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Characteristics of Gillnet Fishing Gear and Vessel Construction in Fish Landing Base of Karangsong, Indramayu, Indonesia

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ABSTRACT

This research study was intended to provide information in order to model an ideal construction of Gillnet fishing practices in PPI Karangsong, in order to support the feasibility of optimum catch. Fish Landing Base (PPI) Karangsong is the most active fishing port in Indramayu. The dominant fishing activity in the Karangsong PPI is gillnet fishing at around 71.4% of the total fishing units. The type of gillnet utilized in Indramayu is commonly called the 'gillnet millennium' and it is constructed out of Poly Amide monofilament. The gillnet vessel itself has a hull shaped in the form of a hard chin bottom. Based on this research, it can be concluded that each region has specific fishing unit characteristics that vary in accordance with the conditions of the waters.

Keywords: construction, gillnetter, millenium net, fishing units, fishing ports

1. INTRODUCTION

Capture fisheries activities in the sea have an important role seen from their contribution to the development of coastal areas, are able to provide fish protein, absorb labor, obtain foreign exchange through export activities and increase fishermen's income (Yulianto et al., 2016).

Indramayu is one of the largest fish producing districts in West Java. Indramayu Regency has the potential to be developed as a center for fisheries production. There are two main sectors which are the main potentials of the Indramayu coastal region, namely the oil and gas sector (24.6%) and the fisheries subsector (24.4%). The fisheries sub-sector in Indramayu has the potential to continue to be developed by increasing the linkages with the downstream sector.

Fish Landing Base (PPI) Karangsong is one of the fishing ports that have the highest activity in Indramayu. The dominant fishing activity in the PPI Karangsong is gillnet fishing gear, around 71.4% of the total fishing units in the PPI Karangsong (Kusnadi et al., 2018). Gillnet is one type of fishing gear that is widely used by fishermen, starting from gillnet circumference, gillnet base, and surface gillnet which is operated at night. Gillnet is classified as a static capture device that requires high stability (Istiqomah, 2014).

Emmanuel (2010), gillnet is a large vertical wall shaped net hanging in water. According to Iporenu et al. (2013), gill net fishing equipment serves to block the passing of fish species, both pelagic and demersal fish. The characteristics of the length and square shape of the net affect the performance of the net and knowledge of the size of selectivity of fishing gear is very important for the management of fisheries and ecology. Fishers may lose gear when there is contact with passing vessels or gear conflicts with active gear (e.g., passive gear is inadvertently, or intentionally, towed away by trawlers or dredgers, or marker buoy moorings are cut) (Pawson, 2003).

Fishing vessels are one of the fishing units that have a very important role for the fishermen, both as a means of transportation from fishing bases to fishing ground and as a means to collect catches. Every region in Indonesia has a characteristic in shipbuilding. This is based on several things including the characteristics of the waters. Fishing vessels in an arrest operation carry out several activities, including searching for fishing ground, operating fishing gear (setting) and chasing fish groups. Gillnet ships require a good level of stability because the operation of fishing gear is carried out on one side of the ship (Kusnadi et al., 2018).

Shipbuilding at PPI Karangsong has its own characteristics with a fatter body such as a bowl which causes the shape and construction of fishing vessels to be built differently from other regions given that the characteristics of the waters for each region are different. Thus, it is necessary to know the characteristics of gillnet ship construction and fishing equipment in Karangsong, Indramayu. This research is expected to provide information as an ideal construction of Gillnet based in PPI Karangsong, in order to support the feasibility of operations in the successful capture with optimum catch.

2. MATERIALS AND METHODS

The research was conducted in March-June 2018 at PPI Karangsong, Indramayu, Indonesia. The research objects studied were fishing gear and gillnet vessels that were above 25 GT as many as 10% of the total number of vessels. This research was conducted using a survey method which was analyzed descriptively, which was systematically describing the construction of gillnet vessels and vessels in PPI Karangsong Indramayu. A sampling survey technique is a procedure in which only a portion of the population is taken and used to determine the desired traits and characteristics of the population.

Data taken during this research are primary data and secondary data. Primary data is obtained by making direct measurements of research objects, namely dimensions of fishing

gear, ships, and fishing equipment that are on the gillnetters. The dimensions of the gillnet ship, namely Length (L) is a horizontal distance, measured from the front point from the height of the bow to the backward point of the stern, Breadth (B) is the horizontal distance at the largest ship in the middle of the ship, calculated from one side the outer (sheer) one to the other side (sheer) facing, and Depth (D) is the vertical distance measured from the lowest deck of the ship to the lowest point of the ship body, to calculate the ratio of the main dimensions of the ship. Secondary data are data obtained from the Office of Marine and Fisheries of Indramayu Regency, PPI Karangsong and from the results of literature studies, including: (a) Data on the number and size of gillnet fishing gear; and (b) Data on the number and size of GT gillnet vessels at PPI Karangsong.

3. RESULT

3. 1. Fishing Gear

Gillnets vary in material, mesh size and dimension depending on the target species (Dar et al. 2017). Gillnet fishing equipment in Karangsong has a regional name, gillnet millenium. gillnet millenium is a type of fishing gear including a rectangular gillnet drift classification. Some intergovernmental bodies and agreements have adopted measures banning the use of gillnet and trammel net gear, in some cases for the explicit purpose of avoiding ghost fishing (Gilman, 2015).

The net material is made of Polyamide monofilament material which has a fluorescence characteristic which can cause light when inserted into the water. Monofilament nets have higher catch rates than multifilament nets and it is thought that the higher visibility of the multifilament nets is the main reason for this difference (Ayaz et al., 2006). In the last decade, a large number of studies have shown that un-coloured (transparent) gillnets made of poly butylene succinate (PBS) resin blended with poly butylene adipate-co-terephthalate (PBAT) resin can be naturally degraded in sea water by the action of bacteria and algae, and simultaneously these studies documented the fishing efficiency of the new nets by direct comparison with conventional nylon gillnets (Park et al., 2007a, 2007b; Kim et al., 2013, 2016). In PPI Karangsong uses a lot of gillnet millenium nets with 12 ply twisted fibers. The construction and design of the gillnet millenium fishing gear operated in Karangsong can be seen in Figure 1.

Polyamide (PA) was the main webbing material used for construction of gillnets in Karangsong. Monofilament twine was used for fabricating gillnets millennium. The mesh size of the gillnets is 4 inch. Gillnets millennium were operated by large mechanised multiday boats as surface drift, column drift or bottom drift by adjusting the number of floats. Based on reported that the gillnets millennium of Karangsong were operated from mechanised, motorised or traditional non-mechanised fishing vessels.

The parts of the gillnet millennium consist of a net body, buoys and ballast. The body of the net is a functioning part of blocking fish vertically. The material used is transparent white Polyamide monofilament ply 12, in 1 pcs the flat net length is 200 meters, the number of horizontal net mesh is 150 eyes, the size of the 4 inch mesh is Tate with the brand Momoi net. Whereas the size of 16 mm mine functions as a sling rope, while a mine size of 14 mm serves as a reinforcement strap and a piece of rope made of Nylon Polyamide material with white

spots, while a mine with a diameter of 6 mm for rope rises serves as a buoy reed (spinning S-shaped), while the mine measuring 3 mm in diameter serves as a ballast rope.

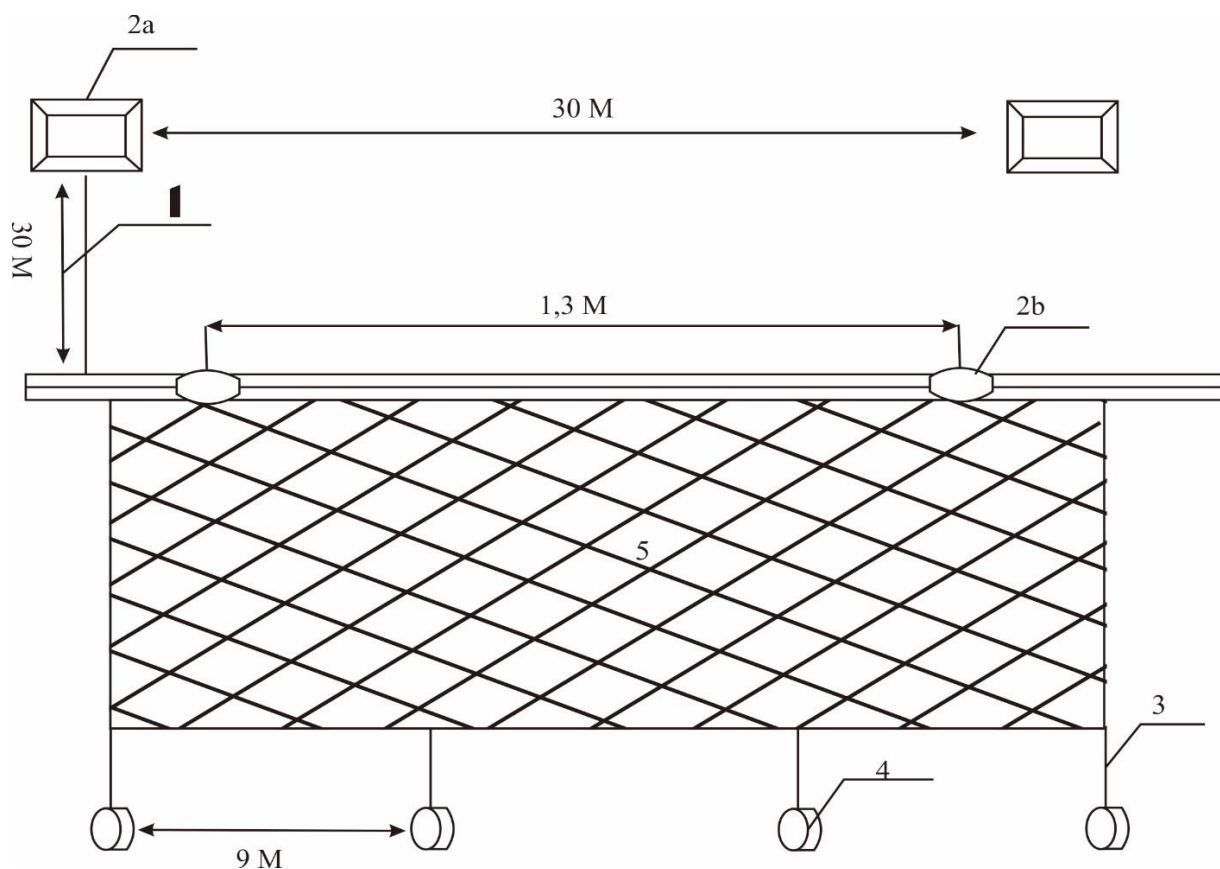


Figure 1. Desain Jaring Gillnet Millenium PPI Karangsong

Fishermen use Polyamide monofilament material because this material has several advantages including synthetic materials, this material is relatively longer resistant to decay or weathering and does not affect the length of immersion in the waters (Kim et al., 2016). In addition this material does not absorb water so it is lighter in the process of drifting the net. Fishermen at PPI Karangsong for ships over 25 GT usually carry a minimum of 100 pcs of gillnet millenium nets which results in very large loads being carried so that the dimensions of the ship are in accordance with the needs of the vessel. The volume specifications of the gillnet millennium net can be seen in Table 1.

Fishing is among the main anthropic activities along coastal areas, affecting several bottom communities (Kaiser et al., 1996). Fishing nets are a particular concern both at sea and on land, because of ghost fishing (Matsuoka et al., 2005). Estimated that 11,500 t of traps and 38,500 of gillnets are abandoned annually in waters and suggested incentive programmes for fishermen to use ecofriendly gear designs (Kim et al., 2014a, 2014b). Although ghost fishing is under 1.00% of landed catches (Brown and Macfadyen, 2007), according to a recent FAO and United Nations Environmental Program reports, the problem is likely to escalate due to the increased scale of fishing operations, introduction of highly durable ishing gear made of long-

lasting synthetic materials, and lack of serious concern shown by the international community to address the problem.

Table 1. Gillnet Millennium Specifications.

No.	Uraian	Volume	Satuan
1.	webbing <i>millenium</i> 14 ply Mesh length : 200 meter Mesh depth : 150 mesh Mesh size : 4 inchi P.A <i>monofilament</i> Brand : Momoi	270	kg
2.	Rope : 1) 16 mm (PPQ) 2) 14 mm (PPQ) 3) 6 mm (Arida) 4) 3 mm (Arida)	135 180 6,3 1,35	kg kg kg kg
3.	Yarn <i>Nylon D.18</i> (Arida)	2,25	box
4.	Baluh Y8F (Fumindo)	630	pcs
5.	Buoy	36	pcs
6.	Ballast	225	pcs

Explanation:

- PPQ and Arida are mining brands used at PPI Karangsong
- Fumindo is one of the PTs in Indonesia that manufactures net making equipment

3. 2. Fishing Vessels

PPI Karangsong is located on the coast of the Java Sea, precisely at the mouth of the Prajagumiwang River, Karangsong Village, Indramayu District with a land area of approximately 4 hectares. PPI Karangsong is the largest center of capture fisheries in West Java and provides economic contribution to the region and community of Indramayu Regency. The potential of capture fisheries at PPI Karangsong in 2017 will yield 17 million tons. The potential of capture fisheries found in the PPI Karangsong cannot be separated from the fishing vessels used. PPI Karangsong has a total of 1,101 fishing vessels consisting of inboard with 10-30 GT as many as 162 ships, 30-50 50 as many as 148 ships, > 50 GT as many as 19 ships while outboard <5 GT as many as 772 ships. The dominant fishing activity in the PPI Karangsong is gillnet fishing gear, around 71,4% of the total fishing units in the PPI Karangsong.

Generally the material used in gillnet shipbuilding at PPI Karangsang is wood. The most widely used wood on ships over 20 GT is merbau wood, one of the wood originating from Kalimantan, which is sent directly according to the order when needed in the desired shipbuilding. Teak wood is used for a fleet of vessels under 20 GT originating from Majalengka, Cirebon and Central Java. The use of this type of wood is based on the habit of the shipbuilders in constructing their artificial vessels. The knowledge obtained only comes from the inheritance of its predecessors and the skills of local residents so that the type of wood used from year to year is relatively the same.

Ship design is explained as a process of determining specifications and producing images of an object for the purpose of making and operating it (Moyst & Das, 2005). Liker & Lamb (2002) stated that the parts of the ship's design, namely the body plan showing the line plan drawing from the front slice of the ship, the profile plan shows the line plan image of the ship slice side view, and the half breadth plan shows a plan drawing line from the visible slice. Ship construction is a picture that shows the construction of parts of the ship. Figure 2 shows the general section or layout of the ship in PPI Karangsang.

The picture of the ship consists of two parts, namely a picture on the top of the ship and a picture on the side of the ship. These two images are very important in determining the parts of the ship.

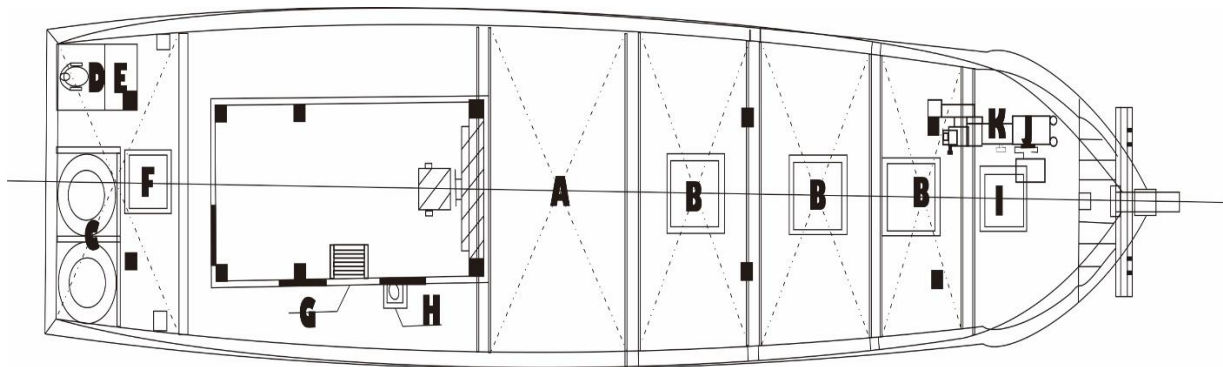


Figure 2. Construction of Gillnetters at PPI Karangsang from the top of the ship

Figure 2 shows the section on the deck. The space at the top of the deck is only one piece and is located at the stern of the wheelhouse and is also used as a control room for the engine. The location of the gillnet ship's layout is arranged in such a way as to be able to operate optimally during the arrest. The net places in front of the wheelhouse, which is in the middle of the ship's part (Figure 2 point A).

Palka is located in front of the net because this is because when the net is withdrawn the gillnet catch is assisted by axle and go as a tool (Figure 2 point J, K). Then the entangled fish is released and cooled and then inserted into the hatch (Figure 2 point B), while the goods room is located in the bow of the ship that contains supplies during fishing (Figure 2 point I). Furthermore, on the stern of the ship there are kitchens, toilets, freshwater places and rudder rooms.

On the front there is a cabin door and additional space. Figure 3 shows the section of the ship under the deck and the masts on the ship from the stern to the bow

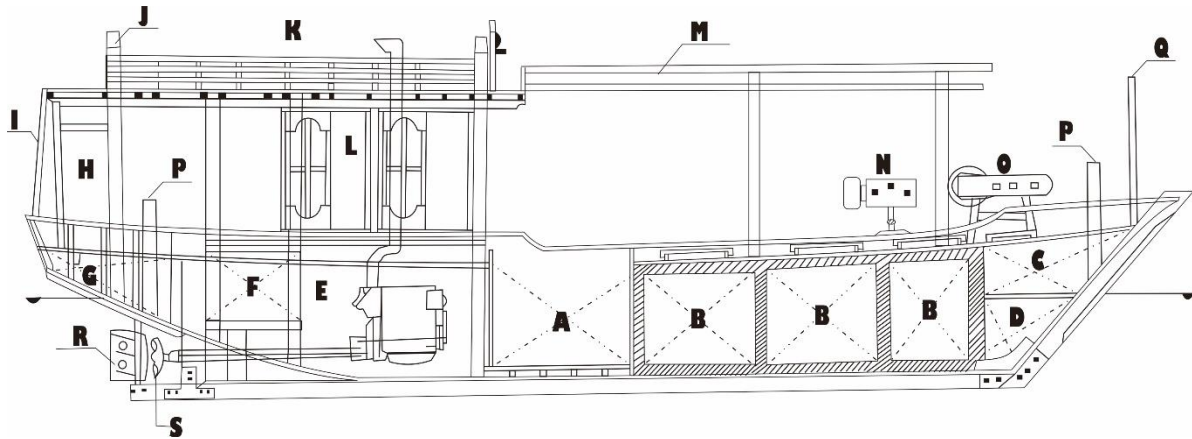


Figure 3. Gillnetter Constructions at PPI Karangsong seen on the side

Keterangan:

- | | | | | | |
|----|-------------|----|--------------------|----|-----------|
| A. | Net places | G. | <i>Rudder Room</i> | M. | Mast |
| B. | Hatch | H. | Kitchen | N. | Go |
| C. | Baggage | I. | Stairs | O. | Gardan |
| D. | Baggage | J. | Mast | P. | Border |
| E. | Engine room | K. | Guard | Q. | Mast |
| F. | Fuel room | L. | Wheelhouse | R. | Stern |
| | | | | S. | Propeller |

Figure 3 consists of a place where the net, hatch, baggage, engine room adjacent to the fuel room to facilitate access to fuel filling. In the stern section of the ship there are rudder room, kitchen and stairs for access to the top of the ship, wheelhouse or cabin, gardan, go and there are several mast that have an important role including the pillar shade function as shade from sunburn usually on the top of it used as a foam float or for clean water. There are also guards and supporting pillars at the top of the ship that function as open spaces for baggage. Furthermore there is a go and gardan as an fishing equipment. The border beam is located at the stern and the bow of the right and left sides of the ship. Mast on the front of the border beam. At the bottom of the ship there are steering wings and propellers.

Design and construction is an inseparable entity in the manufacture of a fishing vessel. Construction of a ship will affect the strength of the ship at sea. The shape of the ship immersed in water varies according to the type of ship. Ships that require high speed must have a slimmer hull shape than ships that do not require high speed.

According to Iskandar (1990) in Apriliani (2017) the construction system used in shipbuilding was the result of agreement between owner and shipbuilders. Likewise with the construction of the gillnet ship at PPI Karangsong, considering that shipbuilding in this port is a capability obtained from generation to generation. The shape of the ship's body under investigation includes the form of a ship kasko in the form of a hard chin bottom. The body shape of fishing vessels in Indonesia is very varies, but does not show certain trends based on the operating method catching tool, if the body shape of the ship is not in accordance with the needs, then the effectiveness and efficiency ship operation is less optimal. The construction of

ships in the PPI Karangsong is designed in such a way that it has been adapted to the operational needs of fishing in the sea and it is expected that the appropriate construction will support the fishing process so that fishermen can obtain maximum catches.

4. CONCLUSIONS

Based on this research, it can be concluded that each region has characteristics of fishing units in accordance with the conditions of the waters. The Indramayu region has the most gillnet fishing equipment compared to other fishing gear. Gillnet in Indramayu is commonly called the gillnet millennium with the basic ingredients of Poly Amide monofilament. Gillnet ships have a ship body shape in the form of hard chin bottom.

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