Kapal: Jurnal Ilmu Pengetahuan dan Teknologi Kelautan
(Kapal: Journal of Marine Science and Technology)
journal homepage : http://ejournal.undip.ac.id/index.php/kapal
2301-9069 (e)
1829-8370 (p)

Implementation of Indonesian Flag for Electricity Standards on Non-Conventional Vessel at Palipi Harbor

Tasdik Tona[1) *)], Nurwahidah[1)]

[1)] Makassar Maritime Science Polytechnic, Jl. Tentara Pelajar No.171, Makassar, South Sulawesi 90165
[*)] Corresponding Author: tasdiktona123@gmail.com

Article Info

Keywords:
Non-convention ship;
electrification;
Gross Tonnage (GT);
Passenger harbor;

Article history:
Received: 11/06/2024
Last revised: 03/09/2024
Accepted: 11/09/2024
Available online: 11/09/2024
Published: 11/09/2024

DOI:
https://doi.org/10.14710/kapal.v21i2.64500

Abstract

This research aims to analyze the current level of application of electricity standards on Indonesian-flagged non-convention ships by Gross Tonnage (GT 7-35), identify the obstacles faced in implementing electricity standards on Indonesian-flag non-convention ships by Gross Tonnage (GT 7-35) and how to make efforts in increasing the application of electrical standards on Indonesian-flagged non-convention ships by Gross Tonnage (GT 7-35). The research method used is a qualitative method with data collection techniques involving observation, documentation, and interviews with related parties. The data analysis technique used is qualitative descriptive analysis. The results show that the electrical condition of non-convention ships varies greatly depending on factors such as ship type, ship size, and the level of maintenance performed. The constraints faced in the implementation of electrical standards on Indonesian-flagged non-convention ships by Gross Tonnage (GT 7-35) are limited resources, understanding and awareness, changes in technology and regulations, and lack of routine maintenance and inspections; and collaboration between authorities, ship owners, and ship crews has not been maximized in the implementation of electrical standards, as well as the absence of training programs or resources offered by related parties to improve understanding and skills related to ship electricity.

1. Introduction

The Regulation from the Minister of Transportation (KM No. 65 of 2009) contains the standard provisions for non-conventional ships by the Indonesian flag. Standards for Non-Convention Ships with the Indonesian Flag, and Decree of the Director General of Sea Transportation No. UM.008/9/20/DJPL-12 concerning Implementation of Standards and Technical Guidelines for the Implementation of Indonesian Flag Non-Convention Ships. [1].

When a public ship is built, it must meet safety standards. One example is that the electrical installation must be sufficient in terms of the electrical power required for the maintenance of the vessel, for its normal operation, and, under reasonable conditions, to guarantee its availability without the use of emergency energy sources. To keep crew, passengers, and the vessel safe from electrical threats in a variety of emergency scenarios, safety-critical electrical current must be provided. On February 7, 2023, at 09.30 WITA, researchers carried out an initial search to get an overview and study in more depth the problems existing on non-conventional ships at the Paotere Passenger Harbor. It related to planning and sourcing of safe ship electrical power. Besides that, Paotere Passenger Harbor shows the installation scheme, installation works, lights, etc. Based on observations show that several non-conventional ships have electrical power sources consisting of gensets (auxiliary engine) and solar power which are managed in conventional lighting systems with various limitations in the use of installation materials which do not yet have standards issued by BKI (Indonesian Classification Bureau) or general policies.

KLM Nadia Jaya 02 GT 40 No. 2418/LLa 2022 LLa No. 6364/L with a ship length of 25 meters, a width of 5 meters a carrying capacity of sixty tons, the skipper Mr. Misbah, and a crew of 5 people, have been working as sailors for generations by sailing from Makassar to Merauke with a distance of 1407 NM and a speed six-knot ship. In the lighting system, especially navigation lights and all-round lights, generators and batteries are used which are sourced from solar power. Generators are used when there is work that uses electrical equipment with large power, while batteries are used in normal shipping conditions only for lighting. This is done to save operational costs, especially in the use of fuel. The electrical installations used do not comply with regulatory standards by the Bureau. Indonesian Classification (BKI). KLM Pelangi 37, GT 23 No.2188/LLa is a smaller non-conventional ship with a transport capacity of only 20 tons and a duration of sailing is about 28 hours. The type of cargo transported from the

Pangkep Islands to Paotere Harbor as a special shipping vessel for expeditions or goods for island communities and vice versa. The lighting system used uses 2 types of LED lights where the electrical energy source is obtained from batteries and generators. Lighting that comes from generators is used only under certain conditions, namely during work that requires bright light, while lighting that comes from batteries is used during normal shipping. The principle of saving lighting is related to the use of fuel in generators. This concerns the problems that exist on non-conventional ships at the Paotere Passenger Harbor related to planning and safe sources of electrical power for ships and how to plan and install lighting installations and others. Based on observations made at Paotere Port, several non-convention ships have electrical power sources consisting of genset and solar power which are managed in a convention lighting system with various limitations on the use of installation materials that do not have standards issued by the BKI (Indonesian Classification Bureau) or general policies.

There are two KLM Nadia Jaya 02 GT 40 No.2418/Lla.2022 Lla No.6364/L Passenger harbor ships with a ship length of 25 meters and a width of 5 meters with a carrying capacity of 60 (sixty) tons. KLM Pelangi 37, GT 23 No.2188/Lla is a smaller non-conventional ship with a transport capacity of only 20 (twenty) tons and a shipping distance of 28 hours. The two Passenger harbor ships each use generators and batteries for operational systems including on-board lighting. However, the use of these two tools does not comply with the standards for use by the Indonesian Classification Bureau (BKI).

The Regulation of the Minister of Transportation contains standard provisions by the Indonesian Flag Ship Standard (NCVS) [2]. The Director General of Sea Transportation signed Regulation Number SK UM 008/20/9/DJPL/2012 which regulates the quality requirements for ships and their crews. Minister of Roads Regulation September 2009 Number KM. 65/2009, which regulates non-conventional standards (NCVS) for Indonesian-flagged vessels, represents a unique advancement in the government's efforts to improve maritime safety regulations [3]. Researchers who use non-conventions together with the application of legal regulations have a communal relationship during this process [4]. Ships that are not subject to international convention regulations are given the Non-Convention Vessel Standard (NCVS) as a safety standard [5]. In the process of creating international standards, the International Electrotechnical Commission (IEC) is very important. Electrical and electronic technologies, especially those working in the maritime sector, they must take this action [6].

Ship safety standards must always meet the requirements of the times. Therefore, the Ministry of Transportation held an on-air or Focus Group Discussion (FGD) through the Directorate General of Sea Transportation to refine and obtain comprehensive input from stakeholders regarding improving the standards of non-conventional ships [7] As shown by the certificate after inspection and testing, safety ship is a condition where the ship meets the standards for materials, construction, building, machinery and electricity, stability, arrangement and equipment, including auxiliary equipment and radio, ship electronics. Point D of Law Number 17 of 2008 states that ships must be carried out in accordance with advances in science and technology, private participation and business competition, regional autonomy, and accountability of state administrators in order to develop the national and international strategic environment. Apart from that, ships safety and security must be prioritized for the sake of national interests. As proven by a certificate of inspection and test results, the condition of the ship meets the standards for materials, construction, building, machinery and power, stability, arrangement and equipment, auxiliary equipment, and radio, as well as ship electronics. In this case, Shipping Safety Standards [8] must be complied with to ensure the safety of shipping navigation and sea transportation ports. Finalized in 1974, the International Convention for the Safety of Life at Sea (SOLAS) is a global regulation covering the following areas: construction (including structures, stability, machinery, electrical installations, fire protection, fire detectors, and fire extinguishers); radio communications; navigation safety; auxiliary equipment, including life jackets, lifeboats and life rafts; and implementation of regulations to improve shipping security and safety, such as the International Ship and Port Facility Security (ISPS) Code and International Safety Management (ISM) Code [9].

The ability of an object to conduct electricity results from the presence of an electric charge [10]. All equipment and tools used to protect the lives of passengers and crew in an emergency are called safety equipment. Knowing the various types of safety equipment and how to use them properly is very important for ship crews. (To support zero accidents, there will be more supervision of how safety equipment is used by crew and service users) [11]. Improvements and/or changes to ship safety regulations, variations in geographical conditions of shipping areas, and implementation evaluation results can be carried out under certain conditions, the implementation of which requires adjustments to compliance with Standards and implementation technical instructions. Non-conventional ships flying the Indonesian flag and this clause [12]. One system that is very crucial in the operation of a ship is the electrical system. In addition to driving the main engine and providing navigation support, this system is also used to illuminate the ship's deck, cabin, and engine room [13]. The Ship Electrical System is a system used to drive motors, auxiliary equipment, lighting, ventilation, and air conditioning equipment that uses a Diesel engine as the main driver for the electric generator. What differs from land generators, ship generators have a neutral point connected to the ship's hull which aims to ensure all vital machines run smoothly even if there are disturbances [14] Introduction to Marine Engineering.

Electricity on ships can be divided into four specific systems including the generating system, main switchboard system, emergency switchboard system, and distribution system [15]. Shipping Safety is defined as a condition of fulfilling safety and security requirements relating to transportation on waters and ports [16]. Safety Equipment or safety equipment is all the equipment and supplies used to protect the lives of ship crew and passengers during an emergency [17]. Non-treaty ships are security restrictions imposed on ships that are not regulated by any international agreement (non-convention). However, ships not covered by the agreement are widely used in several countries, one of which is Japan [18]. According to the 2021 Ship Measurement Regulation

Number Pm 45 of the Indonesian Minister of Transportation, ship tonnage is the volume of the ship expressed in gross tonnage (GT) and net tonnage (net tons/NT). Gross tonnage (gross tonnage/GT) is the volume of the entire space below the ship's deck plus the volume of the enclosed space above the deck (superstructure), which is an integer number without numerical units as determined by the 1969 (International) Ship Measurement Convention. Convention for the Measurement of Ship Tonnage, 1969) [19]. A port is a water area that is protected from waves and is equipped with a ship terminal, including a pier where ships dock to load and unload goods, cranes to load and unload goods, a sea warehouse (transit), and a warehouse where cargo is unloaded from ships and warehouses, in where goods can be stored longer waiting for delivery to the destination area or customer [20].

Indonesian Government Regulation No. A port is a place on land and surrounding waters as intended in Article 69 of the 2001 Port Law as a place for administrative and economic activities, used as a berth, embarkation and/or loading place, and unpacking things. The ship is equipped with maritime security equipment and port support functions, as well as land and intermodal transportation. [21]. According to DA Lasse, what is meant by port is: Law no. Article 17 of the 2008 Shipping Law states: A port is a place consisting of land and/or waters with determined boundaries as well as administrative and commercial places used for docking. , departure and/or departure of passengers and/or goods for loading and unloading at terminals and ports which have maritime safety and security functions as well as port support and space for intermodal transport [22]. People's shipping is a traditional business and has its own characteristics so it is deemed necessary to provide managerial capabilities in better management with a touch of modern technological development.

In order to empower the small and medium-scale coastal people's economy, affirmative policies are needed for all people's shipping activities but still prioritize safety aspects in ensuring ships and crew members [23]. Ships are water vehicles of a certain shape and type, which are driven by wind power, mechanical power, or other energy, towed or towed, including vehicles with dynamic carrying capacity, vehicles under the water surface, as well as floating equipment and floating buildings that do not move [24]. Ships that meet the standards and specifications stipulated in Perpes Number 74 of 2021 relating to sea transportation of people are Sea Personnel Ships. Non-conventional buckets are buckets with a capacity of under 500 GT; motor installation on buckets with a capacity of less than 500 GT must meet the requirements of this article boat. [25]. The volume of the ship in the form of gross tonnage (GT) and net tonnage (NT) is the ship's tonnage (Th.2002, PP No. 51) [26]. The total volume unit of a ship is known as gross tonnage (GT) and is calculated based on the main dimensions of the ship, both below deck and above deck (Th.2013, Minister of Transportation Regulation No.8) [27]. According to the International Convention on the Measurement of Ships (1969), gross tonnage (GT) refers to the overall size of the ship, taking into account the total contents of all enclosed spaces, and determines the volume of structures on deck and structures under coverings [28].

This research aims to analyze and identify the level of application of electrical standards on Indonesian-flagged non-convention ships by Gross Tonnage (GT 7-35) as well as current obstacles. This research is theoretically and practically useful, namely providing an understanding regarding the application of electrical standards on Indonesian-flagged Non-Convention by Gross Tonnage (GT 7-35) as well as helping related parties in making policies and regulations.

2. Methods

2.1. Object of Research

The research location is Palipi Passenger Harbor, Majene Regency, West Sulawesi, Paotere Harbor, South Sulawesi. Which aims to analyze the current level of application of electrical standards on Indonesian-flagged non-convention ships by Gross Tonnage (GT 7-35). This research design uses a qualitative descriptive approach.

2.2. Population or Sample

The population in this study was all public shipping vessels that sailed and moved in ports, where the number of cruise ships was taken randomly, as well as the sampling technique used and carried out was accidental sampling, namely taking samples that were accidentally found in the research area. The samples in this research were non-convention people's shipping vessels carrying out activities at the Paotere and Palipi Passenger Harbor.

Table 1. Names of People's Shipping Vessels

No.	Ship name	GT 7-35	No. Letter
1	KMN New Light 89	28	308/LLr
2	KLM Risma Indah II	32	165/LLr
3	KLM Adi Jaya	25	299/LLr
4	KLM Bintang Naila	17	151/LLr
5	KLM Cahaya Mulia	76	134/LLr
6	KMN Water Returns	29	560/LLr
7	KLM Youngest Princess	17	110/LLr

2.3. Method of collecting data

The data collection methods used are primary data (direct observations at the port where people's shipping vessels are anchored and carry out loading and unloading activities) and secondary data (documents such as government regulations, technical guidelines, policies, and standards related to the electrification of non-governmental vessels). -Convention with the Indonesian flag by Gross Tonnage (GT 7-35).

2.4. Data analysis method

The analysis used a qualitative descriptive approach in completing the Gross Tonnage (GT 7-35) ships regarding the implementation of non-convention ship standards (NCVS) with the analysis and evaluation process carried out comprehensively.

The data collection method was carried out in 2 (two) ways in this research, namely:

a. Primary data, in this case, the data source is direct observation at the port where people's shipping vessels moor and carry out loading and unloading activities, which includes the following:
    1) The samples in this research were non-convention public shipping vessels carrying out activities at the Páotere and Palipi people's ports
    2) Observations were carried out by observing the implementation of non-conventional ship electrical standards
    3) Conduct unstructured interviews with ship owners/entrepreneurs, skippers/masters, and crew members of people's shipping vessels at the two ports.
b. Secondary Data, by analyzing documents such as government regulations, technical guidelines, policies, and standards related to the electrification of non-convention ships flying the Indonesian flag Gross Tonnage (GT 7-35). These documents will provide an understanding of the standard requirements that must be met.

The following is data found when carrying out direct observations in the field by visiting public shipping vessels carrying out loading or unloading activities, which will then be analyzed in completing the research report. In Table 2 are the names of the two people's ports where the research team carried out direct data collection, which then identified several findings as follows.

Table 2. Passenger harbor

No	Port Name	Location	Information
1	Palipi	Regency. Majene	Active Port
2	Paotere	City. Makassar	Active Port

In collecting field data there were several people's shipping vessels, but this discussion was limited to vessels with a GT size of 7-35. People's shipping vessels that carry out activities at People's Harbors come from various inter-island, even inter-provincial shipping vessels (West Nusa Tenggara, Sorong, Kalimantan, etc.) and carry different types of cargo from the superior commodities of island communities, for example, copra, seaweed. , Fish, Salt, etc. Then the return cargo that is transported is the needs of the island community which includes the need for clothing and food.

As respondents in collecting unstructured interview data on people's shipping vessels, the research team carried out random sampling (the selection of informants was determined at random) with several considerations, so that 1 person in the shipping company was selected as a representative in the interview (see Table 3).

Table 3. Respondents on Public/Non-Convention Shipping Ships

No	Name (Initials)	Age (Years)	Sailing Experience	Manning Standards Certificate
1	AA	25 years	4 years	BST KLM
2	BB	27 years	7 years	BST KLM
3	CC	48 Years	10 years	BST KLM
4	DD	52 Years	5 years	BST KLM
5	EE	37 Years	13 years old	BST KLM
6	FF	42 Years	10 years	BST KLM
7	GG	35 years old	3 years	BST KLM

Respondents' names only use initials, as a form of maintaining confidentiality and allowing for similar names, so the research team gave the initials AA to GG.

The use of primary data and secondary data will provide a comprehensive approach to this research. Primary data will provide specific and relevant information obtained directly from stakeholders, while secondary data will provide context and references from existing sources. By combining these two types of data, we will gain a more complete understanding of the application of electrical standards on Indonesian-flagged non-conventional ships by Gross Tonnage (GT 7-35).

3. Results and Discussion

The expected results of this research are to be able to determine the level of compliance with Indonesian-flagged non-convention ship electrification standards by Gross Tonnage (GT-7-35) at Pelabuhan Rakyat, identify factors that influence the fulfillment of electrification standards and provide recommendations for efforts to improve compliance with non-convention ship electrification standards. -Convention with the Indonesian flag Gross Tonnage (GT 7-35) at Pelabuhan Rakyat. Through the results of this research, it is hoped that it can ensure the safety of ships and passengers, maintain business continuity at the port, and create a safe and comfortable port environment for sailors and passengers.

Government regulations regarding Non-Convection Ship Standards (NCVS) Transportation No. 65 of 2009 concerning Standards for Non-Convention Ships with the Indonesian Flag, and Decree of the Director General of Sea Transportation No. UM.008/9/20/DJPL-12 concerning Implementation of Standards and Technical Guidelines for the Implementation of Indonesian Flag Non-Convention Ships.

Current conditions for electrification of non-convention vessels vary depending on factors such as the type of vessel, size of the vessel, and the level of maintenance carried out.

Here are some general descriptions of the current state of non-conventional ship electrification:

a. Simple Electrical Systems Many non-conventional ships still use simple and limited electrical systems. This system may consist of a battery or a DC (scar current) system to provide the required electrical power. Non-conventional vessels with Gross Tonnage (GT 7-35) tend to have limited power capacity, so their electrical systems are designed to meet basic needs such as lighting, navigation, communications, and simple equipment operation.
b. Use of Diesel Generators: Some non-conventional vessels use diesel generators as the primary source of electrical power. This diesel generator can provide greater AC (alternating current) power and is used to operate more electrical equipment. However, ships with diesel generators often have limitations in terms of fuel capacity and required maintenance.
c. Cables and Electrical Infrastructure: The condition of cables and electrical infrastructure on non-convention vessels may vary. Some ships have good, well-maintained wiring and electrical installations, while others may encounter problems such as damaged wiring, poor connections, or significant wear and tear. Poor electrical infrastructure can result in electrical equipment damage, system failure, and higher safety risks.
d. Protection Against Electrical Faults: Non-conventional vessels are generally not equipped with protection against electrical disturbances such as circuit breakers or lightning protection equipment. This can increase the risk of fire, equipment damage, and disruption to the electrical system.
e. Lack of Understanding and Awareness: Ship owners, port operators, and related parties may lack understanding of the requirements and guidelines of applicable electrical standards Lack of understanding of relevant electrical standards can hinder proper implementation and cause non-conformity with established standards
f. Care and Maintenance: The level of care and maintenance performed on non-conventional ship electrical systems varies. Some boats have a regular and regular maintenance schedule, while others may not receive enough attention. Lack of proper maintenance can lead to reduced electrical system performance and increase the risk of equipment damage or failure.

Table 4. Field Observation Results of Non-Convention Ship Electrical Energy Sources

No	Ship name	Sources of Electrical Energy
1	KMN Cahaya Baru 308/LLr GT 28 Ton	 Portable Generator

2	Risma Indah II 165/LLr GT 32 Ton	 Accu/Battery
3	KLM Adi Jaya 299/LLr GT 25	 Alternator
4	KLM Bintang Naila 151/LLr 17 GT	 Solar Cells

Table 5. Field Observation Results of Non-Convention Ship Electrical Installations

No	Ship name	Sources of Electrical Energy
1	KMN Cahaya Baru 308/LLr GT 28 Ton	 Using Unshielded Telephone Cables
2	Risma Indah II 165/LLr GT 32 Ton	 Installation that does not comply with standards

3	KLM Adi Jaya 299/LLr GT 25	 Installation of lights that do not meet standards/attached to flammable wood
4	KLM Bintang Naila 151/LLr 17 GT	 Installation that does not comply with standards

Based on the results of research and descriptions of the electricity conditions of Non-Convention ships (Table 4 and Table 5), currently, many Non-Convention ships use simple and limited electrical systems, some Non-Convention ships use diesel generators as the main source of electrical power, but ships with diesel generators often have limitations in terms of fuel capacity and maintenance required, wiring and electrical infrastructure on Non-Convention vessels may vary, protection against electrical disturbances such as circuit breakers or lightning protection equipment, lack of relevant understanding and awareness that may hinder implementation and causing non-compliance with established standards, as well as maintenance and upkeep of some ships on a routine schedule, while others may not receive sufficient attention. An example of control activities is carried out through a ship security assessment carried out by the Harbor Master [29] through these actions, the results of the investigation are communicated to the competent authority's table.

Lack of proper maintenance can cause a decrease in electrical system performance and increase the risk of equipment damage or failure.

The results of field observations of non-conventional ship electrical installations, where there are several ships in this research, are:

1. KMN Cahaya Baru 308/LLR GT 28 Ton uses unprotected telephone cables.
2. Risma Indah II 165/LLr GT 32 Ton installation is not up to standard.
3. KLM Adi Jaya 299/LLr GT 25 lamp installation not according to standards/attached to flammable wood
4. KLM Bintang Naila 151/LLr 17 GT installation that does not comply with standards.

It is important to note that the electrical conditions of non-convention ships vary greatly, depending on the factors mentioned above. Ship owners and port operators need to increase their understanding of safe electrification, carry out routine maintenance, and ensure adequate electrical infrastructure to minimize risks and increase the operational efficiency of non-convention vessels.

There are obstacles faced in implementing electrical standards on Indonesian-flagged non-convention ships by Gross Tonnage (GT 7-35).

1. Limited resources: one of the main challenges in implementing electricity standards is limited resources, both in terms of finance and infrastructure.
   a. Non-conventional ships, especially small ones, may have limited electrical power and be unable to meet all the electrical standard requirements set.
   b. Public ports serving non-convention vessels may not have adequate electrical infrastructure, including sufficient electrical power supplies and appropriate distribution systems.
2. Understanding And Awareness
   a. Another challenge is the lack of understanding and awareness regarding applicable electricity standards.
   b. Shipowners, port operators, and related parties may not fully understand the technical requirements and guidelines that must be adhered to in the electrification of non-convention vessels.
   c. Lack of awareness about the importance of safe and efficient electricity can lead to the use of electricity systems that do not comply with standards.

3. Technological and Regulatory Changes
   a. Technological and regulatory changes in the shipping industry can pose challenges in implementing electrical standards.
   b. Electricity standards must continue to be updated and adapted to technological advances and related regulatory developments.
   c. The introduction of new technologies, such as environmentally friendly electricity systems or alternative energy sources, can also affect the application of existing electricity standards.
4. Routine Maintenance and Inspection.
   a. Another challenge is maintaining routine inspections of non-conventional ship electrical systems.
   b. Lack of proper maintenance can result in equipment damage, damaged wiring, or unsafe connections.
   c. A lack of routine inspections can result in irregularities in the application of electrical standards.

In facing these challenges, there needs to be cooperation between ship owners, port operators, maritime authorities, and other related parties to improve electricity infrastructure, increase understanding and awareness of electricity standards, and adopt appropriate technology. The following list is several recommendations to improve the implementation of electrical standards on the Non-Convention Gross Tonnage (GT 7-35) ship at Pelabuhan Rakyat:

a. Increase Awareness and Understanding
   1) Providing training and outreach to ship owners, port operators, and related personnel regarding applicable electrical standards, safety requirements, and correct implementation procedures.
   2) Educate stakeholders about the benefits and importance of complying with electrical standards to maintain the safety of ships, crew, and the environment.
b. Renewal and Adjustment of Standards, conduct regular monitoring and evaluation of applicable electricity standards, and carry out updates, if necessary, following technological developments and related regulations.
c. Use of Latest Technology
   1) Encourage the use of the latest technology in non-conventional ship electricity, such as more efficient and environmentally friendly electricity systems, the use of renewable energy, and advanced energy storage technology.
   2) Utilizing an automatic control system to increase the efficiency of electrical power use and reduce unnecessary energy consumption.
d. Collaboration between Government and Industry
   1) Building close cooperation between the government, port authorities, ship owners, and the shipping industry to strengthen the implementation of environmental standards.
   2) Involving the shipping industry in the process of updating standards and developing policies related to non-conventional ship electrification.

By implementing these recommendations, it is hoped that the application of electrical standards on non-conventional ships can be improved, resulting in safer, more efficient, and sustainable operations in people's ports.

4. Conclusion

Based on the research that has been conducted, it can be concluded that:

a. Current electrical conditions of non-conventional vessels vary depending on factors such as the type of vessel, the size of the vessel, and the level of maintenance performed
b. The obstacles faced in implementing electrical standards on Indonesian-flagged non-convention ships by Gross Tonnage (GT 7-35) are limited resources, understanding and awareness, changes in technology and regulations, and lack of routine maintenance and inspections.
c. Collaboration between authorities, ship owners, and ship crews has not been optimal in implementing these electrical standards, and there has been no training program or resources offered by related parties to improve understanding and skills related to electricity on ships.

References

[1] Peraturan Menteri Perhubungan Nomor KM 65 Tahun 2009 tentang Standar Kapal Non Konvensi (Non Convention Vessel Standard) Berbendera Indonesia, Jakarta.

[2] Peraturan Menteri Perhubungan Nomor KM 65 Tahun 2009 tentang Standar Kapal Non Konvensi (Non Convention Vessel Standard) Berbendera Indonesia

[3] Keputusan Direktur Jendral Perhubungan Laut Nomor: KP. 936/DJPL/2020 tentang Rencana Strategis Direktorat Jenderal Perhubungan Laut Tahun 2020-2024

[4] Soekanto, Soekanto. 2013. Beberapa Aspek Sosial Yuridis Masyarakat, Bandungi: PT Alumni, 1983.

[5] Aradhana, Raihan. "Efektivitas Penerapan Non Convention Vessel Standard (NCVS) berdasarkan Peraturan Menteri Perhubungan KM.65/2009 tentang Standar Kapal Non Konvensi Berbendera Indonesia". *Jurnal Kajian Ilmu Hukum dan Politik*, vol. 1, no. 4, 2023.

[6] Komisi Elektroteknik Internasional (International Electrotechnical Commission). https://www.iec.ch/homepage

[7] Agus Yulianto, "Kemenhub Gelar FGD Aturan Standar Kapal non Konvensi NCVS", republika.co.id, https://www.republika.co.id/berita/qhttsf396/kemenhub-gelarfgd-aturan-standar-kapal-non-konvensi-ncvs diakses pada 17 Juni 2022

[8] Lasse. D. A. Manajemen Kepelabuhanan. Jakarta; Raja Grafindo Persada, 2014

[9] IMO, Safety of Life at Sea (SOLAS) 1974 consolidated edition 2001.

[10] Julianto, T. S. Fitokimia Tinjauan Metabolit Sekunder dan Skrining Fitokimia, Universitas Islam Indonesia Yogyakarta

[11] Syahrul, Nizam. 2020. Peningkatan Pengawasan Penggunaan Alat Keselamatan Bagi Pengguna Jasa Dan Awak Kapal Dalam Mendukung Zero Accident

[12] Kementrian Perhubungan Republik Indonesia. Indonesian Flagged Non-Convention Vessel Standard Is Applied. Direktorat Jenderal Perhubungan Laut, 2012.

[13] D. Nanang. Sistem Kelistrikan Kapal. UNIMAR AMNI Semarang, 2019.

[14] D. A. Taylor. "Introduction to Marine Engineering". Elsevier. Butterworth-Heinemann Linacre House, Jordan Hill, Oxford 0X2 80F 200Wheeler Road, Burlington, MA 01803, 2019.

[15] European Maritime Safety Agency. "Electrical Energy Storages for Ships". DNV GL AS Maritime Environment Advisory Veritasveien 1 1363, Høvik Norway, 2020.

[16] A.P. Reza. Keselamatan Pelayaran. Poltektrans SDP Palembang, 2021.

[17] A. Mutholib, "Kajian fasilitas keselamatan kapal pada lintas penyeberangan 35 ilirmuntok", *Jurnal Transportasi*, vol. 25, no. 5, 2013.

[18] N. A. Prasetyo., M. Iqbal, D. Kamsyah, N. Fadhilah, N. Yuniarshi, "Verifikasi Kesesuaian Alat Keselamatan Terhadap Non Convention Vessel Standard Pada Tug Boat 2x1100 HP", *SENOVTEK*, vol. 1, 2022.

[19] International Maritime Organization. (1969). International Convention on Tonnage Measurement of Ship. Diakses pada tanggal 13 maret 2024 dari https://www.imo.org/en/about/conventions/page/international-Convention-on-Tonnage-Measurement-of-Ships.aspx.

[20] B. Triatmodjo. Perencanaan Pelabuhan. Penerbit BETA OFFSET, Edisi Pertama, Yogyakarta, 2010.

[21] Peraturan Pemerintah Republik Indonesia Nomor 69 Tahun 2001 Tentang Kepelabuhanan Presiden Republik Indonesia

[22] Lasse, D. A.. Manajemen Kepelabuhanan. Cetakan kedua. Jakarta: PT Raja Grafindo Persada, 2016.

[23] R. P. Suyono, Shipping Pengangkutan Intermodal Ekspor Impor Melalui Laut Edisi IV, Jakarta, 2007.

[24] UU No.17 Tahun 2008. Tentang Pelayaran Kementerian Perhubungan.

[25] PM No.51 Tahun 2002. Tentang Perkapalan Kementerian Perhubungan.

[26] Peraturan Presiden (PERPRES) Nomor 74 Tahun 2021 Tentang Pemberdayaan Angkutan Laut Pelayaran- Rakyat

[27] PM No. 8 Tahun 2013. Tentang Pengukuran Kapal Kementerian Perhubungan Direktorat Jenderal Perhubungan Laut

[28] London, International Convention on Tonnage Measurement of Ships, 1969.

[29] T. K. Utami, "Kesiapan Kapal Cargo Dibawah 500 GT Terhadap Implementasi Standar Kapal Non Konvensi (Non Convention Vessel Standard) Berkaitan Dengan Manajemen Keselamatan dan Perlindungan Lingkungan Maritim di Pelabuhan Kendari", *Jurnal Penelitian Transportasi Laut*, vol. 17, no. 2, 2015