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LONGLINE FISHING GEAR OPERATING TECHNIQUES ON KM BAHARI NUSANTARA 35

Teknik Pengoperasian Alat Tangkap Longline di KM Bahari Nusantara 35

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ABSTRACT

This study aims to examine the longline fishing gear operating techniques on the KM Bahari Nusantara 35 vessel operating in the Indonesian Fisheries Management Area (WPPNRI) 573 in the Indian Ocean. The study was conducted in January–February 2024 through participant observation and semi-structured interviews during one fishing trip. The results indicate that longline fishing gear operation consists of three main stages: setting, soaking time, and hauling. The average setting time is 3 hours, soaking time is 2–3 hours, and hauling takes the longest, 10–14 hours. The fishing gear used has 1,496 hooks with a main line length of 62,832 meters. The catch was dominated by yellowfin tuna, followed by bigeye tuna and bluefin tuna. The operating techniques applied were deemed effective and appropriate to the characteristics of the fishing area's waters. This research is expected to serve as a reference in developing efficient and sustainable longline fishing gear operating techniques.

Keywords: KM Bahari Nusantara 35, Longline, Operating Techniques, Tuna, WPPNRI 573

ABSTRAK

Penelitian ini bertujuan untuk mengkaji teknik pengoperasian alat tangkap longline pada kapal KM Bahari Nusantara 35 yang beroperasi di Wilayah Pengelolaan Perikanan Negara Republik Indonesia (WPPNRI) 573, Samudra Hindia. Penelitian dilaksanakan pada Januari–Februari 2024 melalui observasi partisipatif dan wawancara semi-terstruktur selama satu trip penangkapan. Hasil penelitian menunjukkan bahwa pengoperasian alat tangkap longline terdiri atas tiga tahapan utama, yaitu setting, soaking time, dan hauling. Rata-rata waktu setting mencapai 3 jam, soaking time berlangsung selama 2–3 jam, sedangkan hauling memerlukan waktu terlama, yaitu 10–14 jam. Alat tangkap yang digunakan memiliki 1.496 mata pancing dengan panjang tali utama 62.832 meter. Hasil tangkapan didominasi oleh tuna sirip kuning, diikuti tuna mata besar dan tuna sirip biru. Teknik pengoperasian yang diterapkan dinilai efektif dan sesuai dengan karakteristik perairan daerah penangkapan. Penelitian ini diharapkan dapat

menjadi referensi dalam pengembangan teknik pengoperasian alat tangkap longline yang efisien dan berkelanjutan.

Kata Kunci: Longline, Teknik Pengoperasian, Tuna, WPPNRI 573, KM Bahari Nusantara 35

INTRODUCTION

The Pengambengan Archipelago Fisheries Port (PPN) is a hub for capture fisheries activities, playing a strategic role in the development of tuna fisheries in Bali and the surrounding area. This port supports industrial-scale fishing activities, particularly export-oriented tuna fisheries. One of the primary fishing gears used by fishermen at the Pengambengan PPN is the tuna longline, known for its effectiveness in catching large, high-value pelagic fish such as yellowfin tuna (*Thunnus albacares*) and bigeye tuna (*Thunnus obesus*) (KKP, 2021; KKP, 2023).

Tuna longline fishing gear is considered relatively environmentally friendly due to its high selectivity for target fish size and species and minimal habitat damage. Longlines are operated by casting hundreds to thousands of hooks strung on a main line, baited, and then left to drift in open sea waters following the current (FAO, 2019; FAO, 2021).

Longline operations, particularly hauling, require skilled crew members because they directly impact fishing efficiency, catch quality, and onboard safety. Proper operating techniques significantly impact the quantity and quality of the catch, as well as the sustainability of the tuna longline fishery (Nugraha et al., 2021; Widodo & Nugraha, 2021).

KM Bahari Nusantara 35 is a tuna longline fishing fleet based at Benoa Harbor and actively operates in the Indian Ocean, specifically in the Indonesian Fisheries Authority (WPPNRI) 573. This region is known as one of Indonesia's primary tuna fishing grounds with high longline operations (Wudianto & Sadhotomo, 2020; Satria & Matsuda, 2020). Therefore, a study of longline fishing gear operating techniques on this vessel is crucial as a basis for developing efficient and sustainable fishing practices.

RESEARCH METHODS

This research was conducted over two months, from January to February 2024. The research activities involved directly observing fishing operations using longline gear on the vessel KM Bahari Nusantara 35, based at Benoa Harbor, Bali. The fishing operation area is located in the Indian Ocean waters within the Fisheries Management Area of the Republic of Indonesia (WPPNRI) 573.

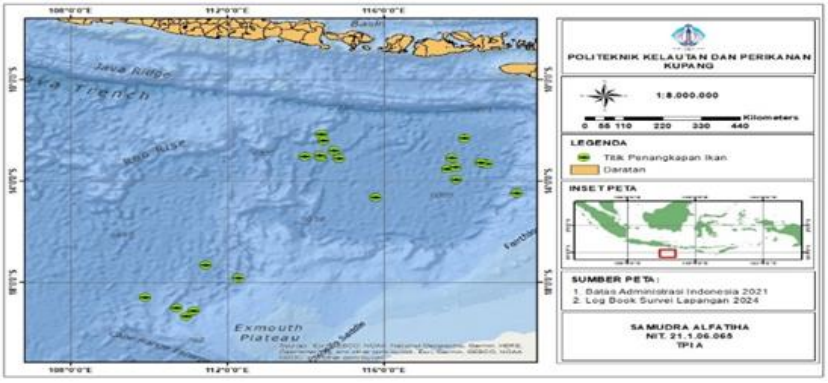

Figure 1. Map of Longline Fishing Areas in WPPNRI 573

Data collection in this study was conducted through participatory observation and semi-structured interviews. Field observations were conducted during one fishing trip with KM

Bahari Nusantara 35. The collected data consisted of primary and secondary data related to longline gear operation techniques.

Observation

Observations were conducted through participatory observation by observing the entire series of longline gear operation activities on board the vessel. Observations focused on documentation and technical aspects of each stage of longline gear operation, including:

1. The setting stage, which is the process of lowering and installing the longline gear into the water.
2. Gear construction phase, including the assembly and preparation of fishing gear components before operation.
3. Hauling phase, namely the process of pulling the fishing gear back onto the vessel and retrieving the catch.
4. The length of time required for each stage of longline fishing gear operation.
5. The type and quantity of catch obtained during fishing activities.

During the observation process, time records, sequence of activities, and visual documentation were recorded to obtain a comprehensive picture of the techniques and operational work patterns of longline fishing gear in the field.

Interview

Semi-structured interviews were conducted with the primary informant, the captain of KM Bahari Nusantara 35. The interviews aimed to obtain in-depth qualitative data regarding the technical and operational aspects of longline fishing gear. The information gathered included:

1. Longline fishing gear operating techniques used during fishing activities.
2. Technical and operational obstacles encountered during the operation process and efforts to address them.
3. Technical information regarding fishing gear, vessel condition, and fishing strategies.
4. Captains' perceptions and experiences regarding the effectiveness of longline fishing gear on catches.

Interviews were conducted directly during fishing activities to ensure that the data obtained were contextual and aligned with operational conditions in the field.

Data Analysis

The data analysis in this study used a descriptive method. This method aims to systematically, factually, and accurately describe longline fishing gear operating techniques based on observation and interview data. The descriptive approach is widely used in capture fisheries operational studies because it is able to represent actual technical conditions in the field (Ulya, 2018; Mallawa & Zainuddin, 2019).

The data analyzed included the stages of longline fishing gear operation (setting, soaking time, and hauling), operating time, gear specifications, and the type and quantity of catch. All data were analyzed narratively to provide a comprehensive overview of longline fishing gear operating practices on the KM Bahari Nusantara 35.

RESULT

Longline Fishing Gear Specifications

The longline fishing gear used on the KM Bahari Nusantara 35 has a total of 1,496 hooks and a main line length of 62,832 meters. In a single operation, five radio buoys are used, spaced approximately 5,670 meters apart, with 1,134 active hooks, and nine buoys between each buoy. The longline gear is constructed in several baskets, each containing six hooks, with branch

lines spaced 50 meters apart, and a main line length of approximately 350 meters per basket.

The configuration of the hook count, main line length, and basket system demonstrates compliance with operational standards for industrial-scale tuna longline fishing in Indonesia. Several studies have shown that tuna longline operations typically use 1,000–2,000 hooks per setup to achieve optimal fishing efficiency (Setyadji et al., 2019; Hidayat et al., 2020). Therefore, the fishing gear specifications on the KM Bahari Nusantara 35 can be categorized as effective industrial-scale longline fishing.

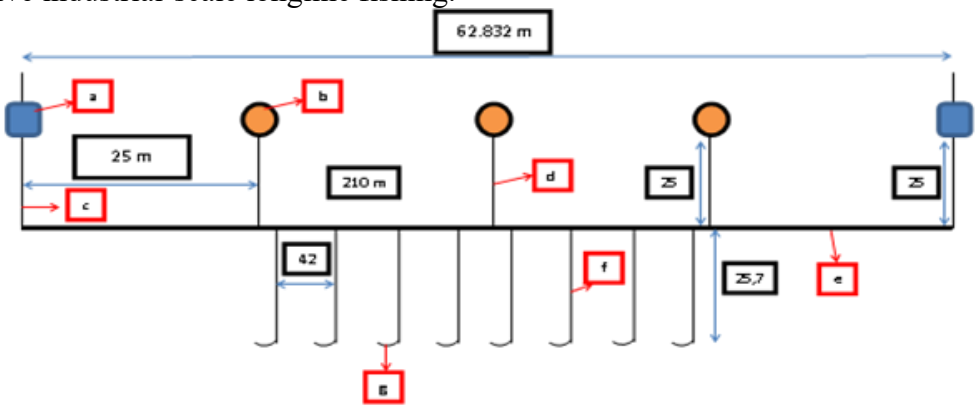

Figure 2. Longline Fishing Gear Construction

Table 1. Longline Fishing Gear Components and Functions

Part Name	Size / Diameter	Length	Material	Function
Radio Buoy	The diameter of the glass ball is 30-35 cm, the thickness is 5-7 mm	9 pieces	Special glass/plastic ball with protective braided rope	Marks the position of fishing gear released into the sea during setup
Buoyline	Diameter 7 mm and 12 mm	15-20 meters (common), 50 meters used on KM Bahari Nusantara 35	Polyethylene (PE)	Connects the mainline to the buoy, keeping the fishing gear afloat
Buoy	The diameter of the glass ball is 30-35 cm, the thickness is 5-7 mm	10-15 mm woven rope eye at the end	Special glass/plastic ball with protective braided rope	Keeps the mainline afloat during setup
Mainline	Diameter 8-10 mm	62,832 meters	Kuralon (strong material)	Place where the branch line rests, the main support for the fishing gear
Branch Line	6.5mm	20-25 meters	Unspecified (usually strong and not easily tangled)	Place where the hook is hung, a fishing medium during transport

Components and Functions of Longline Fishing Gear

The main components of the longline fishing gear on the KM Bahari Nusantara 35 include a radio buoy, buoyline, float, mainline, and branchline. The radio buoy serves as a

marker for the gear's position at sea during the setting and hauling processes. The floatline connects the buoy and mainline to ensure the gear remains at the desired depth.

The mainline used is made of kuralon with a diameter of 8–10 mm, while the branchlines are made of monofilament with a diameter of 6.5 mm. Monofilament is considered more effective due to its smooth and transparent nature, making it less easily detected by target fish. This finding aligns with previous research suggesting that the use of monofilament in longline fishing can increase the chances of fish taking the bait (Firdaus et al., 2020; Mallawa & Zainuddin, 2019).

Longline Fishing Gear Operation

The operation of the longline fishing gear on the KM Bahari Nusantara 35 consists of three main stages: setting, soaking time, and hauling. These three stages are carried out sequentially and are interrelated in determining the success of the fishing operation.

a. Preparation Stage

The preparation stage is carried out before the setting process by ensuring all fishing gear components are ready for operation. The crew checks the availability of bait, hooks, main lines, branch lines, and buoys, and arranges the fishing gear in a basket at the stern of the vessel. Furthermore, crew tasks are divided according to their respective functions.

Good preparation aims to minimize technical disruptions during the fishing process and increase operational efficiency. Equipment readiness and crew coordination directly impact the smooth running of the setting and hauling processes (Firdaus et al., 2020; Putra & Rahmat, 2022).

b. Gear Lowering Stage (Setting)

The setting stage on the KM Bahari Nusantara 35 takes place in the morning, between 11:00 and 15:00 WITA (Central Indonesian Time), with an average duration of around three hours. This process involves four crew members, each with specific duties, such as baiting, attaching snaps to the main line, lowering branch lines, and releasing buoys and radio buoys. The lowering of the fishing gear begins with the release of the flag buoy and weight, followed by the deployment of baited hooks. The lowering takes place at the stern of the vessel, parallel to or at an angle to the ocean current. The hook depth reaches approximately 50–60 meters. The division of crew duties during the setting stage plays a crucial role in maintaining operational stability and the accuracy of gear lowering, especially in industrial-scale longline fishing (Ananda, 2022; Muslim & Barata, 2020).

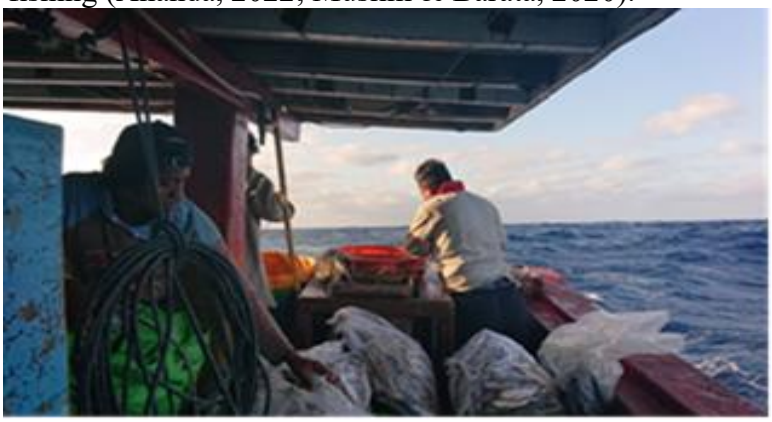

Figure 3. Setting Activities

c. Soaking Time

Soaking time is the time the hook is immersed in the water after setting and before hauling. On the KM Bahari Nusantara 35, the soaking time lasts 2–3 hours. This duration is

considered optimal to allow target fish the opportunity to take the bait without compromising the bait's quality.

Too short a soaking time can result in fish not having the opportunity to take the bait, while too long a soaking time can potentially reduce bait quality and fishing efficiency. Several studies have shown that proper soaking time significantly impacts catch yields and the species composition of tuna caught (Beverly et al., 2020; Beverly et al., 2021; Firdaus et al., 2021).

d. Hauling Gear Retrieval

The hauling phase is the process of retrieving the longline fishing gear onto the vessel. This activity begins around 7:00 PM WITA and ends around 3:00 AM WITA, with a total duration of between 10 and 14 hours, depending on weather conditions, the number of hooks, and operational constraints encountered.

The hauling process begins with the lifting of radio buoys and buoys, followed by the pulling of the main and branch lines along with the hooks. The caught fish are released one by one from the hooks. This stage requires good crew coordination as it relates to work safety and the quality of the catch. Hauling efficiency is crucial for the success of longline tuna fishing operations (Arsad, 2022; Nugraha et al., 2021; Widodo & Nugraha, 2021).

Table 2. Distribution of Tasks for Hauling Longline Fishing Equipment

Crew Duties	Function and Description
Hoover	Operate the mainline reel during setting and hauling
Pulling Fish	Attract fish attached to the hook to the vessel during transport
Reeling Yoka	Coil the branch lines (yoka) and keep them tidy to prevent tangles
Tidying Up the Main Line	Arrange and tidy the main lines on the vessel's deck to ensure smooth setting and hauling
Helmsman	Control the vessel's direction during longline fishing gear operation

Figure 4. Hauling Activities

According to Arsad (2022), longline hauling is carried out sequentially, starting with raising the flagpole, buoy, buoy line, and weights onto the deck of the vessel, followed by pulling the main line and branch lines along with the hooks until the entire fishing unit is lifted onto the vessel.

Main Catch

The tuna catches during January and February 2024 totaled 96 tuna, consisting of 40 yellowfin tuna, 44 bigeye tuna, and 12 bluefin tuna. The dominance of yellowfin and bigeye tuna indicates that the longline gear used is effective in catching large pelagic fish.

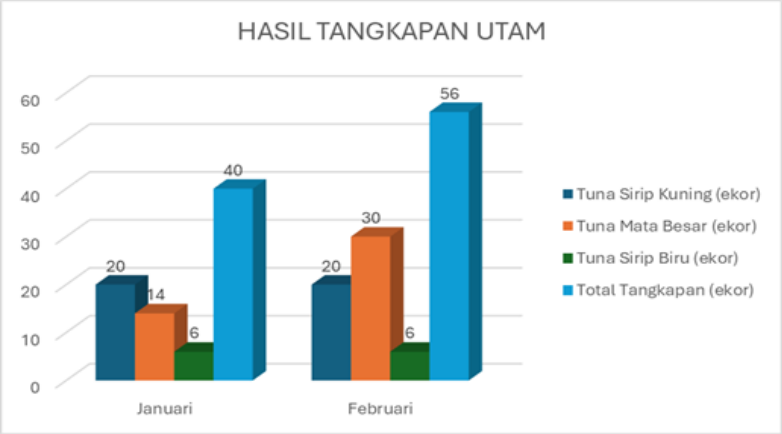

Figure 5. Longline Catch in January and February

The dominance of yellowfin tuna in longline catches is related to the fish's habitat preference, with optimal water temperatures ranging from 28–30°C and hook depths within the tuna's swimming zone. Furthermore, the applied setting and soaking times also influence the catch composition. This aligns with previous research showing that oceanographic factors and fishing gear operating techniques significantly influence the distribution and abundance of longline tuna catches (KKP, 2022; Wudianto & Sadhotomo, 2020).

DISCUSSION

The longline fishing gear specifications on the KM Bahari Nusantara 35, consisting of 1,496 hooks with a main line length of 62,832 m and a basket system of six hooks per unit, demonstrate compliance with operational standards for industrial-scale tuna longline fishing in Indonesia (Setyadji et al., 2019; Hidayat et al., 2020). The use of monofilament branch lines also contributes to fishing effectiveness because they are less easily detected by target fish (Firdaus et al., 2020; Mallawa & Zainuddin, 2019).

The setting phase, conducted between 11:00 and 15:00 WITA (Central Indonesian Time), averaged three hours, and a hook depth of 50–60 m, aligns with the swimming zones of yellowfin and bigeye tuna, thus increasing the opportunity for interaction between the bait and target fish (Muslim & Barata, 2020). A soaking time of 2–3 hours is considered optimal because it allows sufficient time for target fish to strike the bait without compromising its quality (Beverly et al., 2020; Beverly et al., 2021).

The hauling phase lasts 10–14 hours and is the most complex stage of longline operations. The division of crew tasks, such as haulers, fish pullers, and branch line reelers, ensures a smooth hauling process and maintains catch quality (Arsad, 2022; Nugraha et al., 2021). The catch, dominated by yellowfin and bigeye tuna, demonstrates that the longline operation technique on the KM Bahari Nusantara 35 is effective and selective for high-value target fish, in line with the characteristics of the waters of WPPNRI 573, a primary tuna fishing ground (KKP, 2022; Wudianto & Sadhotomo, 2020).

CONCLUSION

The operation of longline fishing gear on KM Bahari Nusantara 35 in WPPNRI 573 consists of the setting, soaking time, and hauling stages which are carried out systematically and efficiently. The setting process lasts for ± 4–6 hours, soaking time for 2–3 hours, and hauling takes the longest time, namely 10–14 hours, in line with the length of the mainline and the number of fishing hooks used. The specifications of the fishing gear and the clear division of crew duties support the smooth fishing operations and maintain the quality of the catch. The catch is dominated by yellowfin tuna, indicating the suitability of the operating technique with

the characteristics of the waters and the behavior of the target fish. Thus, the longline operating technique applied on KM Bahari Nusantara 35.

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