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THE EFFECT OF THE APPLICATION OF MARPOL ANNEX 1 ON OIL SPILL PREVENTION AT PT. SAPTA SANDIKA KRIDA

Muhammad Thamrin[a], Rehani Fitrina[b], Tiara Zahira Agwin[c], Diandra Auraly Infani Helmi[d]

[a]Faculty of Management and Business, , Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia
Corresponding author: thamrinaroba@yahoo.com, tiarazahira4@gmail.com

Abstract: Marine pollution occurs because living things are thrown into the sea or can be explained as dirt or waste that enters the marine environment. There are various sources of pollutants that can damage the sea, one of the causes is due to oil spills coming from operating ships. Therefore, this study aims to determine the application of marine pollution, know the prevention of oil spills, and determine the effect of the application of marine pollution on oil spills by applying Marpol 73/78 Annex 1. The method used in this study is a correlation method combined with a quantitative method approach using purposive samples, while data collection uses the questionnaire method to the crew. The test tool used is Smart PLS 4 with SEM (Structual Equation Modeling) analysis method. This study produced positive results and significance studied with two variables tested, namely the application of Marine Pollution and Oil Spill prevention.

Keywords: *marine pollution, annex 1, prevention, oil spills, international marine organization*

1. Introduction

Indonesia is an archipelagic country that has a sea area of 5.8 million km^2 and abundant marine resources. It is estimated that 85% of the national economy will be highly dependent on marine resources if all marine potentials are managed optimally and managed properly. In 2023, it is predicted that the Indonesian economy will be strengthened by four main sectors, namely services, agriculture, and natural resources.

As citizens, it is our duty to protect the environment and preserve it as a provision for the next generation. Monitoring marine pollution is an important part of modern environmental regulations that seek to care for and protect marine ecosystems more efficiently so as to improve their quality (Bellas et al in Hasibuan et al., 2022). With marine sustainability that is maintained, it will be a source of income for the state or coastal communities because most of them depend on marine wealth and also as cultural heritage in the field of tourism which will become a destination for Indonesian colors or foreign tourists.

Oil spill is the release of oil into the marine environment that can occur directly or indirectly from various activities such as shipping, oil and gas company activities, or other activities. On March 18, 1967, the supertanker MT Torrey Cayon ran aground as it entered the English

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Channel and spilled its entire cargo of 120,000 tons of crude oil into the sea. The Cayon Torrey tragedy became the first major oil spill case and there was no prior preparation plan to deal with the situation. Thus, to overcome the serious impact of oil spills at sea, MARPOL (Marine Pollution) was created which aims to prevent and minimize operational and accidental pollution of ships and achieve complete elimination of deliberate pollution of the marine environment by oil and other harmful substances from the routine operation of ships to minimize and reduce accidental disposal of such materials.

Oil spills can be catastrophic or very dangerous events not only for ship crews and companies but fishing communities and also nature itself which takes thousands of years to restore these marine ecosystems. In recent years there has been an oil spill that has caused huge losses to Indonesia even though it was not caused by ships owned by PT. SAPTA SANDIKA KRIDA but it can be a lesson for the crew to be more careful and aware of oil spills that can cause marine pollution.

Oil spills have occurred in various locations around the world. Oil spills can be said to be situations of oil descent or leakage intentionally or unintentionally polluting the marine environment. The impact of this oil spill can be detrimental to the ecosystem or others. Several oil spill incidents that occurred in the past 5 years, namely in 2018 there was an oil spill case in Balikpapan (MV. Ever Judger) resulting in 202,700^{m3} or 1,238,619 barrels. In 2020 there was a drilling well leak or negligence of oil transport ships that carried out illegal tank washing which resulted in polluting the coast of Pari Island along 2 km. Then in 2021 the case of ship oil disposal that was not in accordance with the rules was in Gianyar, Bali, which had an impact on a lot of oil residue on Purnama Beach. And in 2023 there was a case of the MT tanker accident. Princess Empress which affected the diesel spill as much as 800,000 liters.

These cases have the impact of marine pollution due to oil spills, the occurrence of hydrocarbon components in oil can poison and kill marine life or living things in the waters, especially those who need oxygen caused by oil degradation which reduces the oxygen content in seawater. In dealing with oil spill cases, compliance with environmental regulations, the use of safer technology in oil transportation, as well as the development of effective emergency response plans are important factors in preventing and overcoming oil spill cases.

2. Literature review

2.1 Prevention

Prevention is an effort made by individuals or groups in preventing something unwanted from happening. Prevention of Pollution from ships is an effort that must be done by the Master and / or crew as early as possible to avoid or reduce oil spill pollution, toxic liquids, hazardous cargo in packaging, sewage, garbage, and exhaust gases from the ship to the waters and air (Ministerial Regulation No. 29 of 2014).

Prevention can be interpreted as processes, steps or actions carried out to avoid something happening, so it can be considered as the same action as preventive efforts (Andi, 2023).

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http://proceedings.itltrisakti.ac.id/index.php/altr

In prevention activities, one of them may require SOP. Standard Operating Procedure or abbreviated as SOP is a guide for work implementers or officers in carrying out their duties, as a guide that is expected to facilitate activities in achieving goals with desired results. Effective implementation of SOP will reflect consistency in performance results, products produced, and service processes, by aiming for conformity, service, and balanced coordination. In the process of designing and implementing this SOP, participation from all relevant parties is needed, because they have a deep understanding of the field situation and will be directly affected by the implementation of the SOP (Fauzan, 2021).

In the shipping industry and in many other fields, SOP are very important and must be followed by every crew member. Along with the development of the company, the complexity of the business, and the changes that occur, the role of SOP is increasingly needed as a guide to carry out various work processes in the company.

2.2 IMO (International Marine Organization)

In accordance with the awareness of the importance of human factors and the need to improve ship operational management in preventing ship, human, cargo and property accidents and preventing pollution of the marine environment, the IMO (International Maritime Organization) issued regulations on ship safety management & marine (Sumara et al., 2019). IMO (International Maritime Organization), namely SOLAS (Safety of Life at Sea), 1974 and MARPOL (Marine Polution), 1973, 1978. International regulations relating to the construction, equipment and operation of ships and the prevention of pollution by oil on Annex 1 MARPOL (Max et al., 2018).

The initial purpose of these efforts was to prevent pollution of the ocean by oil, resulting in the adoption of the first comprehensive antipollution convention, the International Convention for the Prevention of Pollution from Ships (MARPOL) in 1973. However, over the past few years it has changed. The original Marpol Convention has been amended many times to include broader measures or measures in the prevention of marine pollution, including provisions to address pollution from chemicals, other hazardous substances, garbage, and sewage.

2.3 MARPOL 73/78

Marine pollution is the entry or inclusion of living things, substances, energy, and/or other components into the marine environment by human activities so that the quality drops to a certain level that causes the marine environment not to be in accordance with quality standards and/or functions (Government Regulation No. 19 of 1999).

Pollution of the marine environment means the inclusion by humans, directly or indirectly, of materials or energy into the marine environment, including estuaries, which results in or may bring adverse effects such as damage to marine biodiversity and marine life, hazards to human health, disruption to activities at sea including fishing and other lawful uses of the sea, decrease in the quality of use of seawater and reduction in comfort (*United Nation Convention the Law of the Sea (UNCLOS), 1982*).

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Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/altr

Marine pollution is a problem that requires special and consistent handling by countries interested in maintaining safety aspects in maritime areas. The increasing demand for sea transportation will result in using the sea as a traffic route in the shipping sector (Hasibuan et al., 2022).

MARPOL is an international regulation that aims to prevent marine pollution. Every system and equipment contained on board that functions to support the implementation of this regulation must obtain certification from the authorities (Latief et al., 2018).

The explanation of Annex 1 is: (1) Prevention of pollution by oil, given on October 2, 1983; (2) Annex 1 was established in connection with the sinking of the tanker Torrey Canyon when it entered the English Channel and spilled 120,000 tons of crude oil into the sea in 1967. Questions have been raised about measures to be taken to prevent marine pollution and the absence of a system to provide compensation for marine accidents resulting in pollution; (3) Although pollution of the marine environment due to accidents has tremendous negative impacts, the conference considers that pollution due to ship operations is still a more dangerous threat. Therefore Annex 1 is more of a further elaboration and convention of OILPOIL 1954 which covers the prevention and control of pollution by oil; (4) The policy direction taken into 4 parts, namely: (a) Construction: Segregated Ballast Tank (SBT); Dedicated ballast tank; Tank size restrictions; Subdivision and stability; Protective location of SBT (Double Hull); Retention on board; (b) Equipment: Oily Water Separation; Oil Discharge Monitoring and Control System; Interface Detector; Landfill installations; Oil record book; SOPEP; (c) Supervision: Discharge rate; Waste area; Receiption facility; Law enforcement.

Construction Requirements: (1)Tanks – tanks for oil residue (Sludge); (2) Each ship of GT size 400 or more must be equipped with tanks whose capacity is appropriate to the type of engine and the length of travel to accommodate residual oil derived from purification of fuel, lubricating oil and oil leakage in the engine room; (3) Pipes to and from slugde tanks must not have a direct connection out of the ship other than through discharge connection; (4) Oil separator and ballast water and transportation of oil in fore pick tanks; (5) Delivery on ships whose surrender after 31 December 1979 of GT 400 size or greater other than tankers and tankers after 31 December 1979 of GT 150 size or greater may not carry ballasts in fuel tanks; (6) If it is necessary to carry a large amount of fuel so that it is necessary to carry ballast water that is not clean ballast in the fuel tank, the ballast shall be discharged to the raceiption facility or to the sea according to the rules and shall be recorded in the oil record book; (7) On ships of GT 400 or more whose contract is after 1 January 1982 and in the event that there is no contract whose full laying is after 1 July 1982, oil may not be transported.

According to Marine Environment Pollution Factors: (1) Pollution due to shipping activities: The ship ran aground; The ship sank; Impact ship; Fire ship; Passenger and crew activities; Fall of cargo; Normal operation of the vessel; (2) Pollution due to the normal operation of the ship is divided into 3, namely: (a) From the machining room: Lubricating oil leakage; Seawater coming from the propeller shaft and engine coolant installation; Fuel

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leakage; Fuel spills and lubricating oils; (b) From the loading bay: Washing tanks; Ballast system; Falling or spilling loads; (c) From the accommodation room: Garbage; Human waste; And so on; (3) Pollution caused by oil drilling: Operational activities of ships around oil drilling areas; The occurrence of oil pipeline leaks during the exploration process or due to errors from the substantial exploration process; Ship To Ship (STS) Process; (4) Pollution due to port and shipyard activities: Facilities for collecting liquid waste from ships are not yet available at ports; The occurrence of spills of any type of cargo into the sea due to the loading and unloading process of goods; Especially in activities at the shipyard (dock), waste disposal arrangements based on the type have not been arranged properly (Dede, 2019).

2.4 Oil spills

Oil is petroleum in any form including crude oil, fuel oil, dirty oil, oil impurities, and refined refined products such as various types of asphalt, kerosene, gasoline, distilled oil, naptha, and the like (Ministerial Regulation No. 29 of 2014).

Oil spills are spills that can cause pollution caused by tanker operations, ship repair or maintenance activities, loading and unloading processes in the middle of the sea through STS (Ship To Ship), submarine oil pipeline leaks, and ship accidents (Hentri, 2020).

Oil spills, intentional or unintentional, are a very dangerous source of concern. Oil spills into the sea can arise due to various factors, such as collisions or ships running aground, or due to negligence from the crew. In general, oil pollution from tankers starts a lot from the disposal of ballast tank water. For example, on a 50,000-ton tanker, the discharge of water from ballast tanks can reach 1,200 barrels (Darza, 2020).

2.5 Shipboard Oil Pollution Emergency Plan (SOPEP)

SOPEP (Shipboard Oil Emergency Plan) is an emergency plan for oil pollution at sea and in accordance with the requirements of MARPOL 73/78 in Annex I, all ships with a tonnage of more than 400 GT are required to have an emergency plan to overcome oil pollution at sea in accordance with the norms and guidelines set by the International Maritime Organization under MEPC (Committee for Marine Protection). As for ships that transport oil or cargo that has the potential to cause oil pollution with a minimum tonnage of 150 GT, it is mandatory to have SOPEP (Fauzan, 2021).

The Master acts as the main holder of responsibility for the overall implementation of SOPEP, together with the Chief Officer who is subordinate to him and responsible for the implementation of SOPEP on board. Crew (ABK) are all people who work on the ship, tasked with operating and maintaining, as well as guarding the ship and its cargo. The crew consists of several parts, and has their own duties and responsibilities, the crew is responsible to the ship's officers to their respective departments. The highest leader for the departmental deck is mualim 1 and is responsible to the captain (Potto et al., 2022). SOPEP provides guidance for Skippers, Officers and Crew on steps that can be taken in dealing with various draft oil spills that can occur on ships. In oil tankers, the scenario also includes actions taken in cargo handlers and cargo tanks containing large amounts of oil.

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Conceptual Framework

Based on the purpose of the literature, the following frame of mind can be made:

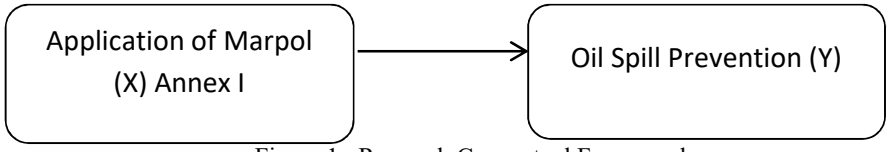

Figure 1 : Research Conceptual Framework

Hypothesis

H_o. There is no influence from the application of Marpol to prevent oil spills.

H_a. The influence of the application of Marpol on oil spill prevention.

3. Research method

In the implementation of this research in order to get good results and not experience difficulties, careful planning is needed so that the data obtained along with the results of this research get a truth in the research. In conducting this study using a correlation method combined with a quantitative method approach using purposive samples, while data collection used questionnaire or questionnaire methods to the crew as many as 16 crew on the ship. After collecting the data, researchers conducted data analysis using the Structural Equation Model (SEM) approach based on Partial Least Square (PLS). Data analysis will be carried out using a statistical technique known as Structural Equation Modeling (SEM) using the Partial Least Square (PLS) approach using SmartPLS version 4.

4. Results and discussion

Characteristics of Respondents

The following are the results of the analysis of age characteristics from respondent data, shown in table 1 below:

NO.	CHARACTERISTICS OF RESPONDENTS	CONDITION	
		SUM	PERCENT
1.	**GENDER**		
	a. MALE	**56**	**70%**
	b. FEMALE	**24**	**30%**
2.	**AGE**		
	a. 18-25	**39**	**48,8%**
	b. 25-35	**37**	**46,3%**
	c. 35-40	**4**	**5%**

Table 1 : Respondent Data

Source : Processed by the author using SmartPLS 4

Judging from table 4.1, the age of respondents in this study is categorized into 3 categories,

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/altr

namely 18-25 years old, 25-35 years old, 35-40 years old. Based on data from 80 respondents, the age range of 18-25 years was obtained as many as 39 people with a percentage of 48.8%, the age of 25-35 years as many as 37 people with a percentage of 46.3%, and the age of 35-40 years as many as 4 people with a percentage of 5%. In the category based on gender, it was dominated by male respondents as many as 56 people with a percentage of 70%. While female respondents had 24 results with a percentage of 30%. By looking at data over the age of 18-25 years, it dominates the number of respondents in the age category and the male gender dominates the number of respondents in the gender category.

Skema Model Partial Least Square (PLS)

In this study, hypothesis testing used the Partial Least Square (PLS) analysis technique with the smartPLS 4.0 program. The following is a package of PLS program models tested:

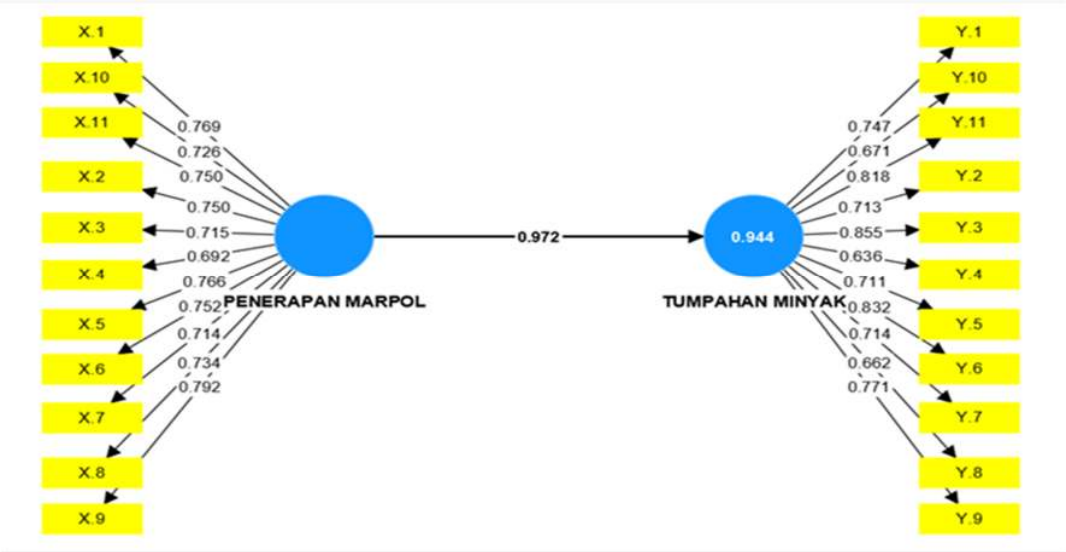

Figure 2. Outer Model

Source : Processed by researchers using SmartPLS4

Indicators of Validity (Outer Loading) and Convergent Validity (AVE)

To test convergent validity used outer loading value or loading factor. Individual indicators with a correlation value above 0.7 are considered reliable. However, in scale increase studies, loading factor values of 0.5 to 0.6 are still acceptable, convergent validity can be met on each variable having an AVE above 0.5 (Ghozali, 2021: 68) in (Afifah, 2022). Here are the outer loading values :

Variable	Indicator	Loading Value (>0.7)	AVE (>0.5)
Application of Marpol	X.1	0.769	0.551
	X.2	0.750	

ISSN: 2622-5778 (online)
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http://proceedings.itltrisakti.ac.id/index.php/altr

	X.3	0.715	
	X.4	0.692	
	X.5	0.766	
	X.6	0.752	
	X.7	0.714	
	X.8	0.734	
	X.9	0.792	
	X.10	0.726	
	X.11	0.750	
Oil Spill Prevention	Y.1	0.747	0.551
	Y.2	0.713	
	Y.3	0.855	
	Y.4	0.636	
	Y.5	0.711	
	Y.6	0.832	
	Y.7	0.714	
	Y.8	0.662	
	Y.9	0.771	
	Y.10	0.671	
	Y.11	0.818	

Table 1: Outer Loading and AVE

Source : Processed by researchers using Smart PLS 4

Based on the data in table 1 above, it is known that each indicator of many research variables has an outer loading value of >0.7. The outer loading value above is enough to meet the convergent validity requirements. However, there are 4 statements that <0.7, namely on indicators X.4, Y.4, Y.8, and Y.10. The 4 statements are still acceptable so that the data above

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http://proceedings.itltrisakti.ac.id/index.php/altr

shows that all indicators are declared feasible or valid for research use and can be used for further analysis.

Composite Reliability dan Cronbach's Alpha

This section is used to test the reliability value of indicators on a variable using Composite realibility and Cronbach's alpa. Composite realibility values of 0.6-0.7 are considered to have good reliability and Cronbach's expected alpa values are >0.7 (Ghozali, 2021:70) in (Afifah, 2022)

Variable	Composite Reliability	Cronbach's Alpha
Application of Marpol (X)	0.919	0.918
Oil Spill Prevention (Y)	0.921	0.917

Table 2 : Composite Reliabilitydan Cronbach's Alpha
Source : Processed by researchers using Smart PLS 4

Based on the presentation of data in table 2 above, it can be seen that the composite reliability value of all research variables >0.6 and Cronbach's alpha value >0.7. Thus these results can show that all research variables have met the requirements so that it can be concluded to have a high level of reliability.

Model Goodness Test (Goodness Of Fit)

	R-square	R-square adjusted
Oil Spill	0.944	0.944

Table 3 : R Square
Source : Processed by researchers using Smart PLS 4

Based on the data in table 3 above, it can be seen that the R-square value for the Oil Spill variable is 0.944. The acquisition of this value explains that the percentage of the magnitude of oil spills can be explained by the application of Marpol by 94.4%.
The assessment of goodness of fit is known from the Q-Square value. The Q-Square value has the same meaning as the coefficient determination (R-Square) in regression analysis, where the higher the Q-Square, the model can be said to be better or more fit with the data. The results of the Q-Square value are as follows:

Q-Square= 1 – (1 – R1)
= 1 – (1 – 0,944)
= 1 – 0,056
= 0,944

Based on the results of the calculation above, a Q-Square value of 0.944 is obtained. This shows the magnitude of diversity of research data that can be explained by the research model is 94.4%. While the remaining 0.56% is explained by other factors that are outside this research

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model. Thus, from these results, this research model can be declared to have a good goodness of fit.

Path Coefficient Test

Path coefficient evaluation is used to show how strong the influence or effect of the independent variable is to the dependent variable. While coefficient determination (R-Square) is used to measure how much endogenous variables are influenced by other variables. RSquare results of 0.67 and above for endogenous latent variables in structural models indicate the influence of exogenous variables (influencing) on endogenous variables (influenced) is included in the good category. Meanwhile, if the result is 0.33 – 0.67 then it is included in the medium category, and if the result is 0.19 – 0.33 then it is included in the weak category.

Based on the inner model scheme shown in table 4 below, it can be explained that the path coefficient value is shown by the Application of Marine Pollution to Oil Spills of 99,995.

Based on these results, it shows that all variables in this model have a path coefficient with a positive number. This shows that if the greater the value of the path coefficient on one independent variable on the dependent variable, the stronger the influence between independent variables on the dependent variable.

Test The Hypothesis

Based on the processed data that has been done, the results can be used to answer the hypothesis in this study. Test the hypothesis in this study by looking at the value of T-Statistics and the value of P-Values. The research hypothesis can be declared acceptable if the P-Values value <0.05.

Hypothesis	Influence	T-Statistic	P-Values	Result
H1	Application of Marpol to Oil Spills	99.995	0.000	Accepted

Table 4: T-Statistics and P-Values

Source : Processed by researchers using Smart PLS 4

Based on the data in the table above, it can be seen that the hypothesis proposed in this study is acceptable because the influence shown has a P-Values value of <0.005. So that it can be stated that the independent variable in the future has a positive and significant influence.

The results of this study show that the application of marine pollution has a positive and significant influence on oil spill prevention, showing that the higher the application of Marpol, the higher the oil spill. In the hypothesis test, it can be known that T-Statistic 99.995 and P-Values 0.000 < 0.05 which means H_O is rejected and H_a is accepted, so that the hypothesis that there is a positive and significant influence of the Application of Marine Pollution has an impact on Oil Spill Prevention at PT. Sapta Sandika Krida accepted.

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Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/altr

Previous Research Results

In summary, research that has been conducted by several researchers who have discussed the same object as this study, here is about previous research on marine pollution.

The first research conducted by Danang Saifuidin, Agus Subardi, Susilo R. A. J (2020) the purpose of the study was to determine "Causes and Efforts to Handle Oil Spills in Bunker Activities on LPG / C Decora Ships" this study aims to determine the causes of oil spills in bunker activities on the Decora LPG / C ship and to determine efforts to increase the alertness of the crew of the Decora LPG / C ship in dealing with oil spills in bunker activities by carrying out oil spill drill. The results showed the cause of the oil spill caused by the implementation of bunker activities and handling of oil spills that were not in accordance with procedures. Efforts were made to increase the alertness of the Decora LPG/C ship crew in dealing with oil spills by carrying out oil spill drills, establishing SOPEP, conducting safety meetings, supervision by ship officers and the company's role in implementing oil spill drills on board.

In research conducted by Dwi, Vitasari (2018) the purpose of the research "Application of Annex I (MARINE POLLUTION 1973/1978) as an Effort to Prevent and Overcome Oil Pollution by Ships in MT. Pelumin One". Implementation of Annex I (Marine Pollution 1973/1978) as Prevention and Control of Oil Pollution by Ships at MT Pelumin Satu Regarding ship operational activities that can cause oil pollution, in accordance with Marine Pollution (MARPOL) 1973/1978 where all ships are required to carry out the implementation of annex I. The implementation of annex I on board is used in the prevention of oil spills on ships. It is necessary to examine all matters relating to the prevention of marine pollution by oil, where the structure, equipment, equipment systems, planning and condition of ships are in accordance with the provisions of Annex I Marine Pollution (MARPOL) Convention 1973/1978. The purpose of this study is to know and explain the international provisions governing the prevention of oil spills by ships and their implementation in Indonesian laws and regulations.

Research conducted by Yusuf, Susilo (2021) the purpose of the research "Efforts to Minimize and Handle Oil Spills in the Application of Annex 1 Marine Pollution (MARPOL) 1973/1978 on board MT. Red Dynasty. Seawater pollution caused by oil spills often occurs in the sea. It is caused by explosions such as offshore oil rigs, tanker accidents, and loading and unloading operations on tankers. Oil spills are one type of pollution that has a big effect in the long run. Oil spills in the sea are caused by pollution that causes damage to biological resources and destruction of underwater ecosystems. In this paper. The author determines the formulation of the problem of the impact of spills on ships and at sea. How oil spills respond on board. Then from these two things, the author also added How to improve crew skills in dealing with oil spills. Not optimal handling of pollution by oil spills, because with a lack of understanding of the duties of each crew, handling pollution caused by oil spills becomes slow and uncoordinated. This study used a qualitative approach method, namely observation and using documents and data related to the prevention and treatment of pollution caused by oil spills on MT ships. Red Dynasti. It was later discovered from the findings that the handling of pollution caused by the oil spill on the MT. Red Dynasti is not optimal. Based on the results of this study, it can be concluded that implementation efforts against oil spills on board ships are still lacking

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http://proceedings.itltrisakti.ac.id/index.php/altr

and responsibility, as well as knowledge about prevention, still do not really understand their respective tasks when dealing with oil spills.

5. Conclusion

The results of the analysis on the research that has been conducted show that the relationship between the variables of the application of marine pollution Annex I and oil spill prevention is very significant, so it is accepted that increasing the application of Marpol Annex I contributes positively to reducing oil spills on ships. This has a positive impact on the company because the better the application of Marpol Annex I by a company, the lower the risk of oil spills on ships. The results of this research are to provide support and encourage innovation in the application of marine pollution prevention practices to companies to focus more. This research can be the basis for maintaining and improving compliance with established regulations, as well as assisting companies in maintaining the integrity of the marine environment.

6. Implications

The application of marine pollution Annex I is important as a basic rule in preventing oil spills. The results showed that the application of marine pollution carried out had a significant effect on the performance and procedures for preventing oil spills that the company implemented as a measure to prevent marine pollution. This confirms that it is important to apply every item in Marine Pollution Annex I and prove the benefits of implementing marine pollution to companies or ship owners so that they feel that the application of marine pollution is very helpful in preventing marine pollution caused by shipping activities. The company must schedule ships to dock boarding, carry out routine engine maintenance methods, supervise exhaust areas and provide supporting equipment as stated in Annex I such as the Shipboard Oil Pollution Emergency Plan (SOPEP) which aims to maximize oil spill prevention activities. Competitive advantage: This study highlights the importance of implementing marine pollution as a measure to prevent marine pollution due to shipping activities. Companies that implement every content of marine pollution well can extend the life of ships and also prevent losses that must be paid due to marine pollution.

7. Research limitations

In this study was conducted based on a limited sample so that the discussion of the results of this study was only about one company, not in general. Vulnerable time writing and obtaining short data with a short duration in research will not reflect changes seen in the point of view of a certain period of time. This research focuses on the application of marine pollution carried out by the company and based on procedures and regulations issued by the company. There are other factors that can cause oil spills on ships, namely human error and there is also no discussion from the safety side when dealing with oil spills that occur.

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Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/altr

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