Main Dimensional Ratio of Grant Ship Kementrian Kelautan dan Perikanan (KKP) Based in Subang Regency

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ABSTRACT

The suitability of the main dimensions of the ship is very important in the process of making fishing vessels to produce ships that are in accordance with their designation. A simple parameter that can be used a reference for shipbuilding is the ratio of the main dimensions. This study aims to calculate the ratio of the main dimensions of the ship to see the characteristics of aid vessels in supporting fishing operations in Subang Regency. The research method used is the case study method. The value of the main dimension ratio of the aid ship based in Subang Regency is in accordance with the comparison value of the main dimension ratio of the ship in Indonesia with theoperation method static gear. The value of the L/D ratio obtained shows an indicator of weakness, namely a 6 GT vessel has a weak thrust and a 25 GT vessel has poor stability when operated. To overcome this, the 6 GT ship is equipped with a standard marine engine to overcome the weakness of the ship's thrust so that the ship can go at a good speed, while the weakness of the 25 GT ship is overcome by filling water in thechamber ballast so that the ship remains stable when operated.

1. INTRODUCTION

The potential for fishing ground in Indonesian waters can be utilized by fishing operations. Vessels used in fishing operations are one of the important factors in increasing production yields from fishing operations in order to meet the community's need for fish [1]. Based on the Ministry of Maritime Affairs and Fisheries (KKP) in 2017 to answer the community's need for fish and increase capture fisheries production, a program of providing fishing assistance vessels was made to fishermen.

The provision of assistance in the form of fishing vessels was handed over to every region throughout Indonesia [2]. Subang Regency is one of the areas that received ship assistance. The waters of Subang Regency are included in the North Coast of Java. The Ministry of Maritime Affairs and Fisheries hopes that with the aid boats, Subang Regency fishermen can optimize fishing activities in the North Waters of Java because the potential for capture fisheries there is large while the number of fishermen is very low [3]. Optimal use of aid vessels is expected to increase the capture fisheries sector in Subang Regency.

The suitability of the main dimensions of the ship is very important in the process of making fishing vessels to produce ships that are in accordance with their designation [4]. A simple parameter that can be used as a reference for shipbuilding is the ratio of the main dimensions. The value of the comparison between the length and width (L/B) which will affect the strength of the ship, comparing the length and depth (L/D) which will affect the speed of the ship and comparing the width and depth (B/D) which will affect the speed of the ship. ship stability [5]. To make or design a ship, the ratio of the main dimensions is very important, if the ratio of the main dimensions of the ship is ideal, it will affect the optimum catch and the safety of fishermen [6].

Assistance vessels based in Subang Regency have been utilized in the operation offishing gear gillnet millennium. The aid ship provided to fishermen in Subang Regency is not yet known for its main dimension ratio characteristics. Based on the condition of the waters on the North Coast of Java, it is necessary to conduct research to calculate the ratio of the main dimensions of the ship to see the characteristics of the ship in supporting fishing operations.

2. METHODS

2.1 Research Location

The research was conducted in March-May 2021 in Subang Regency. The object of the research is the aid ship from the Ministry of Maritime Affairs and Fisheries based in Subang Regency. The aid ships provided to an area are generally managed by the Village Unit Cooperative (KUD), the ships are spread over 5 KUDs in Subang Regency, namely KUD Mina Fajar Sidik, KUD Mina Bahari, KUD Mina Jaya Laksana, KUD Mina Bahari and KUD Mina Karya Baru.
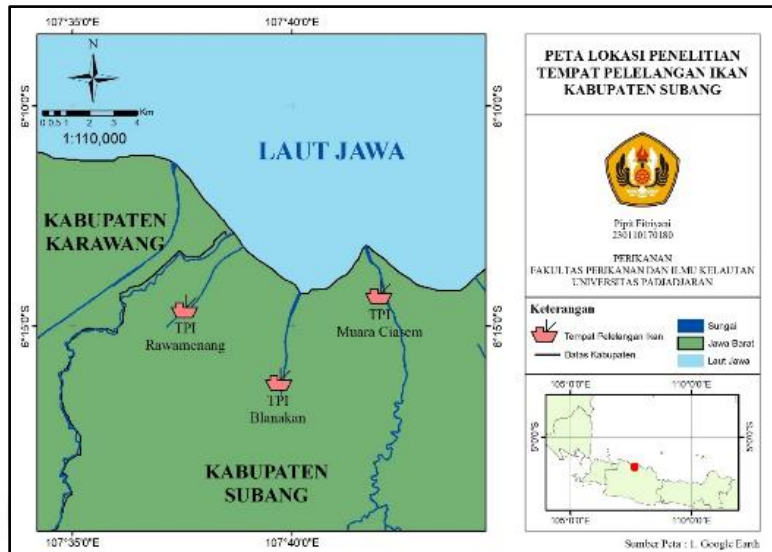

Figure 1. Map of Location Research

2.2 Research Method

The research method uses the case study method. The case in this study is an analysis of the ratio of the main dimensions of the KKP aid ship based in Subang Regency. A case study is an intensive, in-depth and detailed study of a comprehensive picture [7]. A research case study aims to examine research questions and problems that cannot be separated between a phenomenon and the context in which the phenomenon occurs. The data needed in this study are primary data and secondary data. Primary data consists of data on the main dimensions of the ship. Secondary data in the form of data on the number and distribution of aid vessels obtained from the Fisheries Service of Subang Regency as well as literature review from previous research.

Primary data collection is done by direct measurement in the field. The object in the form of a relief ship is then measured with the main dimensions, namely length (L), width (B), and depth (D). Secondary data was obtained by interviewing the DKP regarding the management of aid ships, the number and distribution of aid ships in Subang Regency.

2.3 Research Method

The data obtained were then analyzed using comparative descriptive analysis. The analysis is used to describe the ratio of the dimensions and compared with a standard value of the ratio of the main dimension of fishing boats in Indonesia by Iskandar and Pujiati (1995) [8], which is contained in Table 1.

Table 1. Value ratio of the main dimension of vessels based on the method of operation in Indonesia

Operating 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 and Pujiati (1995) [8].

3. RESULT AND DISCUSSION

Number of Assistance Vessels in Subang Regency

The government assistance program through the KKP to improve the welfare of fishermen is the program of providing aid vessels [9], the Ministry of Maritime Affairs and Fisheries (KKP) since 2016-2017 has provided assistance ships for Subang Regency as many as 6 ships, 3 units 6 GT, 2 units 13 GT, 1 unit 25 GT. The aid ships are spread across several KUDs in Blanakan District, Subang Regency, namely Mina Fajar Sidik KUD with 6 units of 25 GT ships, Mina Bahari KUD with 2 units of 13 GT ships, Mina Jaya Laksana KUD with 1 6 GT ships, KUD Mina Bahari as many as 1 unit of ship size 6 GT and KUD Mina Karya Baru as many as 1 unit ship size 6 GT. The ship is made in Tangerang with fiberglass. Ships made of fiberglass have advantages in terms of cost, maintenance, construction and manufacturing processes compared to other materials [10].

Main Dimension

The process of making fishing vessels in accordance with their designation, the suitability of the main dimensions of the ship is very important [11]. Ship size requires data, including requests for ship type, size, and shipping area. Loaded net payload, speed and other necessary data such as ship length (L), ship width (B), inside of the ship (D), and some coefficients of the underwater hull section [12]. The main dimensions of the KKP assistance ship based in Subang Regency can be seen in Table 2.

Table 2. Main Dimensions of the KKP Assistance Ship

No.	Name of Ship	Size GT	L	B	D
1.	KM.Nelayan 2016 - 29	25	17.14	3.55	1.84
2	KM.Nelayan 2017 - 821	13	13.5	2.75	1.55
3	KM.Nelayan 2017 - 820	13	13.57	2.76	1.55
4	KM.Nelayan 2017 - 557	6	10.6	2.62	0.97
5	KM. Nelayan 2017 - 558	6	10.58	2.65	0.94
6	KM. Nelayan 2017 - 556	6	10.6	2.64	0.98

The KKP aid ship has 3 sizes, namely 25 GT 1 unit, 13 GT 2 units and 6 GT 3 units. The length of the ship with a size of 25 GT is 17.14 m, 3.55 m wide, and 1.84 m deep. The 13 GT ship has an average length of 13.53 m, width 2.75 m, and depth of 1.55 m. The main dimensions of the 6 GT ship have an average length of 10.59 m, a width of 2.63 m, and a depth of 0.96 m.

Main Dimension Ratio

The ratio of the main dimensions of the ship can reflect thecharacteristics performance of a ship which includes stability, as well as the ability to maneuver. Ships that have better performance are influenced by the ideal main dimension ratio. The dimension ratio is the ratio between length and width (L/B), width and depth (B/D) and the ratio between length and depth (L/D) [4]. Calculation results of the main dimension ratio of the KKP aid ship is calculated based on the comparison of the value of length (length over all/L), width (breadth/B) and deep (depth/D). The comparison value determines the main dimension ratio characteristics of the KKP aid vessel which can be seen in Table 3.

Table 3. The Result of Calculation of the Main Dimension Ratio of the KKP Assistance Vessel

No.	Name of Vessel	Size	L/B	L/D	B/D
1.	KM.Nelayan 2016 - 29	25	4.83	9.32	1.93
2	KM.Nelayan 2017 - 821	13	4.91	8.71	1.77
3	KM.Nelayan 2017 - 820	13	4.92	8.75	1.78
4	KM.Nelayan 2017 - 557	6	4.05	10.93	2.70
5	KM. Nelayan 2017 - 558	6	3.99	11.26	2.82
6	KM. Nelayan 2017 - 556	6	4.02	10.82	2.69
Minimum Value			3.99	8.71	1.77
Maximum score			4.92	11.26	2.82
Average			4.45	9.96	2.28

Comparison of the value of the L/B, L/D, B/D dimension ratio of KKP aid vessels based in Subang Regency can be seen in Table 1. The value of the L/B ratio has a value of 3.99 – 4.92 m with an average value of 4.45 m, the value of the L/D ratio has a value of 8.71 – 11.26 m with a value of an average of 9.96 m, the value of the B/D ratio has a value of 1.77-2.82 m with an average value of 2.28 m. The results of these calculations are compared with the value of the comparison ratio for fishing vessels in Indonesia in Table 1. The fishing gear used by the KPP assistance ship in Subang isfishing gear gillnet millennium, the fishing gear is a type of fishing gear withoperating method static gear [13]. The results of the calculation of the ratio of the main dimensions of the KKP aid ship in Subang Regency are compared with the ratio of the dimensions of the ship using themethod static gear, this is based on the type of fishing gear used.

1) **L/B**

Value The L/B value is used to analyze the ship's motion and speed. If the value of the L/B ratio is getting smaller, the ship will have good maneuverability and result in a slow ship speed and vice versa [1]. The results of the calculation of the L/B of the KKP aid ship can be seen in Figure 2.
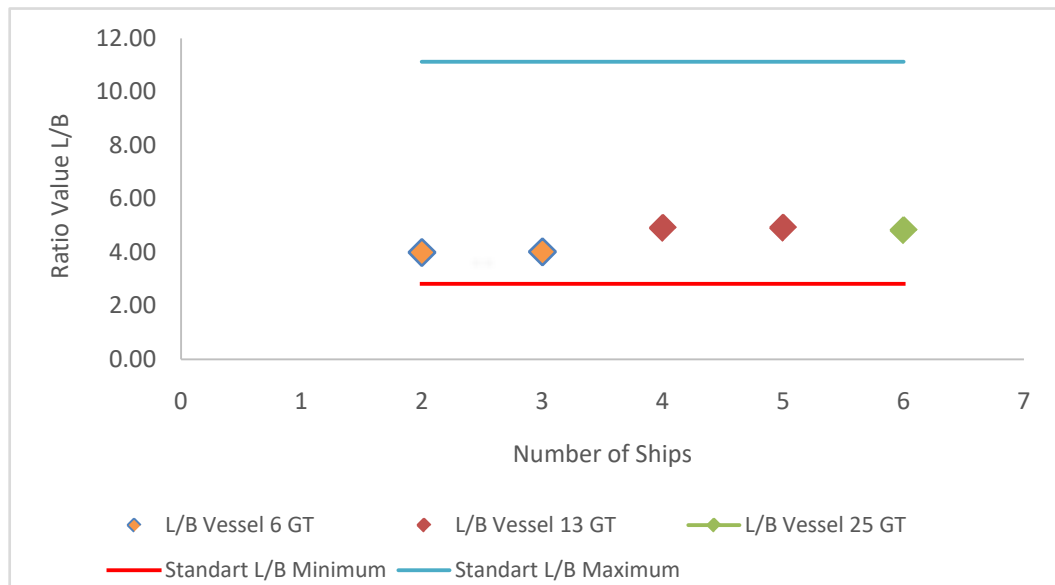
Figure 2. L/B Value of KKP Assistance Vessels
(Remarks: Comparator Iskandar and Pujiyati, 1995)

Figure 2 shows the distribution of the dimension ratio value of the KKP aid ship in Subang Regency. The distribution of L/B dimension ratio values is shown by green dots for 6 GT, orange vesselsfor 13 GT vessels, and gray for 25 GT vessels. The(linelinered) shows the minimum limit value for comparison and the(linelineblue) shows the maximum limit value for comparison based on Iskandar and Pujiyati (1995). The value of the L/B dimension ratio of KKP aid vessels of 6 GT, 13 GT and 25 GT is within the range of comparison ratio values based on the calculation results. The value of the comparison L/B dimension ratio used forships static gear is 2.83 for the minimum limit and 11.12 for the maximum limit. The average value of the L/B dimension ratio for the KKP aid vessel of 6 GT is 4.02, the KKP aid vessel of 13 GT is 4.91 and the KKP aid vessel of 25 GT is 4.83.

The three sizes of KKP aid vessels have L/B dimension ratio values that are close to the minimum value of the comparison ratio, so it is indicated that the KKP aid vessel based in Subang Regency has good maneuverability but the speed of the ship is low. If the value of L/B is getting smaller, it will adversely affect the speed of the ship because the value of the resistance to motion will be greater [14]. Due to the good maneuverability of the KKP assistance ship located in Subang Regency so that the ship does not experience modifications to the addition of a katir which functions to maintain the stability of the ship. Unlike the KKP aid ships in Pangandaran Regency and Sukabumi Regency, the aid ships in both locations underwent modifications to add a raft [15].

   2)   **L/D Value**

The value of the L/D ratio is the longitudinal strength of a ship, if the L/D value is greater, the stability of the ship will increase but the thrust capability is getting smaller [15]. The results of the calculation of the L/D of the KKP aid ship can be seen in Figure 3.
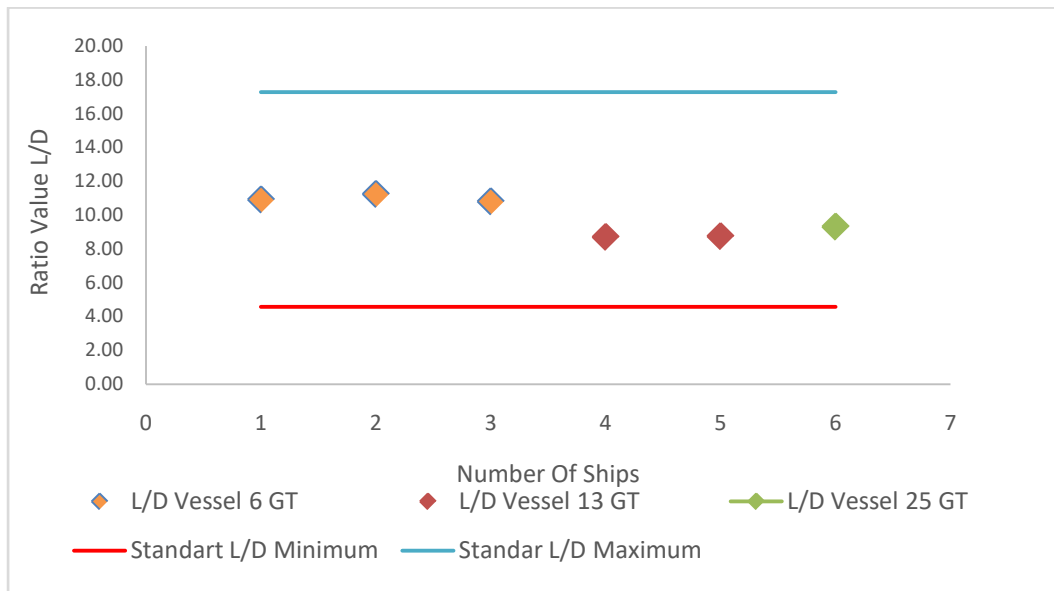
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Based on the calculation of the L/D dimension ratio, the three sizes of the KKP aid ship based in Subang Regency have good longitudinal strength, because they are within the range of comparison ratio values forships static gear. This means that the KKP aid ship is not prone to breaking during operation and the ship remains strong despite facing high wave conditions [16]. The smaller the value of the L/D dimension ratio, the lower the stability of the ship [1]. The KKP aid ship based in Subang Regency shows that the larger the GT size of the ship, the greater the thrust but its stability decreases. This is in line with what was stated by fishermen who use aid vessels, he explained that for the use of aid vessels measuring 25 GT so that the ship remains stable when operated, theroom ballast must be filled with water. Thespace ballast on the ship serves to maintain the stability of the ship so that it does not sway when operated. [17]. As for the 6 GT ship, it is equipped with a standard marine engine to overcome the weakness of the ship's thrust so that the ship can go at a good speed. The marine air engine is a machine whose construction is more complex than the usual fishing boat engine, engine spare parts are still limited in availability in Indonesia, and it is not easy to modify the engine transmission because it is not commonly available on the market but theengine marine air has the advantage that the power expended larger but requires less fuel [18].

3) B/D Value

The value of the B/D dimension ratio becomes the basis for analyzing the stability and propulsion ability of the ship. The stability of a ship will increase and the ability to push the ship will decrease if the value of the B/D ratio is greater [1]. The distribution of the B/D ratio of KKP aid vessels in Subang Regency can be seen in Figure 4.
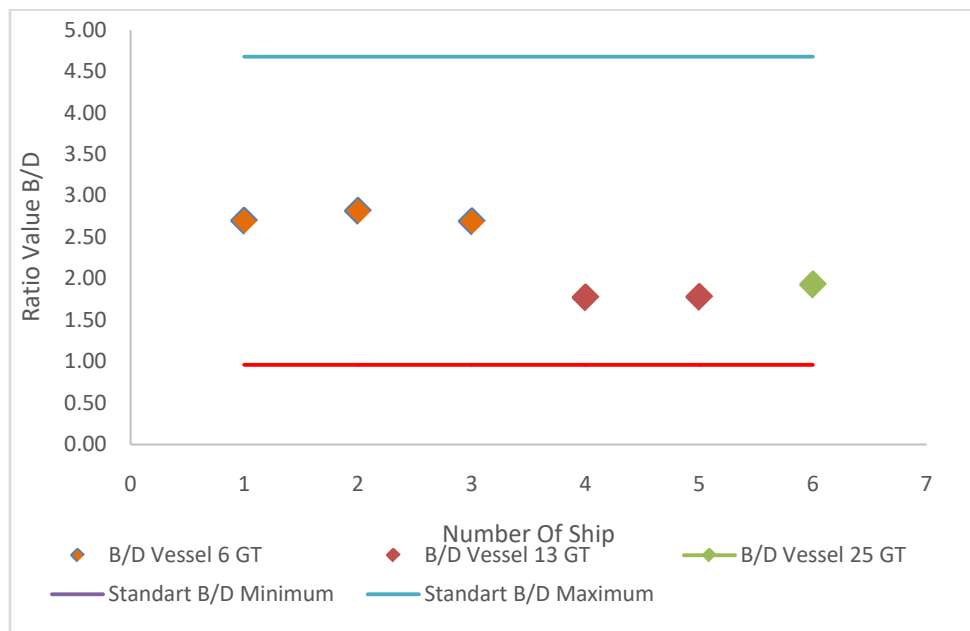
Figure 4. B/D Value of KKP Assistance Ships
(Remarks: Comparator Iskandar and Pujiyati, 1995)

Figure 4 shows the distribution of the dimension ratio value of the KKP aid ship in Subang Regency. The distribution of B/D dimension ratio values is shown by green dots for 6 GT, orange vesselsfor 13 GT vessels, and gray for 25 GT vessels. The(linelinered) shows the minimum value of the comparison and thelineblueshows the maximum value of the comparison based on Iskandar and Pujiyati (1995).

The value of the B/D dimension ratio of the KKP aid vessels of 6 GT, 13 GT and 25 GT is within the range of comparison ratio values based on the calculation results. The value of the comparative B/D dimension ratio used forships static gear is 0.96 for the minimum limit and 4.68 for the maximum limit. The average value of the B/D dimension ratio of the 6 GT KKP aid vessel is 2.74, the 13 GT KKP aid vessel is 1.78 and the 25 GT KKP aid vessel is 1.93. The value of the B/D dimension ratio for ships of size 13 and 25 GT is smaller than ships of size 6 GT. This shows that the 6 GT vessel has better stability and lower thrust compared to the 13 and 25 GT aid vessels.

4. CONCLUSIONS

The value of the main dimension ratio of the aid ship based in Subang Regency is in accordance with the comparison value of the main dimension ratio of the ship in Indonesia by Iskandar and Pujiyati (1995) with theoperation method static gear. The ratio value obtained shows an indicator of weakness based on the value of the L/D ratio. Based on this, the 6 GT ship has a weak thrust, while the 25 GT ship has poor stability when operated. To overcome this, the 6 GT ship is equipped with a standard marine engine to overcome the weakness of the ship's thrust so that the ship can go at a good speed, while the weakness of the 25 GT ship is overcome by filling water in thechamber ballast so that the ship remains stable when operated.

5. ACKNOWLEDGEMENT

6. REFERENCES

[1] Palembang S, Luasunaung A, Pangalila F P. (2013). Kajian rancang bangun kapal ikan fibreglass multifungsi 13 GT di galangan kapal CV Cipta Bahari Nusantara Minahasa Sulawesi Utara. *Jurnal Ilmu dan Teknologi Perikanan Tangkap*, 1 (3): 87-92.

[2] Putra P K D N Y. (2019). Desain Kapal Penangkap Ikan Berdasarkan Kearifan Lokal Di Pelabuhan Perikanan. *Institut Pertanian Bogor*, *March*.

[3] Widjajda. 16 Februari (2018). Nelayan Jawa Barat Menerima Bantuan dari (KKP). Cirebon, Jawa Barat, Indonesia.

[4] Istiqomah I, Susanto A, Irnawati R. Desember (2014). Karakteristik Dimensi Utama Kapal Jaring Rampus di Pelabuhan Perikanan Nusantara Karangantu Kota Serang Provinsi Banten. *Jurnal Perikanan dan Kelautan*, Vol (4), No (4); 269-276.

[5] Novita Y, Iskandar BH, Imron M, dan Nurdin HS. (2016). Design of Purse Seine Fishing Vessel Modification at Bulukumba South Sulawesi Province. *Jurnal Perikanan dan Kelautan*, *6*(2), 125-136.

[6] Pasaribu, R., Fauziyah, & Agustriani, F. 2010. Karakteristik Desain Kapal Perikanan Bottom Gillnet di Pelabuhan Perikanan Nusantara Sungailiat Bangka Belitung. Maspari Journal, 02(2011), 54-62

[7] Pratama D A, dan S Soetomo. (2014). *Dampak Hubungan Kota dan Desa Dalam Perkembangan Pariwisata di Kawasan Bandungan (Studi Kasus : Kecamatan Bandungan dan Kelurahan Bandungan). 2*(4), 311–320.

[8] Iskandar BH, Pujiati S. (1995). Keragaan Teknis Kapal Perikanan di Beberapa Wilayah Indonesia (laporan penelitian). Bogor (ID): Jurusan Pemanfaatan Sumber Daya Perikanan, Fakultas Perikanan Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor.

[9] Luhur ES. (2012). Potret Subsidi Perikanan Tangkap Laut di Pelabuhanratu, Sukabumi. Buletin Riset Sosek Kelautan dan Perikanan, 7(1): 21-26.

[10] Ardiana D, Razali R, dan Muharnis M. (2014). Proses Pembuatan Kapal FRP Berkapasitas 14 M Bagi Nelayan di Kabupaten Bengkalis. *Inovtek Polbeng*, *4*(1), 43-47.

11] Tangke U. (2009). Evaluasi dan Pengembangan Disain Kapal Pole and Line di Pelabuhan Dufa-dufa provinsi Maluku Utara. *Agrikan: Jurnal Agribisnis Perikanan*, *2*(1), 1-9.

[12] Niam WA. (2017). *Desain kapal ikan di perairan laut selatan Malang* (Doctoral dissertation, Institut Teknologi Sepuluh Nopember).

[13] Anggreini AP, Astuti SS, Miftahudin I, Novita PI, dan Wiadnya DGR. (2017). Uji Selektivitas Alat Tangkap Gillnet Millenium Terhadap Hasil Tangkapan Ikan Kembung (Rastrelliger Brachysoma). *JFMR (Journal of Fisheries and Marine Research)*, *1*(1), 24-30.

[14] Setiawan F, Supeni HEA, Wahab AA. (2021). Pengaruh rasio dimensi utama terhadap stabilitas kapal purse seine di kecamatan kusan hilir (studi kasus kapal purse seine kmn bangun polea 01). *Jurnal Riset Kapal Perikanan*, *11*(1), 17-23.

[15] Apriliani IM, Dewanti LP, Zidni I. (2017). Karakteristik dimensi utama kapal perikanan pukat pantai (*beach seine*) di Pangandaran. *Jurnal Airaha*, *6*(2): 48-53.

[16] Apriliani IM, Khan AM, Rizal A, dan Dewanti LP. (2021). Perbedaan *General Arrangement* Dan Rasio Dimensi Utama Kapal Hibah Yang Berbasis Di Kabupaten Pangandaran Dan Sukabumi. *Jurnal Riset Kapal Perikanan*, *11*(1), 59-66.

[17] Subekhi R E. dan B Suwasono. (2018). Distribusi Tegangan Sistem Perpipaan Ballast Pada Kapal Perintis 1200 GT Menggunakan Perangkat Lunak Caesar Ii 5.10. In *Prosiding Seminar Nasional Sains dan Teknologi Terapan* (pp. 447-452).

[18] Wiyastra AP, Baskoro MS, dan Purwangka F. (2012). Instalasi Permesinan Pada Kapal PSP 01. *Jurnal Teknologi Perikanan dan Kelautan*, *3*(1), 35-43.