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FEASIBILITY ANALYSIS OF OPERATION OF PURSE SEINE AS A FISHING VESSEL IN BONE BAY, SOUTH SULAWESI

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Abstract
This study aims to analyze the feasibility of operating purse seine vessels operated in Bone Bay. The sampling method uses purposive sampling. There are 4 ship samples and to facilitate measurement using ships that are docking. The data analyzed are the ratio of the main size of the ship, stability, seaworthiness criteria, and ship operation criteria.
The results showed that the feasibility of operating purse seine vessels operating in Bone Bay, feasible to operate based on the results of the analysis of each parameter. The L/B ratio value of the purse seine vessels studied ranged from 3.73 – 4.59; L/D ranges from 10.72 – 12.58; and B/D ranges from 2.34 – 3.16. The stability curve of sample ship 1 shows a Max GZ value of 163.27 cm at a slower angle of 73.6 deg, sample ship 2 shows a Max GZ value of 159.75 cm at a low angle of 58.2 deg, sample ship 3 shows a Max GZ value of 154.75 cm at a low angle of 60.9 deg and sample ship 4 Data shows a Max GZ value of 139.59 cm at a low angle of 60.9 deg. The criteria value of the sample ship has met the minimum value standards set by the IMO (International Maritime Organization).

Keywords: purse seine ship, operating feasibility, purposive sampling, bone bay.

Introduction

Fishing vessels are vessels used in the world of fisheries both in fishing business, collecting aquatic resources, research work, training, supervision and so on. However, unlike other general ships, such as passenger ships or freighters, fishing vessels have more complicated and heavier operational functions. Given the operational function of the ship, several special requirements are needed that require the main privileges that must be owned by fishing vessels, including (1) maneuverability, (2) stability, (3) speed, and (4) seaworthiness. (Matafi et al., 2015).

Purse seine vessels are the main means used as a means of transportation and means to carry out fishing methods and as a place to accommodate catches. Many things need to be considered on the ship before operating, in terms of safety equipment on board, ship permits, and policies related to fishing safety arrangements. According to the Bone County Fisheries Marine Service, Purse Seine vessels operating in Bone Bay whose home base in Bone County totaled 183 units.

The thing that is very avoided in shipping is the occurrence of accidents at sea. The fatal causes of ship accidents are low awareness of the crew about work safety on shipping and fishing activities, low mastery of shipping and fishing safety competence because the crew only controls instincts and natural conditions, the ship is not equipped with safety equipment as it should be and navigation equipment such as GPS (Global Position System) or compass. Likewise in ship designs made traditionally by ship craftsmen without paying attention to the main ratio of the ship because it can also affect the stability and speed of purse seine ships.

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Bone Regency is one of the districts in South Sulawesi that has great fisheries potential. Management of this potential needs to be supported by the availability of seaworthy fishing vessels. Seaworthiness research needs to be conducted to evaluate the feasibility of vessels operating in the waters of Bone Bay.

Research Method

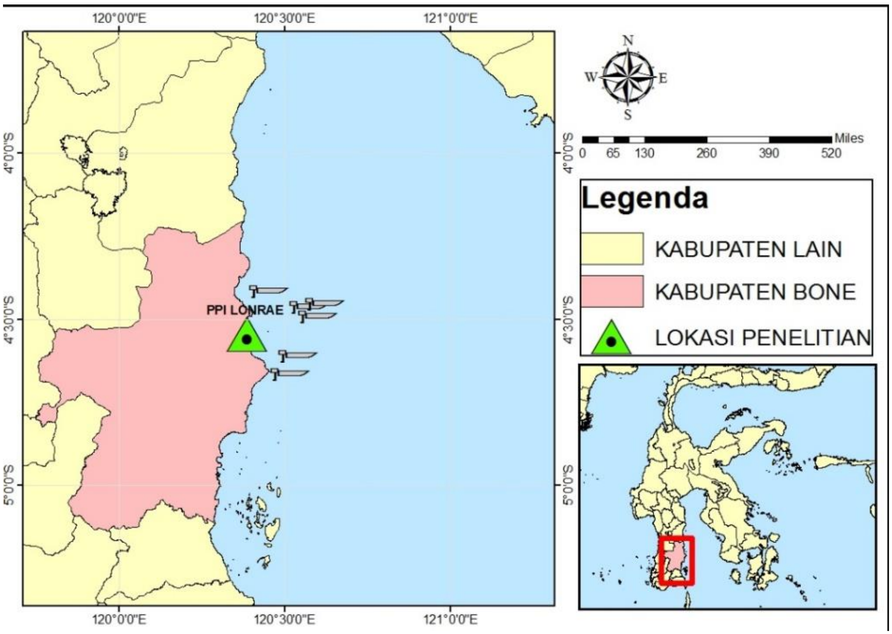

Figure 1. Map of Research Location

The approach used in this study is qualitative and quantitative descriptive approach. A qualitative approach is a research procedure that produces descriptive data in the form of written or spoken words of people and observable behavior. The qualitative approach has a natural characteristic as a source of direct, descriptive data, process takes precedence over results. Analysis in qualitative research tends to be carried out by inductive analysis and meanings are essential.

The quantitative research approach is research based on the philosophy of positivism and is used to examine certain populations or samples. Data collection in this study requires research instruments. Data analysis is quantitative in nature with the aim of testing established hypotheses.

Sampling using purposive sampling, which is sampling carried out intentionally in accordance with the requirements or characteristics of the sample needed. This sample is a type of nonprobability sample. It is also referred to as a judging or expert sample. A purposive sample is a non-randomly selected and usually smaller subset of a population intended to represent it logically. This can be done by understanding the background of the population by selecting samples that illustrate the variation. Researchers use sampling when they want to access a specific subset of people, where all survey participants are selected to fit a particular profile.

Purposive sampling is a random sampling methodology in which the targeted sample group has certain attributes. This method can be used in many populations, but is more effective with smaller sample sizes and more homogeneous populations. Sampling is beneficial because researchers can scrutinize all data.

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The data analysis used in this study is as follows:

1. Main Size Ratio of Ship

   The Main Size Ratio of Ships includes L/B, L/D, B/D with reference to Ayudhyoa standards (1972)

2. Stability Value

   Ship stability assessment is carried out through ship stability analysis based on International Maritime Organisation (IMO) standards

3. Seaworthiness Criteria

   The assessment of safety equipment criteria on ships is carried out by taking into account aspects of safety equipment on fishing vessels.

4. Feasibility Analysis of Ship Operating Criteria

   The analysis of operating feasibility is carried out by calculating the weight of the criteria of each parameter by taking into account the importance value of the parameters used, namely the ratio of the main dimensions, the value of stability and the criteria of seaworthiness.

Results and Discussion

Characteristics of Purse Seine Vessels Studied

Ships are fishing fleets used by fishermen to go to fishing grounds and operate fishing gear, especially purse seine, but the ship must be adjusted to the fishing gear below and the fishing location. The success of a fishing vessel is if it meets 3 (three) factors, namely seaworthy, operable and storeworthy. Seaworthiness is very influential on the performance of ships at sea so that ship design must be considered and adjusted by the creteria of Indonesian fishing vessels (Asis Arkam, et al 2017).

The purse seine vessels studied are generally designed without modern calculations but are traditionally and hereditary designed using makeshift equipment. The specifications of the purse seine vessels sampled can be seen in Table 1.

Table 1. The main sizes of the purse seine vessels studied

Sample Ship	L (m)	B (m)	D (m)	d (m)
Sample 1	18.6	4.25	1.85	0.24
Sample 2	20.14	5.07	1.6	0.20
Sample 3	17.7	4.74	1.65	0.21
Sample 4	15.39	3.35	1.32	0.17

Source: Primary data (2019).

The main size data of purse seine vessels obtained the main size ratio values of each L/B, L/D, and B/D can be seen in Table 2.

Table 2. The value of the ratio of the main sizes of the Purse Seine vessels studied

Sample Ship	L/B	L/D	B/D
Sample 1	4.37	10.76	2.34
Sample 2	3.97	12.58	3.16
Sample 3	3.73	10.72	2.87
Sample 4	4.59	11.65	2.53

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Source: Primary data (2019).

The L/B ratio value of the purse seine vessels studied ranged from 3.73 – 4.59; L/D ranges from 10.72 – 12.58; and B/D ranges from 2.34 – 3.16. The main size ratio of the ideal ship for the purse seine type is to have an L/B ratio ranging from 4.30 – 4.50; L/D ranges from 10.00 – 11.00 and B/D ranges from 2.10 – 2.15 (Ayodhyoa 1972).

In Table 2 it is explained that not all ships studied have a ratio value that is in accordance with Ayodhyoa's statement (1972). Sample vessels that are not included in the recommended ratio value category have L/B, L/D and B/D values smaller than recommended and there are some vessels that have values greater than the recommended value.

In purse seine ships, samples that show L/B ratio values are in accordance with Ayodhyoa's statement (1972), namely sample 1 with a value range of 4.31, while other sample ships have greater values and smaller values than the provision values. According to Ayodhyoa (1972) if the L/B value shrinks, it will adversely affect the speed of the ship. However, if the L/B value increases, it will increase the speed of the ship. To adjust to the standard ratio value, it is necessary to add a B value while still paying attention to the L value to provide good stability to the ship.

For the L/D ratio value of purse seine sample ships that have L/D ratio values as suggested by Ayodhyoa (1972) there are two ships, namely sample 1 with a value range of 10.76 and sample 3 with a value range of 10.72, while other sample ships have a ratio value greater than the recommended standard, where Ayodhyoa's statement (1972) if the L/D value increases then the ship's longitudinal strength will weaken. The L/D value increases due to a low depth (D) value. Therefore, it is necessary to increase the depth value (D) on the ship while still paying attention to the L value to adjust to the standard value of the L/D ratio so that the ship has good longitudinal strength. As stated by Ayodhyoa (1972) that, if the depth value (D) is enlarged, positive things are obtained, including longitudinal strength will improve so that the ship will be stronger against bending movements that are directed up to down.

For the value of the B/D ratio, there is no sample purse seine vessel size that has a B/D ratio value that is in accordance with that suggested by Ayodhyoa (1972). The B/D value of the sample ships has a value greater than the provision, there is also a value smaller than the value determined by Ayodhyoa (1972). The B/D value is enlarged because the depth value (D) is too low to match the width of the ship. In the purse seine vessels studied the stability will increase but the longitudinal strength of the ship will weaken, which is in accordance with Ayodhyoa's statement (1972) that if the B/D increases then the stability will improve but the longitudinal strength (pushing force) will deteriorate. For adjustment to the standard value of the B/D ratio, it is necessary to increase the depth value (D) with an adjustment to the B value to obtain a good longitudinal strength (pushing force) of the ship with good stability.

The discrepancy of these values with the standard values of Ayodhyoa (1972), is caused by shipbuilding that is not based on naval architect calculations, because ships are made in traditional shipyards with traditional knowledge. In addition, the lack of knowledge of shipbuilders about the suitability of ship sizes and equipment used in shipbuilding is also still traditional. According to traditional ship craftsmen, the size of the ship is made according to the owner's request and the adequacy of available materials, and it is said to be successful and feasible to sail because a ship made traditionally without appropriate calculations, can sail well in waters with all situations and conditions and the physical state of the ship lasts a long time.

The stability value of the Purse Seine vessel under study

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The stability of the sample vessel was analyzed using the Maxsurf application and generated the curve and the enforcement arm value (GZ). The GZ curves of sample vessels can be seen in Figures 2, 3, 4 and 5.

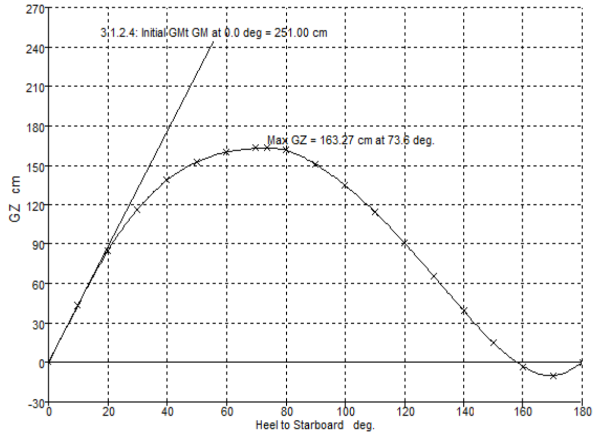

Figure 2. Ship stability curve 1

The stability curve presented in Figure 2 shows a Max GZ value of 163.27 cm, a 73.6 deg angle.

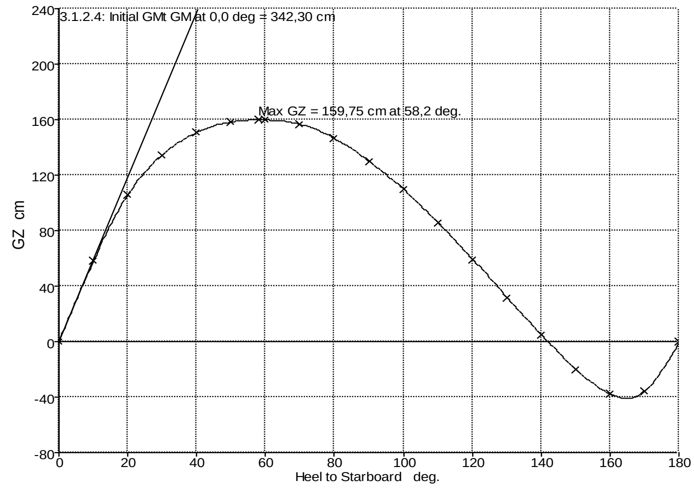

Figure 3 Ship stability curve 2

The stability curve presented in Figure 3 shows a Max GZ value of 159.75 cm at an angle of 58.2 deg.

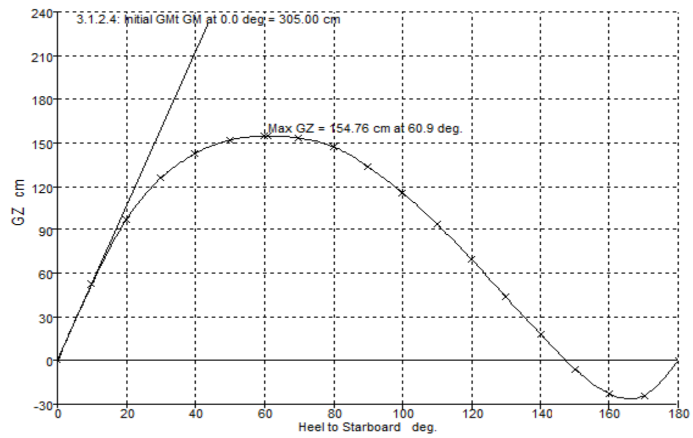

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Figure 4. Ship stability curve 3

The stability curve presented in Figure 4 shows a Max GZ value of 154.75 cm at an angle of 60.9 deg.

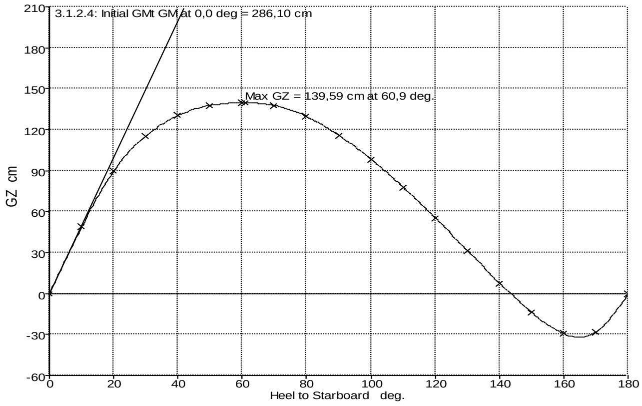

Figure 5. Ship stability curve 4

The stability curve presented in Figure 5 shows a Max GZ value of 139.59 cm at an angle of 60.9 deg.

From the ship's stability curve shows that the GZ enforcement arm produced by the sample ship is positive, which means that the ship is able to return to its original position after experiencing a malfunction, meaning that the stability of the studied ship is quite good and seaworthy. This is in accordance with Tailor's (1977) statement that at full condition (maximum loaded) a positive GZ righting arm is produced that is able to return the ship to its original position.

Table 3. Sample Vessel Stability Criteria Value versus IMO Standard Value

Criteria	***Value***	***Units***	**Sample 1**
Area 0 *to* 30	315,130	cm.deg	1879,694
Area 0 *to* 40	515,660	cm.deg	3160,947
Area 30 *to* 40	171,890	cm.deg	1281,253
Max GZ at 30 *or greater*	20,00	Cm	163,30
Angle of maximum GZ	25,0	Deg	73,6
Initial GMt	15,00	Cm	251,00
			Sample 2
Area 0 *to* 30	315,130	cm.deg	2351,804
Area 0 *to* 40	515,660	cm.deg	3785,323
Area 30 *to* 40	171,890	cm.deg	1433,519
Max GZ at 30 *or greater*	20,00	Cm	159,70
Angle of maximum GZ	25,0	Deg	58,2
Initial GMt	15,00	Cm	342,30
			Sample 3
Area 0 *to* 30	315,130	cm.deg	2153,237
Area 0 *to* 40	515,660	cm.deg	3502,161
Area 30 *to* 40	171,890	cm.deg	1348,924
Max GZ at 30 *or greater*	20,00	Cm	154,80
Angle of maximum GZ	25,0	Deg	60,9
Initial GMt	15,00	Cm	305,00
			Sample 4
Area 0 *to* 30	315,130	cm.deg	1993,950

Area 0 *to* 40	515,660	cm.deg	3229,131
Area 30 *to* 40	171,890	cm.deg	1235,180
Max GZ at 30 *or greater*	20,00	Cm	139,60
Angle of maximum GZ	25,0	Deg	60,9
Initial GMt	15,00	Cm	286,10

Based on Table 3 of the sample ship criteria values against the minimum value standards set by IMO, it is known that all sample vessels have met the standards or are greater than the standard values required by IMO. The stability results of the sample vessel show that the GZ enforcement arm has a value greater than the minimum value applied by IMO.

Good ship stability greatly supports the performance of ship operations, especially on fishing vessels. To obtain good stability, the area of the GZ curve for an area up to 30° should not be less than 315,130 cm. DEG, the area up to 40° should not be less than 515,660 cm. deg, and the area between 30° to 40° should not be less than 171,890 cm. Deg. In addition, the ship must also not have a swing angle for the GZmax enforcement arm must not be more than 30°, and for the value of the GZmax enforcement arm must not be less than 20.0 and the metacenter height must not be less than 15.00.

Conclusion

Based on the research and data analysis, it can be concluded that: 1. The Al An'am broiler farming business in the partnership pattern in 2021 costs Rp.454,658,571, revenue Rp.535,506,868, and income of IDR 53,002,642. 2. RC Ratio in 2021 is 1.4 so that Al An'am livestock activities in the partnering pattern in Attangsalo Village, Ma'rang District obtain profits or are worthy to development.

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