MINIMIZATION OF MARINE POLLUTION AND EFFECT TO THE MARINE LIFE: CASE STUDY AT JOHOR PORT.

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ABSTRACT

Marine pollution is common in our daily life and happens every year on the open sea. There are many factors that drive to the pollution at the sea such as oil leakage, garbage, and toxic dumping. Most of the time this pollution could cause endanger to the marine life species under the sea. Marine pollution is commonly happening at the port because there are shipping activities there. This research objective is to identify what type of pollution and what the main reason for the pollution to occur every year at Johor Port and analysed by using a graph based on the result and to discuss the type of port activities that could cause marine pollution, evaluate the environmental impact, applied by the port in minimizing marine pollution. The seaport contains different types of marine operations which depend on what types of services they have provided to the ships who sail to the related port. Seaport activity is very important in maintaining economic sustainability. The port is known as the main centre of economic activities for the country. For this research the methods that the researcher used to analyze the data while completing this research were also explained in detail in this chapter by using the SPSS program. This research also will give an overview to the readers on how this research has been conducted and how the result of this research was achieved. This study deployed a questionnaire-based method and the results from the respondent that been given by the researcher during this project.

Keywords: shipping, economics, SPSS program, marine operations, pollution.

1.0   INTRODUCTION

In general, marine pollution is common in our daily life and happens every year at the open sea. There are many factors that drive to the pollution at the sea such as oil leakage, garbage, and toxic dumping. Most of the time this pollution could cause endanger for the marine life species under the sea. Marine pollution is commonly happening at the port because there are shipping activities that happen there. There are many ships that go in and out of port every day and every year. So much pollution could happen at the port whether known to the administration or unknown. These case studies help us to implement a method for the minimization of marine pollution at Johor Port and minimize the effect on the marine life at Johor Port. Recent years have seen a growing interest in the environmental impact of port operations and development due to pressing global issues such as climate change and energy consumption.

The port industry is facing increasing challenges since it is subject to closer scrutiny in terms of environmental regulatory compliance. Hence, a sustainable port operation is inevitable to long term sustainability of the port industry. An ability of the port operations to design and implement business strategies which meets not only current but also future needs of the port and its stakeholders without creating harm to human and nature while keeping an optimal balance between business performance and minimal impact to environment explains a sustainable port operation. Johor Port Berhad (JPB) is one of the busiest ports in Asia. In Malaysia, emission inventories for air pollutants and systematic data for the use of scientific

community is rather scarce. Usually, emission inventories of air pollutants have been made on port mainly for general administrative and public information. Besides, data containing emissions gaseous in ports that can act as a baseline to improve and enhance the air quality are hardly found. Johor Port Berhad (JPB) is also the biggest port for palm oil and the probability for the oil to spill into water is high and will make the water pollute. The oil spill is dangerous to the marine life near Johor Port.

The study will be focusing on identifying what type of pollution and what are the main reasons for the pollution to occur every year at Johor Port from and make an analysis based on the result. Next is to implement methods for minimization of pollution at Johor Port and the effect on Marine life. Finally, is to analyze the type of port activities that could cause marine pollution, efforts applied by the port in minimizing marine pollution.

The study helped the port to maintain the water from polluted by the ships and help the marine life to survive now and in the future. This study exploited the main reasons for the pollution happened at the and causes the pollution.

2.0   LITERATURE REVIEW

Literature is very important in producing a study. The literature review is one of the investigations of previous research by other researchers on the study of marine pollution at port. The purpose of this study is to know what the environmental effects are, accidents happen around the port and cause marine pollution. This study also helps us to develop a method and recommendation for ports to act strictly when comes to marine pollution near their port.

The trading world is managed by cargo for the raw material shipments such as sand, iron ore, and cement. These raw materials are much easier to carry by cargo ships because they carry in a large quantity. The trading activity needs the seaport for the completion of the need for ships to berth and unload the cargo. Thus, port activity plays a crucial role in the global economy [1]. The port activities are categorized by numerous complicated ventures as contrasted to the other logistic node [2].

3.0   RESEARCH METHODOLOGY

Methodology method is more than just the approach one plans to use to collect evidence. An analysis of the principles and the hypotheses that underline the idea is always important. The study approach is very significant for achieving the purpose of this report, because it demonstrates a systematic move in finishing the research project. This chapter addresses the usage of approaches to apply the study result focused on emphasis on analytical analysis. The contribution of the project is depicted in Figure 1.
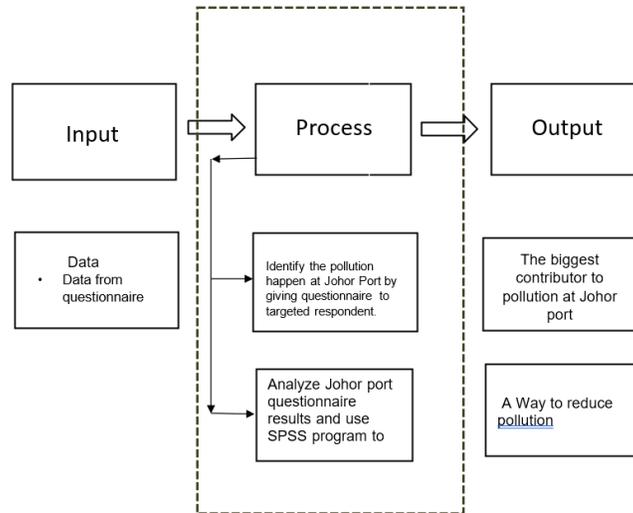
Figure 1: Main research activities to contribute for marine pollution atJohor Port survey.

The methodology of the study is important so that the research carried out has the most appropriate and effective method of solving research problems. Moreover, the method of study being designed involves the study design, the subject or study samples, research procedures, data collection procedures and procedures data analysis.

This study uses SPSS software to develop data analysis from the respondents near Johor Port and the workers there. They are given the questionnaire to fill out, and the data will be collected and be put in the SPSS software. The program will run an analysis, the mean, standard deviation, and normality test based on the result.

4.0   RESULTS AND DISCUSSION

Identifying the importance of marine ecosystems and the significance of minimizing marine pollution. Thus, the section showed the primary and secondary data to explain why this issue is crucial for the health of the oceans and marine life. Based on Table 1, the study uses Cronbach's alpha table to see the reliability of this survey whether it is acceptable or poor. Thus it will minimize marine pollution on marine life.

Table 1: This study uses Cronbach's alpha table to see the reliability of this survey whether it is acceptable or poor.

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Table 2: Frequency analysis for section a survey

	N	Minimum	Maximum	Mean	Std. Deviation
Gender	362	1	4	1.38	.486
Age	362	1	4	1.65	.624
Race	362	1	4	1.29	.636
Organization	362	1	4	2.34	1.140
Working Experience	362	1	4	1.70	.536
Valid N (listwise)	362				

Table 2 above shows the frequency analysis for section A survey. The result shows that all respondent (362) answer the survey correctly and had no error. The mean for gender are 1.78 and the standard deviation are 0.486. For the age, the mean are 1.65 and the standard deviation are 0.624. The mean for the race are 1.29 and the standard deviation are 0.636. For the organization, the mean are 2.34 and the standard deviation are 1.140. Last but not least, the mean for working experience are 1.70 and the standard deviation are 0.536.

Table 3: gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1	224	61.9	61.9	61.9
2	138	38.1	38.1	100.0
Total	362	100.0	100.0	

Table 3 above shows the gender of the respondent. For male the frequency of the respondent who answer the survey are 224 and the female are 138.

Table 4: age

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	156	43.1	43.1	43.1
2	179	49.4	49.4	92.5
3	26	7.2	7.2	99.7
4	1	.3	.3	100.0
Total	362	100.0	100.0	

Table 4 shows that the ages of the respondents do not all fall into the same category.18 to 28 years old (1), 29 to 39 years old (2), 40 to 50 years old (3), and 55and older (4) are the ages of the 362 respondents who provided input (4).

Table 5: race

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	292	80.7	80.7	80.7
2	38	10.5	10.5	91.2
3	30	8.3	8.3	99.4
4	2	.6	.6	100.0
Total	362	100.0	100.0	

The responders, who are local residents near Johor Port and the workers of JohorPort at Pasir Gudang, are outlined in table 5 above according to their race. According to the findings of the analysis, the majority of respondents were of Malay (1) origin, making up 80.7% of the total number of respondents.

Table 6: Organization

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	88	24.3	24.3	24.3
2	168	46.4	46.4	70.7
4	106	29.3	29.3	100.0
Total	362	100.0	100.0	

According to the data that was analyzed for the organization that responded at the table 6 thatmay be found above. According to the data in table 6, the largest number of respondentscame from the non-government sector (2), which totaled 168 people and accounted for 46.4% of the total.

Table 7: Working experience.

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
1	118	32.6	32.6	32.6
2	238	65.7	65.7	98.3
3	2	.6	.6	98.9
4	4	1.1	1.1	100.0
Total	362	100.0	100.0	

The table 7 presents the working experiences that respondents had while working at the Johor Port, Pasir Gudang. It has come to light that most of the respondents had held theircurrent jobs for between one to five years (2). This is due to the fact that 65.7% of respondents, which is equivalent to 238 respondents, claimed to have worked for almost 1to 5 years or more.

Table 8: Research Objective 1

	Mean	Std. Deviation	N
Type 1	4.66	0.550	362
Type 2	4.69	0.527	362
Type 3	4.23	0.530	362
Type 4	4.45	0.657	362
Type 5	4.34	0.664	362
Type 6	4.62	0.570	362
Type 7	4.23	0.547	362
Type 8	4.21	0.540	362
Type 9	4.48	0.596	362

Nine questions taken from the questionnaires are shown in the table 8 that can be found above. According to table 8 that can be found above, the mean and standard deviation for each question is related to the type of marine pollution at port and the main reason for the pollution to occur.

Table 9: Research objective 2

	Mean	Std. Deviation	N
Strategy 1	4.17	0.540	362
Strategy 2	4.14	0.612	362
Strategy 3	4.24	0.501	362
Strategy 4	4.27	0.624	362
Strategy 5	4.21	0.490	362
Strategy 6	4.26	0.521	362
Strategy 7	4.31	0.588	362
Strategy 8	4.22	0.503	362
Strategy 9	4.41	0.604	362

The results of obtaining the mean and standard deviation for each question are presentedin the table 9 that can be found above. The questions come from the second section of the questionnaire, which focuses on strategies of port to avoid marine pollution from occurringat port.

Table 10: Test of normality

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Type 1	362	100.0%	0	0.0%	362	100.0%
Type 2	362	100.0%	0	0.0%	362	100.0%
Type 3	362	100.0%	0	0.0%	362	100.0%
Type 4	362	100.0%	0	0.0%	362	100.0%
Type 5	362	100.0%	0	0.0%	362	100.0%
Type 6	362	100.0%	0	0.0%	362	100.0%
Type 7	362	100.0%	0	0.0%	362	100.0%
Type 8	362	100.0%	0	0.0%	362	100.0%
Type 9	362	100.0%	0	0.0%	362	100.0%
Strategy 1	362	100.0%	0	0.0%	362	100.0%
Strategy 2	362	100.0%	0	0.0%	362	100.0%
Strategy 3	362	100.0%	0	0.0%	362	100.0%
Strategy 4	362	100.0%	0	0.0%	362	100.0%
Strategy 5	362	100.0%	0	0.0%	362	100.0%
Strategy 6	362	100.0%	0	0.0%	362	100.0%
Strategy 7	362	100.0%	0	0.0%	362	100.0%
Strategy 8	362	100.0%	0	0.0%	362	100.0%
Strategy 9	362	100.0%	0	0.0%	362	100.0%

A normality test, as shown in Table 10, is used to verify whether or not the population from which a sample of data was collected was normally distributed. It is often carried out for the purpose of determining whether or not the data involved in the research have a normal distribution. The Kolmogorov–Smirnov test and the Shapiro–Wilk test, which are both well-known normality tests, are the two approaches that are utilized the most frequently in order to determine whether or not the data are normally distributed. The SPSS programmed, version 20, was utilized in the analysis of these test results.

5.0   CONCLUSION AND RECOMMENDATION

In conclusion, marine pollution at ports is a serious environmental problem that has to be addressed right away with workable solutions. In summary, the causes, effects, and potential solutions for marine pollution in port regions was throughout the previous project. It is then, discovered a number of sources of marine pollution at ports, including insufficient waste management procedures, cargo handling activities, vessel operations, and port infrastructure. These operations cause the release of pollutants into the maritime environment, including oil spills, chemical contaminants, plastics, and untreated wastewater, which has detrimental ecological effects. The negative effects of marine pollution at ports are numerous and extensive. It poses a serious risk to marine ecosystems by destroying habitats, reducing biodiversity, and interfering with natural processes. Pollutant buildup in the ocean can have hazardous consequences on marine creatures, resulting in hampered growth, weakened immune systems, and even demise. Additionally, coastal

populations who depend on marine resources for their livelihoods, such as the fishing and tourist sectors, are impacted by marine pollution at ports. The negative effects of marine pollution at ports are numerous and extensive. It poses a serious risk to marine ecosystems by destroying habitats, reducing biodiversity, and interfering with natural processes. Pollutant buildup in the ocean can have hazardous consequences on marine creatures, resulting in hampered growth, weakened immune systems, and even demise.

Regarding the recommendation, the respondent strongly suggests that Port administrations should implement and enforce strict environmental rules that handle numerous port operations issues, such as vessel emissions, ballast water management, trash disposal, and handling of hazardous materials. To maintain uniformity and efficacy, these policies should be in line with international norms and standards. Promote Sustainable Practises at port in order to encourage port operators, shipping corporations, and other stakeholders to adopt sustainable practises, ports should do so. This can involve the use of alternative fuels as well as the use of cleaner technology, such low-emission ships and port machinery. Environmental effect can also be minimised by promoting energy-saving practises and the use of renewable energy sources in port infrastructure.

Ports also should have reliable waste management systems to guarantee that garbage is handled, treated, and disposed of properly. This entails the construction of sufficient wastewater treatment facilities, recycling infrastructure, and garbage collecting facilities. The maritime environment may be kept clean by enforcing rigorous limits on the discharge of contaminants, such as chemicals and oil. Ports should work with the appropriate authorities and emergency response teams to build thorough spill response strategies. These plans have to specify precise steps for a quick and efficient reaction in the case of an oil spill or the discharge of another hazardous chemical. To maintain readiness and cooperation among key stakeholders, regular drills and training exercises should be held.

Encourage environmental reporting and monitoring, such as for the purpose of locating pollution hotspots and evaluating the efficacy of pollution mitigation measures, it is essential to establish rigorous monitoring programs to evaluate water quality, air emissions, and other environmental factors. Regularly disclosing environmental performance can increase accountability and transparency. Collaboration between port administrations, business organizations, governmental organizations, academic institutions, and local communities should be encouraged by ports. The creation and use of efficient pollution control methods can be facilitated through the exchange of best practices, experiences, and technical developments.

Public education programs can inform travellers, residents, and port users about the value of marine preservation and the effects of marine pollution. To actively engage the public in pollution prevention initiatives, promote appropriate trash disposal methods, discourage the use of single-use plastics, and host community clean-up events. It's also important to support ongoing efforts to find innovative techniques, plans, and methods for reducing marine pollution at ports. The industry can change for the better by sponsoring pilot projects that show the viability and efficacy of new pollution reduction techniques and investing in innovation. Ports can considerably decrease marine pollution, safeguard ecosystems, and support the sustainable development of coastal regions by putting these ideas into practice.

REFRERENCES

[1]   Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of Convenience Sampling and Purposive Sampling. American Journal of Theoretical and Applied Statistics, 5, 1-4. Prevention of Pollution by Sewage from Ships. (n.d.).

[2]   Iduk, U., & Samson, N. (2015). Effects and solutions of marine pollution from ships in Nigerian waterways. International Journal of Scientific and Engineering Research, 6(9), 81-90

[3]   Krushelnytska, O. (2018). Solving Marine Pollution: Successful models to reduce wastewater, agricultural runoff, and marine litter (No. 130154, pp. 1-40). The World Bank.

[4]   Ishak, I. C., Kamaruzaman, K. Z., & Ramli, M. K. THE IMPACT AND CONTROL STRATEGIES TOWARDS MARINE POLLUTION: A CASE STUDY AT A PORT

[5]   Ivanov, A. (2019, November 21). Effects of Water Pollution on Marine Life. Simply Eco Store

[6]   Chiu, R.-H., Lin, L.-H. and Ting, S.-C. (2014) Evaluation of Green Port Factors and Performance: A Fuzzy AHP Analysis. Mathematical Problems in Engineering, 2014.

[7]   McLeod, S. A. (2019). Likert Scale Definition, Examples and Analysis. Simply Psychology.

[8]   Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative Content Analysis. SAGE Open, 4(1), 215824401452263.