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Waste management from ships at Vietnam seaports

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Abstract. This paper analyzes and evaluates the situation of waste management from ships at Vietnam's seaport system on the basis of comparing with the requirements of Vietnam's legal regulations on management and treatment of waste as well as provisions of international maritime conventions to which Vietnam is a member. Based on that, some solutions are proposed to improve the management efficiency of waste from ships for Vietnamese seaports.

1. Introduction

In recent years, Vietnam's seaport system has made great progresses in both quality and quantity, basically meeting the requirements of socio-economic development and step by step meeting the needs of international integration demand. However, with the speed of the economics fast growing, the number of foreign and domestic ships of visiting Vietnam's seaports is increasing, which means the problem of waste generated from ships at ports is increasing, therefore the leading to the risk of pollution environment in Vietnam's sea and seaport waters.

To protect the environment in economic development, Vietnam has issued many regulations on waste management in general and waste management in ports in particular such as: Environmental Protection Law No. 55/2014 / QH13 , Vietnam Maritime Code No. 95/2015 / QH13, Decree No. 109/2014 / ND-CP on the Regulation on protection of seaport projects and maritime channels, Decree No. 37/2017 / ND-CP on articles Port operation business lawsuit, Circular No. 41/2017 / TT-BGTVT of the Minister of Transport Regulations on management of collection and treatment of ships' waste in seaport waters. Vietnam has fully participated in the Annexes I, II of the International Convention on the Prevention of Pollution by Ships (MARPOL), and has a plan to fully implement Annex III, IV, V, VI before 2030 [1].

In order to ensure good management of waste from ships at Vietnamese seaports in accordance with the regulations of the Vietnamese legal system and international maritime conventions that Vietnam is a member, the analysis, Assessing the status of this work is really necessary.

2. Vietnamese seaport system

Vietnam has basically completed the investment in seaport construction and has formed three port centers in the North (including Hai Phong, Quang Ninh) and Central (including Da Nang, Quang Ngai, Quy Nhon and Nha Trang).) and the South (including Ho Chi Minh City, Dong Nai, Ba Ria - Vung Tau). In the port centers, an international gateway port has been formed such as Hai Phong port (Lach



Huyen area) and Ba Ria - Vung Tau port (Cai Mep - Thi Vai area). Vietnam's seaport system currently includes 06 seaport groups associated with economic areas in the Vietnamese territory, including:

- Method Northern seaport group (Group 1) from Quang Ninh province to Ninh Binh province;
- North Central Coast's seaport group (Group 2) from Thanh Hoa province to Ha Tinh province;
- Trung Trung Bo's seaport group (Group 3) from Quang Binh province to Quang Ngai province;
- South Trung Bo's seaport group (Group 4) from Binh Dinh province to Binh Thuan province;
- Southeastern seaport group (Group 5) includes Ba Ria Vung Tau, Binh Duong, Dong Nai, Ho Chi Minh City and Long An provinces;
- Mekong Delta's seaport group (Group 6).

Currently, there are 45 seaports in the whole country, including: 02 grade seaports, 12 class I seaports, 18 seaports of class II and 13 seaports of class III. The total number of ports is 251 berths with a total length of about 88km. Vietnam's seaport system has met the requirements of transporting goods by sea, positively serving the process of socio-economic development in coastal areas and the whole country; create motivation to attract and promote related economics and industries to develop together. The volume of goods through the port has continuously grown over the years, 2018 reached 530,145,000 tons [2]. The increase in cargo handling means that the number of ships arriving at the port increases, and the amount of waste discharged from the ship needs to increase.

Table 1. Volume of goods through Vietnam's seaport in the last 3 years [2].

№	List of goods categories	Unit	Volume of cargo through the port		
			2016	2017	2018
1	Total	1000 tons	459,833	472,059	530,145
	Export goods	1000 tons	111,535	112,220	142,793
	Import goods	1000 tons	143,937	135,487	174,189
	Domestic goods	1000 tons	160,902	154,116	212,323
	Transit goods	1000 tons	43,459	70,236	840
2	Container	1000 tons	148,081	149,348	181,472
		1000 Teus	12,988	12,965	18,062
	Export	1000 tons	50,142	50,531	61,989
		1000 Teus	5,158	5,040	6,113
	Import	1000 tons	61,213	60,194	74,318
		1000 Teus	5,162	5,078	6,192
	Domestic	1000 tons	36,663	38,623	45,165
		1000 Teus	2,668	2,847	5,757
3	Liquid goods	1000 tons	62,559	57,686	73,015
	Export	1000 tons	9,228	6,381	5,297
	Import	1000 tons	17,821	17,920	22,045
	Domestic	1000 tons	35,510	33,385	45,673
4	Dry goods	1000 tons	205,797	194,789	274,818
	Export	1000 tons	52,165	55,308	75,507
	Import	1000 tons	64,903	57,373	77,826
	Domestic	1000 tons	88,729	82,108	121,485

5	Transit goods	1000 tons	43,459	70,236	77,778
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3. The Current status of waste management from ships at Vietnam's seaports

The operation of the ship generates many different types of waste. The Marine Environmental Protection Committee (MEPC) listed the main types of waste from ships as follows (table 2):

- oil waste;
- sewage;
- garbage;
- waste from exhaust gas cleaning system;
- ozone depleting substances.

Table 2. Type of waste [3].

MARPOL Annex V-related	MARPOL Annex I-related	MARPOL Annex IV-related	MARPOL Annex VI-related
A. Plastics	Oil bilge water	Sewage	Ozone depleting substances
B. Food wastes	Oil residues (sludge)		
C. Domestic wastes	Oil tank washings (slops)		
D. Cooking oil	Dirty ballast water		
E. Incinerator ashes	Scale and sludge from tank cleaning		
F. Operational wastes			
G. Cargo residues			

In recent years, although Vietnam's ports have actively invested in infrastructure or associated with service units to collect and treat waste from ships. However, the ability of collect waste has not yet met the needs of the ship to dock.

According to statistics of Vietnam Maritime Administration (2013): Almost all of ports have not built waste treatment stations from ships at the port, except for Quang Ninh Port with wastewater and oil treatment stations; For the reception, there are 16/25 port authorities equipped with equipment to receive domestic waste at ports (accounting for 64%), there are 08/25 port authorities that can receive domestic wastewater (accounting for 32%).), and 7/25 port authorities can receive hazardous waste (accounting for 28%); Waste treatment from ships is largely due to the functions of the companies, port enterprises have not done this task themselves [4-8]. With the collected statistics, there are 2/6 port groups able to meet the treatment of all hazardous waste generated by ships (mainly wastewater and oil), accounting for 33%; only port group 5 has a company capable of meeting the demand of domestic wastewater treatment, accounting for 17%; and there are 4/6 port groups whose companies meet the demand of treating domestic waste from ships, accounting for 67%. Therefore, without domestic waste is treated almost meet the demand, the remaining domestic wastewater and hazardous waste do not meet the current needs of ships to the port.

It is forecasted that in the case of ports not investing in infrastructure for waste management from ships, but only using the existing receiving system, by 2030 (the year is expected to fully participate in Vietnam MARPOL Convention annex) only 1/6 of the port group meets the demand for domestic waste and domestic waste water collection, 2/6 port groups meet the demand for hazardous waste collection (data The forecast is presented in table 3).

Table 3. Assessing the level of meeting the needs of receiving and treating ships from the current system by 2030.

№	Port	Responsibility for hazardous waste (%)		Responsibility for domestic wastewater (%)		Responsibility for domestic waste (%)	
		2020	2030	2020	2030	2020	2030
1	Group 1	52.34	30.84	18.54	10.91	56	31
2	Group 2	1.84	1.09	0	0	94	30
3	Group 3	362.97	214.12	0	0	630	285
4	Group 4	0	0	0	0	82	39
5	Group 5	199.30	132.96	328.77	219.10	70	51
6	Group 6	2.97	1.29	15.40	6.52	22	13

Vietnam's legal provisions on waste management from ships:

Article 128, Vietnam Maritime Code: "Seaports must have plans and measures to receive and treat waste from ships according to regulations".

Circular No. 41 / TT-BGTVT regulating:

- Article 4 and Clause 1: "Hazardous solid waste, water and oil sludge and other hazardous liquids from boats must be managed and collected according to the provisions of Chapter II of Decree No. 38/2015 / ND -CP on April 24, 2015 of the Government on waste and waste management (hereinafter referred to as Decree No. 38/2015 / ND-CP), Circular No. 36/2015 / TT-BTNMT on 30/30 June 2015 of the Minister of Natural Resources and Environment on hazardous waste management (hereinafter referred to as Circular No. 36/2015 / TT-BTNMT) and relevant legal provisions ”.
- Article 4 and Clause 2: "Domestic waste from boats must be managed and collected in accordance with Chapter III of Decree No. 38/2015 / ND-CP and relevant laws".
- Article 4 and Clause 3: "Industrial solid waste from boats must be managed and collected according to the provisions of Chapter IV of Decree No. 38/2015 / ND-CP and relevant laws".
- Article 4 and Clause 4: "Dirty water from boats must be managed and collected according to Chapter V Decree No. 38/2015 / ND-CP and relevant laws".
- Article 4 and Clause 5: "Seaport enterprises themselves providing services of collecting and treating wastes from vessels in seaport waters must comply with the provisions of Decree No. 38/2015 / ND-CP, Circular No. 36/2015 / TT-BTNMT and relevant legal provisions”.
- Article 4 and Clause 6: "Seaport enterprises which do not provide services of collecting and treating wastes from vessels in seaport waters must sign contracts with organizations and individuals providing collection services. Collecting and treating waste from boats in seaport waters to meet the regulations on waste collection and treatment in Decree No. 38/2015 / ND-CP, Circular No. 36/2015 / TT-BTNMT and relevant legal provisions”.
- Article 4 and Clause 7: "Activities of collecting waste from boats in seaport waters must be guaranteed by seaport enterprises within 4 hours after the regional port authorities receive requests from procedures for boats ”.

Therefore, comparing with the above regulations, the management of waste from ships at all Vietnam's seaport groups does not meet the requirements of Vietnamese law as well as the regulations of the public International convention that Vietnam is a member. These limitations stem from the following causes:

- Vietnam does not have a unified port management agency (like the model of port authority) to manage the whole seaport in accordance with the plan and adjust and expand when necessary.
- The method of allocating land and water areas to organizations investing in the construction of wharf bridges as done in the past time has shredded the regulations of the seaport system, creating fragmented and unconventional investment, the lack of uniformity and synchronization synchronous development of seaport infrastructure including infrastructure for receiving and

treating waste from ships. The cost of procuring equipment for collecting and treating waste from the ship is very high, if there is no coordination between ports in the port group that each port makes individually, it is very difficult to implement.

- Regulations on environmental protection of international conventions that Vietnam has participated in and are prepared to participate in legalization are few. This makes it difficult for regulatory agencies to inspect and supervise the reception of waste from ships of seaports. Table 4 presents an assessment of the compatibility of the Vietnamese regulatory system and the MARPOL Convention concerning the reception and disposal of ship waste [9-15].

Table 4. Assessing the compatibility of the MARPOL Convention and the laws of Vietnam on the reception and treatment of waste from ships.

No	MARPOL	Vietnam legislation
1	Annex I. Regulations for the Prevention of Pollution by Oil	
Chapter 6	Receiving means	
Regulation 38	A. Receiving facilities outside special areas 1. The Government of each Member of this Convention shall ensure that it is equipped at oil terminals, repair ports and other ports where the oil sludge should be discharged, equipment for receiving residues and the remaining mixture of Oil tankers and other vessels that are sufficient to meet the vessel's demand for use without stopping the ship improperly B. Receiving means in special areas	Vietnam has provisioned in Circular No. 41 / TT-BGTVT. However, currently the only a few ports are equipped with waste water treatment equipment along with receiving facilities. Currently, Vietnam is researched to establish a special region
2	Annex II. Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk	
Chapter 8	Receiving means	
Regulation 18	Receiving means and equipment of receiving terminals	Vietnam has no legal regulations on this area
3	Annex IV. Prevention of Pollution by Sewage from Ships	
Chapter 4	Receiving means	
Regulation 12	Receiving means 1. The Government of each Convention Member requires that vessels operating within their sovereignty waters and vessels passing through that waters must the requirements of regulation 11.1 to ensure that the ports and terminals Wastewater receiving means satisfy the needs of vessels without stopping the vessel	Vietnam has provisioned in Circular No. 41 / TT-BGTVT. Now, Wastewater treatment system in Vietnam has several ports are equipped with waste water treatment equipment along with receiving means, but is not guaranteed to meet the requirements of the Appendix.
4	Annex V. Prevention of Pollution by Garbage from Ships	

No	MARPOL	Vietnam legislation
Regulation 7	Receiving means	Vietnam has provisioned in Circular No. 41 / TT-BGTVT
Regulation 8	Control of whose country have ports on mining requirements)	Vietnam has completed the requirements of this regulation
5	Annex VI. Prevention of Air Pollution from Ships	
Regulation 17	Receiving device	Vietnam has no legal regulations on this area. Currently, Vietnam's ports and berth have not equipped the equipment and receiving means ozone depleting substances from ships.

4. Some of solutions to improve the efficiency of waste management from ships

In order to improve the efficiency of waste management from ships, the following solutions should be implemented:

- Strengthening participation in international conventions on environmental protection in the maritime field. Which participation in international conventions will create favorable conditions for Vietnamese vessels to enter international ports, creating a legal corridor for port authorities to carry out PSC inspections of foreign vessels to your country to ensure compliance with the provisions of the international convention.
- Strengthen material and technical facilities to serve the state management of the environment, especially for inspection, examination and supervision of environmental protection for seaport activities.
- It is necessary to update international regulations and guidelines in the maritime field and review the provisions of the International Convention to which Vietnam is a member. Legalize these provisions into the Vietnamese legal system.
- Checking and supervise activities of seaport enterprises and vessels when operating in seaport waters; Maritime safety inspection of vehicles participating in the management area to detect and recommend timely to eliminate potential risks that could cause environmental pollution.
- Building regulations on waste collection fees arising from ships for participating organizations and individuals to collect, receive and treat wastes generated from ships at seaports.

5. Conclusion

The world seaport has developed to the fourth generation, known as the green port, where the port's operation efficiency is always assessed on the harmony of three aspects: economic benefits and commun benefits and environmental benefits. In order to Vietnamese ports to reach green ports, the first step is to improve the efficiency of waste management including waste from ships.

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