability. Naval Architecture and Marine Engineering, 2011, 9-19.
19. Nopandri R, Fauziyah. Static Stability of the Bottom Gillnet Vessel in the Port of Nusantara Fisheries in Sungai Liat Bangka Belitung. Maspari Journal. 2011; 1(2011):63-69.
20. DM Abraham, Miao-Hui Joanne Yeh, DW Halpin. Modeling and Simulation of Breakwater Construction.

Winter Simulation Conference Proceedings, 1995, 1017-1023.
21. Rizal A. Reformulation of Regional Development Strategy To Strengthen Marine Sector in West Java, Indonesia. World Scientific News. 2018; 107(2018):207-215.
22. Rizal A. Science and Policy in the Coastal Zone Management. World News of Natural Sciences. 2018; 21(2018):1-8.
23. Vetthy Fatimah, Atikah Nurhayati, Isni Nurruhwati, Indah Riyantini. Study Social Economy Green Tree Conservation Area (*Chelonia mydas*) as a Daily Ecowism in Pangumbahan, Sukabumi District, Indonesia. World Scientific News. 2019; 130(2019):82-98.
24. Apriliani IM, Khan AMA, Herawati H, Dewanti LP, Syarifudin M. Design and Construction of Fishing Vessels in Pangandaran. International Journal of Advanced Scientific Research. 2019; 4(4):53-59.