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BALLAST WATER MANAGEMENT IN THE WATERS AROUND PT. PELINDO I FOLLOWING THE REGULATION OF IMO MEPC 56/23 ANNEX 2 BASED ON ENVIRONMENTAL RISK MITIGATION

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ABSTRACT

In 2017, the capacity of discharged ballast water was 140,000 tons or the equivalent of 141,000 kiloliters every year, assuming 60% of ships discharged 25 tons of ballast water. The cost of externalities due to environmental damage to the marine waters in 2013-2017 was 5.08 billion rupiahs. This cost was used to mitigate environmental risks due to damage to the port waters environment due to ballast water discharge.

KEY WORDS : IMO, Ballast water, Processing, Externalities

INTRODUCTION

Logically, sailing is carried out from one region to another. When the ship sails back and forth, the cargo of the ship must be in a full condition so that it will benefit the shipowner and the ship must be maintained in optimal performance. Optimal ship performance is obtained when the ship sails in a maximum laden position, so the propeller can also work optimally to generate thrust. When the ship is empty, additional shiploads are required by adding a load of ballast water to maintain optimal propeller performance. The activity of loading and unloading seawater into and from a ship seem to be activities that do not cause problems or harms. This ballasting activity is essential for safe and efficient sailing operations of the ship, but it is not recognized that this activity can cause changes on marine ecology, economic problems, and serious health impacts on marine biota and humans due to the arrival of a large number of marine species from ballast waters. Ballasting activities have been regulated in an international convention by the IMO (International Maritime Organization), which was born from the London Protocol and the London Convention on the Prevention of Sea Pollution due to Disposal of Waste and other Materials. The aim of the London Convention and the London Protocol is to control all sources of marine pollution and prevent marine pollution through the regulations on dumping waste materials. Waste is referred to as black- and gray-list, which can be considered for disposal at sea according to the degree of danger to the environment. Blacklisted items are not allowed to be disposed of at sea. International environmental protection is listed in MARPOL (Marine Pollution) which is divided into 6 annexes. The Annex includes (i) protection from oil, (ii) protection from bulk NOx liquids, (iii) protection from dangerous goods in packages, (iv) protection from dirty water/ discharge water, (v) protection from waste, and (vi) protection from air pollution.

Indonesia has ratified the ballast water management convention on November 24, 2015. In

line with the ratification, Indonesia has included ballast water management regulations in the Government Regulations. The regulating regulation is Presidential Regulation No. 132 of 2015 concerning the Ratification of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004).

Ballasting and deballasting activities can disrupt the ecology of the marine environment due to the arrival of invasive species in the waters of the destination port if the ballast water is not treated first (Basuki *et al*., 2019). The implementation of national and international rules (IMO) in ship ballast water management is necessary. In the area of Pelindo II in Jakarta, there is a potential that 48,741.06 kL of ballast water per year is discharged directly from the ship to the marine environment and this must be managed properly (Basuki *et al*., 2018). Biological invasions need to be reduced as required by the IMO in the process of ballast water discharge (Briski *et al*., 2018). Ballast water treatment can be carried out with several methods. It is necessary to choose the optimum method by comparing the ultraviolet irradiation and electrochlorination methods in treating ships' ballast water in terms of cost (Vorkapic *et al*., 2018). UV treatment is utilized to control ballast water that is discharged at a port, as required by IMO regulation D2, (Bradie *et al*., 2017; First and Drake, 2014)

Transportation of goods by sea continues to grow from year to year. Around 90% of world goods are transported by. This will cause the movement of species from one area to another due to ballast water discharged by transporting ships. Ballast water treatment methods using UV irradiation and electrochlorination are compared using cost efficiency comparisons based on fuel usage (Vorkapic *et al*., 2018). A related study is a study on marine phytoplankton at the four ports of Tanjung Priok that was conducted by comparing marine phytoplankton in the waters of the port and those contained in the ballast water that ships discharge at the ports. Samples of ballast water were selected from several types of ships that docked and discharged ballast water between November 2011 and October 2012 (Thoha and Rachman, 2018). An analysis of species contained in ballast water discharged in Valdez, Alaska from several ships visiting from the Pacific waters in the USA shows that there is a correlation with invasive species, which came from the discharged ballast water (Darling *et al*., 2018)

MATERIALS AND METHODS

This research was conducted in the working area of PT. Pelindo I headquartered in Medan. This research is a type of research with field data in the form of the number of ship visits, both national (domestic) and international ships. From the number of ship visits, an analysis of the amount of ship ballast water discharged in port waters was carried out. Analysis of externalities due to ship visits, ship operations, and other supporting operations was also performed.

RESULTS AND DISCUSSION

An increase in domestic and international trade, which is followed by the process of transporting goods and services, is followed by an increase in the need for transportation equipment and all of its facilities. This becomes an opportunity and a challenge for port managers because it has positive and negative impacts. The positive impact is that the region has developed its economy and there will be connectivity between regions, reducing price disparities. On the other hand, there are negative impacts on culture, social environment, and the natural environment in general. The table shows the number of ship visits loading and unloading in the area of PT. Pelindo I, both domestic and international ships.

Based on Table 1, it can be seen that domestic (national) ship visits dominated and had a fluctuating trend. Likewise, visits of ships with international routes tended to fluctuate. Based on the data in Table 1, especially the data on visits of ships with international routes, it is necessary to deliberate about discharging ballast water (deballasting), which indicates the presence of carried invasive species. The flow of ship visits as presented in Table 1 is followed by the flow of loading and unloading of goods in the area. The goods can be packed in containers or non-container (bulk, sacks, and general cargo).

Impact of Ship Visits and Flow of Goods

Consumption of public goods often results in what is referred to as externalities or external impacts. In general, externalities are defined as impacts (positive or negative) or in the formal language of the economy as net costs or benefits from the actions of one party to another party. More specifically, externalities occur when the production or

Table 1. Domestic and International Ship Visits at PT. Pelindo I

No.	Sailing Flow	Unit	Year				
			2013	2014	2015	2016	2017
1	International ship	Unit	9,288	10,587	10,037	9,375	9,713
		GT	21,028,175	23,597,031	23,057,422	25,260,000	21,044,512
2	Domestic ship	Unit	55,728	63,519	60,221	56,251	58,276
		GT	126,169,052	141,582,184	138,344,533	151,560,002	126,267,074
Total	Unit		66,016.00	74,106.00	70,258.00	65,626.00	67,989.00
	GT		147,197,227.00	165,179,215.00	161,401,955.00	176,820,002.00	147,311,586.00

consumption activities of one party affect another party who did not choose to incur it, and the party causing the externalities does not provide compensation to the affected party. Externalities are a phenomenon that is encountered every day, which is not only limited to the management of natural resources. In an economic system, the basic functions of production, distribution, and consumption occur in a natural environment. This natural environment plays a role as a provider of raw goods and energy materials, without which the production and consumption processes would not occur. The results of the production and consumption processes, other than goods and services, are waste, which is a side effect of the production and consumption process. This waste can be thrown back into nature after going through a refining process or recycled. This also applies to the operational processes at the port, especially to the impact on the air and marine environment.

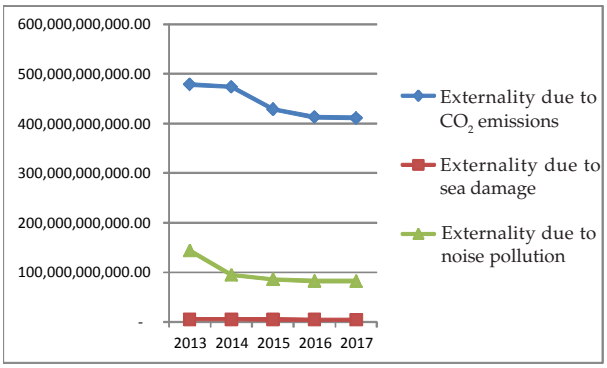

Fig. 1. Environmental Externalities Due to Port Operations at PT Pelindo I

The increasing trend of ship visits and the increase in the flow of goods transported by sea mode will have an impact on the environment of the port. The impacted port environment includes the air environment and the marine environment. This externality factor must also be anticipated by port managers. It is related to the costs that must be borne by port operators, concerning the community, due to the impact it causes.

Externalities that must be borne by the port operator (PT. Pelindo I) related to the air environment, due to CO_2 emissions and noise, and the marine environment, can be seen in Figure 1.

Externalities Due to CO_2 Emissions

Externalities Due to Damage of Marine Environment

Externalities due to Noise

Based on Figure 1, with the more ship visits, loading and unloading will have a logical impact on port operations. The real impact is an increase in the number of devices with fossil fuel-based prime movers (trucks, forklifts, and other lifting and conveyance equipment). The IMO (International Maritime Organization) regulation concerning water management has been enacted and Indonesia has ratified the regulation in November 2015. This international regulation must be anticipated well because it will affect the protection of the marine environment.

Ballast Water Management

Based on international regulations issued by the world maritime body, namely the IMO (International Maritime Organization) concerning Ballast Water Management, the discharge of ballast water must not be arbitrary. Before the ballast water is dumped at the port of destination, the ballast water must be treated in such a way that the dispersing of carried invasive species can be prevented. Based on the number of ship visits, especially ships with international routes, the amount of ballast water discharged can be predicted. The amount of ballast water discharged by a ship was estimated by counting the number of ships; 10% to 60% of all ships discharged ballast water. The amount of ballast water discharged per ship varies from 5 tons to 25 tons.

CONCLUSION

In 2017, the capacity of discharged ballast water was 140,000 tons or the equivalent of 141,000 kiloliters every year, assuming 60% of ships discharged 25 tons of ballast water. The cost of externalities due to environmental damage to the marine waters in 2013-2017 was 5.08 billion rupiahs. This cost was used to mitigate environmental risks due to damage to the port waters environment due to ballast water discharge.

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