



Analysis of Garbage Management according to Marpol 1973/1978 Annex V on MT. Klasogun

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Abstract. The objective of this research is to identify water pollution caused by waste that does not comply with the regulations outlined in MARPOL 1973/1978 Annex V. This study was conducted on the MT Klasogun and employed a qualitative descriptive method. Primary data was collected directly from the research site through direct observation and interviews with the crew members aboard the MT Klasogun, as well as literature related to the research topic.

The results of the research indicate that during garbage collection, there was no segregation of waste types, no compaction of garbage, and no proper disposal of food scraps. Additionally, garbage was not collected based on the type and color of the bins, nor according to its classification, and there was no recording of waste as required by MARPOL 73/78 Annex V.

Keywords: Procedure, Garbage, Recording

1 Introduction

In the era of modern development, ships have evolved to play a crucial role in transporting goods, as sea transportation is often more economical than other modes. The increase in the number of ships carrying goods and passengers has enhanced efficiency in moving resources across locations and countries. However, these advancements can also pose risks to water quality if discharged effluents fail to meet established management standards and regulations.

Many people mistakenly believe that the ocean is a suitable place for dumping waste, whether domestic or industrial. There is a widespread misconception that the ocean can naturally break down all materials. However, not all substances decompose easily, leading to persistent water pollution that harms marine life, degrades natural resources, and impacts the aquatic environment. Pollutants released by human activities, including ship operations, can disrupt ecological balance, endanger marine organisms, and diminish the productivity of these waters.

According to the Kompas Digital Library, pollution levels in Jakarta Bay and the Thousand Islands remain substantial, with over 14,000 cubic meters of waste entering

domestic garbage but also wastewater from large oil and gas tankers (Dwic March, 2018).

The World Economic Forum estimates that there are currently 150 million tons of plastic in the ocean. According to research by Jenna R. Jambeck and colleagues at the University of Georgia, 192 coastal countries generate about 275 million metric tons of plastic waste. Of this amount, between 4.8 and 12.7 million metric tons enter the ocean annually (Danu Damarjati, 2018).

According to the International Maritime Organization (IMO) regulations outlined in MARPOL 73/78 Annex V, ships are required to prevent garbage pollution as stipulated in Regulation 9. This standard mandates that each vessel develop a "Garbage Management Plan," providing a comprehensive approach to managing and disposing of ship-generated waste in compliance with the guidelines outlined in Appendix V.

Reducing pollution from ships requires the knowledge, skills, and responsibility of all crew members. This includes adhering to regulations for waste disposal and proper use of equipment and materials on board. Following these guidelines is essential for maintaining a clean and unpolluted marine environment. Water pollution has become a significant concern in recent years.

Based on the author's observations over approximately two weeks on the MT Klasogun, it was found that many crew members still dispose of waste directly into the sea, including items such as paper, plastic, fabric, machine debris, and food waste. In light of this issue, the author poses the question: How can waste management on the MT Klasogun be improved to align with the waste management regulations outlined in MARPOL 1973/1978 Annex V?

2 Overview

Water pollution is a change in the marine environment that is not driven or influenced by external factors due to human activities. Such foreign substances can be found in industrial garbage, household garbage, fuels, other non-biodegradable products, hot water used for cooling, and so on.

Water pollution is the introduction or entry of organisms, substances, energy and/or other substances into water or through human activities so as to reduce the quality of seawater. roll, destroy creatures. it is harmful to humans.

Water pollution is the introduction or ingress of corrosive organisms, energy and other substances by human activities, thereby degrading the quality of seawater to the point that it can no longer maintain the quality and function of the ocean.

Water pollution refers to changes in the aquatic environment that can adversely affect water resources, pose risks to human health, disrupt marine activities such as fishing and daily water use, and diminish the overall quality and utility of water.

Planning involves determining the desired future state of the organization and outlining the steps needed to reach that destination. It encompasses the development of operational objectives that guide the organizational structure in achieving specific goals. A well-constructed plan identifies overarching objectives and the most effective

strategies for attaining them. Planning is crucial in all management activities, as it serves as the foundation for executing other tasks.

Planning aims to break down large tasks into smaller, manageable components. This approach simplifies project management and helps identify the personnel required to collaborate effectively on the project. Planning also clarifies the activities that need to be completed, designates who will execute them, outlines how tasks will be coordinated, assigns responsibilities, and specifies the stages at which decisions will be made.

Controlling refers to the process of monitoring employee actions to ensure the organization remains on track to achieve its goals.

The Garbage Management Plan is a comprehensive strategy for managing waste on board. Garbage operations are governed by specific regulations, which include procedures for garbage management and maintaining records of garbage disposal or incineration. Additionally, a garbage register book must be maintained, and filled out in English by a designated service officer, with each page signed by the captain.

If an accidental fall occurs, it is crucial to document the circumstances and cause of the incident. A ship's garbage management system can be divided into four stages.

Garbage management is influenced by various factors, including the type of ship, its location, and the number of people on board. Additionally, the ship should be equipped with the necessary machinery, equipment, and garbage handling systems to ensure effective waste management. It is essential to assign sufficient personnel to operate these systems according to the specific needs of the ship and at appropriate times.

Moreover, adequate facilities must be provided for transporting garbage to port collection and storage facilities. This includes provisions for discharging materials into the sea when permitted, in compliance with regulations.

According to the American Society for Testing and Materials on the Principles of Water Systems (2015: 81), garbage trucks and related vehicles must comply with the regulations set forth by the Marine Environmental Protection Committee (MEPC) regarding ship fuel.

An incinerator is a device designed for burning various types of waste, including oil, solid garbage, and other materials, except for plastics and non-metallic items, which have a low flash point of 60°C (Incinerator Installation and Maintenance Guide, 2016:7). Incineration serves as an effective method of garbage management; it systematically burns waste, converting it into smoke and ash. However, regarding the disposal of ship-borne garbage, the procedures are not fully defined, as not all waste that can be discharged into the sea complies with MARPOL's garbage disposal regulations.

Marpol 73/78 Annex V: Ship incinerators are mainly used to burn garbage, residual oil, and garbage oil. Combustion of primary plastic garbage requires more air and heat for decomposition. It is a simple and effective device for burning plastic garbage. Large quantities of plastic materials containing ash from burning heavy metals or other toxic garbage should not be discharged into the sea. The ash should be placed on the ship as far as possible and disposed of at the port, and the competent authority should approve the use of the incinerator while the ship is in port. However, it is not allowed to burn garbage on board a ship while it is in port or near a city, as this will add to the pollution.

Waste that cannot be discharged overboard must be stored on board the ship until it can be properly disposed of at port. The handling of this waste depends on the duration of the voyage and the available storage capacity at the port. It is essential that garbage is stored appropriately to contain any hazardous materials, and waste containing food should be segregated from non-food waste. Additionally, all waste and storage containers should be clearly labeled and securely stored to prevent accidental disposal.

According to Presidential Decree No. 29 Annex V (2012), it is the responsibility of the governments of the respective contracting parties to ensure that the provisions related to the storage of garbage in ports and harbors are promptly addressed to meet the needs of the ships using these facilities. Each contracting party's government shall inform the union to notify the relevant parties whenever instruments are presented under this regulation.

The operating vessel will receive a certificate from the storage facility at the port or from the captain of the receiving vessel, confirming the quantity of garbage delivered. This certificate is valid for a duration of two years.

Marine debris disposal should adhere to Annex V of MARPOL 73/78, ensuring that the harbor area is kept clean while responsibly disposing of debris in the water. The landfill must be relatively compact, as even if mixed garbage is disposed of more than 25 miles from the nearest shore, much of the liquid material can still reach the shore. Therefore, it is essential to provide ballast to facilitate sinking. Additionally, garbage should be dumped into waters that are more than 50 feet deep to mitigate the risk of storm damage.

The management of potential exposure to substances such as petroleum and hazardous chemicals is generally governed by specific schedules or pollutant regulations. Additionally, various provisions are necessary to ensure compliance with different levels of regulation.

To establish a port unloading schedule, the ship needs to provide information regarding the items that need to be unloaded, especially those that require special care.

Kumparan (2018) Marine pollution from ships can be summarized as:

1. Inside this is processed food. This is the garbage generated by the user (society), which is thrown away in the garbage bin
2. This is solid garbage is any garbage other than human garbage, urine, and feces. Garbage can include plastic, metal, glass, and other materials.
3. Use of garbage water. Garbage, i.e., garbage that decomposes quickly, food garbage, vegetables, leaves, etc. This garbage can be further processed into compost.
4. This is inorganic garbage. Non-biodegradable garbage, which includes non-biodegradable garbage such as plastic food containers, paper, plastic toys, drinking bottles and cups, cans, wood, etc., are the ones.
5. Dirty oil. Garbage water is any water that is used and not needed and discharged as black water in a sewage treatment plant.

According to Perpres No. 29 Marpol 73/78 (2012), there are several types of pollutants from ships, namely:

1. Inside. Maintenance debris consists of materials such as chips, engine shavings, paint flakes, and other remnants collected by crew members and technicians during aircraft maintenance or operations.
2. Food waste encompasses perishable items such as fruits, vegetables, dairy products, poultry, raw meat, and other contaminants generated in dining areas.
3. Plastic waste consists of solid materials that contain valuable substances, including polymers and organic matter. Plastics can vary widely in form, ranging from hard and brittle to soft and rubbery.
4. Garbage is a potentially hazardous material used in the loading and unloading of ships.
5. Yes, industrial garbage is all garbage materials, processed garbage, and other materials that are considered household.
6. Wastewater consists of liquid materials that have been used and improperly disposed of in landfills.

All water managers must actively provide the necessary equipment and infrastructure for treating drinking water and segregating waste across various sectors, such as plastics, batteries, food waste, and more. Shipping companies are also required to comply with MARPOL regulations. This garbage management system should serve as a tool for shipping companies, utilizing appropriate compactors to minimize noise, particularly for plastic and other debris. Leftover food should be processed through a food processor before being discharged into the ocean. Additionally, modern methods should be employed to remove mercury, glass, and metal from containers to minimize oil contamination and other pollutants whenever possible. The use of clean fuel is essential not only for reducing fuel consumption but also for protecting the environment. Oil-water separators (OWS) are recommended on ships.

Special Domestic Garbage Disposal. It is strictly prohibited to discharge any type of plastic into the sea, including plastic threads, fishing gear, plastic bags, and plastic items that may contain ash, toxins, or other heavy metals. To prevent pollution, the discharge of these materials is restricted to a minimum distance of 25 nautical miles from shore. Additionally, food waste and all other household garbage, such as paper, cloth, glass, metal, bottles, cookware, and other non-reusable items, must not be discharged within 12 miles of the coast.

Garbage Disposal Regulations. Disposal of garbage may be permitted in accordance with this regulation if it is processed by crushers or helicopters and effectively removed from land. However, such disposal is prohibited within 2 miles of the nearest land due to safety concerns. Chopped or ground garbage must be passed through a sieve with holes no larger than 25 mm to ensure that any remaining particles are sufficiently small to minimize environmental impact.

Special Requirements for Garbage Disposal. According to paragraph (2) of this law, the export of fixed and floating platforms for any purpose, including marine exploration and the exploitation of marine mineral resources, is prohibited within 500 meters of these platforms. Contaminated food may be discharged into the sea if the vessel is at least 12 miles from land and is located within 500 meters of a fixed or floating platform. Cooked food scraps must be processed through a sieve with holes no larger than 25

millimeters in diameter to minimize environmental impact. Additionally, garbage disposal is restricted in specific internal areas, including the Mediterranean Sea, Baltic Sea, Red Sea, Gulf of Mexico, North Sea, Antarctic Ocean, and Caribbean Sea.

The Mediterranean Sea is the boundary of the Mediterranean Sea, which consists of the coastal waters along the border between the Mediterranean Sea and the Red Sea and corresponds to 41° North latitude (North) and the western boundary beyond the Strait of Gibraltar. 5°36' West Longitude (W). The Baltic Sea region consists of the Gulf of Bothnia and the Gulf of Finland within the Baltic Sea. The entrance to the Baltic Sea is centered on a latitude parallel to the Skaw Skagerrak at 57° 44.8' North latitude. The Black Sea region is located on the Mediterranean Sea coast between the Mediterranean Sea and the Mediterranean Sea at 41° North latitude. The Black Sea region is the Red Sea region, including the Gulf of Suez and Aqaba, to the west along a straight line between Ras si Ane (12°28.5' North latitude, 43°19.6' East longitude (E)). including. Murad (12) between Husn.°40.4' N, 43°30.2' E). The bay region is centered on the coast located southwest of the straight line between Ras al Hadd (22°30' N, 59°48' E) and Ras Fasteh (25°04' N, 61°025' E).E North The marine area is the area of the North Sea, including the surrounding coast, bounded by the North Sea south of 62° North latitude and east of 4° West longitude (W) of the Skagerrak area from the eastern boundary of the Skaw area. latitude 57° 44.8'; Standard Location in the English Channel and East Coast at 5° W in the east and 48° 30 N in the north. Antarctica is an oceanic region located at 60° south latitude (NN).

As defined in Article 2, paragraph 1 of the Convention on the Protection and Development of the Marine Environment of the Greater Caribbean (Cartagena de Indias, 1983), the Greater Caribbean means the Caribbean Sea, including the Gulf of Mexico, the coastal and inland seas, and some of the deep Atlantic Ocean. The 30° North boundary runs from Florida north to longitude 77° 30' West, to the intersection of the lines 20° North and 59° West, to the parallels 7° 20' South and 50° West, and it goes through the sea as the eastern boundary of French Guiana.

Sewage directly or indirectly affects aquatic life. Direct effects of poisoning, death of children, etc. Garbage can also cause direct damage:

1. Remove/remove the food source.
2. Chemical signals essential for life are also disrupted
3. Disruption of ecological balance.

The study of aquatic ecosystem impact focuses on how pollution disrupts the lives and communities of aquatic animals. Such disruptions can lead to failures in reproduction, increased mortality rates, and the potential displacement of species. Many affected animals may die, while others may escape or be transferred to welfare facilities to ensure their survival.

The impacts of garbage disposal or oil spills on the aquatic environment include:

1. Algae, seaweed, and plankton. Respiratory disease in plankton, fish fry, and larvae, reproductive cycle threatened. At diagnosis: movement disorders, decreased growth, poor circulation.

2. Whales, dolphins, if affected: decreased appetite, weakness, and difficulty swimming. Dehydration can be caused by indigestion and drinking disorders. Ingestion: kidney failure, nervous system disorders.
3. Sardines, mackerel, etc., to the touch: skin tenderness. Ingestion: injury to the digestive system, brain, hepatitis, kidney failure.
4. Coral, shrimp, giant crab, octopus, salted crab, If inhaled: difficulty breathing, poor absorption.

3 Research Methods

The author employs a qualitative research design to conduct this study, aiming to obtain, process, and interpret data in a manner that enhances clarity and comprehension. This approach facilitates the systematic and organized arrangement of collected data, thereby addressing the research questions more effectively. In this research, the independent variables include the smooth operation of the ship while the dependent variable remains to be clearly defined.

The population for this research consisted of the entire crew of the MT Klasogun. To represent this population, a sample of six crew members was selected, all of whom were involved in the garbage management program aimed at preventing seawater pollution. The sampled crew members included the Chief Mate, Second Mate, Third Mate, Second Engineer, Third Engineer, and Boatswain.

Operational variables pertain to the definitions used for analysis in this study. These variable markers are observable indicators that signify changes in the context of the research. This research focuses on analyzing the garbage management system on the ship.

In this research, data was analyzed using statements gathered through observations, interviews, and supporting documents, including studies and articles from literature reviews. All information obtained from interviews and observations underwent an information reduction process to summarize the key aspects of the results.

The next step involved data transfer, where information sharing facilitated the efficient dissemination of proprietary information and supported decision-making.

4 Research Results And Discussion

Garbage collection on the MT. Klasogun has not been conducted effectively, as there are no bins designated according to the regulations set by MARPOL. Each type of garbage container must be distinctly colored and appropriately installed to correspond with the various types of waste generated on board, such as cloth, cans, and containers for plastic food waste.

Garbage management on the MT. Klasogun does not fully comply with the requirements of Annex V of MARPOL 73/78, as it relies solely on one method: the combustion process using an incinerator. The collection of garbage has not been performed using mechanical equipment, and manual tools are employed instead due to

their unavailability on the ship. Furthermore, the incineration of plastic waste is prohibited, as stated in the "Installation Manual, Incinerator Operation 2016: 7."

The garbage storage area on the MT. Klasogun does not fully comply with the requirements of MARPOL Annex V, as the garbage is not segregated or sorted according to color and type. Currently, all waste is piled together in a single location beside the ship rather than being organized as specified. (Page 3, page 49).

The findings indicate that garbage management on the MT. Klasogun is insufficient, highlighting the urgent need for an effective garbage management system to prevent marine pollution. This issue calls for producers to address resource scarcity and ensure safe handling practices on ships. The deficiencies can be attributed to the lack of supporting facilities onboard and a general lack of understanding among the crew regarding proper garbage disposal procedures by international standards outlined in MARPOL Annex V 73/78.

Effective garbage management encompasses all stages from collection to disposal, necessitating the availability of adequate tools and methods onboard. The success of these management practices relies heavily on having sufficient equipment and processes in place to mitigate pollution in the marine environment caused by waste.

5 Conclusions And Suggestions

5.1 Conclusion

The author concludes that the garbage management system on MT Klasogun does not meet the established procedures for handling waste at sea. Specifically, during garbage collection, there is a lack of segregation of waste types, compaction of garbage, and proper disposal of food scraps. Additionally, garbage is not collected according to the designated type and color of the trash bins, nor is it sorted based on its classification. Furthermore, there is no systematic recording of waste, which is a requirement under MARPOL 73/78 Annex V.

5.2 Suggestion

Suggestions from research are that the trash cans should be given signs, types, and classifications for existing types of garbage, such as painting the drums or existing garbage and also putting up posters or placards about garbage in places that are easily seen by the crew. Recording garbage should also be by the requirements of MARPOL 73/78 Annex V.

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