

PAPER • OPEN ACCESS

Community Preparedness on Transboundary Oil Spill Governance in Bintan Island

To cite this article: Dhani Akbar *et al* 2020 *J. Phys.: Conf. Ser.* **1655** 012144

View the [article online](#) for updates and enhancements.

You may also like

- [Potential of Sea Passenger Movement Post Ports Development in Kepulauan Seribu](#)
K Mahardika
- [An institutional analysis of the trans-national marine waste: a case study of sludge oil in Bintan seawater, Kepulauan Riau, Indonesia](#)
W E Yudiantmaja, Yudithia, T Samnuzulsari et al.
- [Marine education for coastal and city youth](#)
Tuty Handayani, Riani Widiarti and Elgodwistra Kartikoputro



244th Electrochemical Society Meeting

October 8 – 12, 2023 • Gothenburg, Sweden

50 symposia in electrochemistry & solid state science

▶ Deadline Extended!
Last chance to submit!

New deadline:
April 21
submit your abstract!

Community Preparedness on Transboundary Oil Spill Governance in Bintan Island

Dhani Akbar¹, Azhari Setiawan², Rendi Prayuda³, Ardi Putra⁴, Ariski Aznor¹, Wayu Eko Yudiatmaja⁵

¹International Relations Department, Faculty of Social and Political Science, Universitas Maritim Raja Ali Haji. Jl. Raya Dompok, Tanjungpinang, Kepulauan Riau Province. 29111. Indonesia

²International Relations Department, Faculty of Social and Political Science, Universitas Abdurrab. Jl. Riau Ujung No. 73. Pekanbaru. 28291. Indonesia

³International Relations Department, FISIPOL, Universitas Islam Riau. Jl. Kaharuddin Nasution No 113 Marpoyan, Pekanbaru. Riau Province. 28125. Indonesia

⁴Political Science Department, Faculty of Social and Political Science, Universitas Maritim Raja Ali Haji. Jl. Raya Dompok, Tanjungpinang, Kepulauan Riau Province. 29111. Indonesia

⁵Public Administration Department, Faculty of Social and Political Science, Universitas Maritim Raja Ali Haji. Jl. Raya Dompok, Tanjungpinang, Kepulauan Riau Province. 29111. Indonesia

akbardhani@umrah.ac.id

Abstract. The waters of the Kepulauan Riau have a strategic position, the entry and exit point of the Malacca Strait and connecting Middle Eastern which known as oil producer countries regions and East Asian Industrial countries. The main role to guard the environment and implement the government policies is the local community in the border area. This study applied quantitative method to investigate public perceptions towards oil waste-related issues by identifying knowledge, attitude, perception about impact and future condition foreseeing, attribution of responsibility, political perception, and political attitudes. KMO Measure of Sampling value is greater than .5 (KMO = .672) and indicates the research instrument was meritorious and statistically significant ($<.001$). In term of political perception and attitude, we found a high positive correlation (Pearson's $R=.700$, $p=<.001$) between the two variables. High score in attribution of responsibility to TNI indicates a potential further analysis on behalf of securitization theory from Copenhagen School of International Security and International Relations. Respondents tend to believe and demand that security sector must take a major role within the issues since a normal political process was perceived to be not quite enough to overcome the problems. It means that securitization will be perceived to succeed in the bilateral or trilateral framework instead of multilateral one.

1. Introduction

According to Ishak et al [1], the sea transport has a great risk which affects the condition of the sea and sea life in the event of oil spilled by the shipping activities. However, Haryono et al [2] said that marine oil spill pollution was impacted to water quality and extreme impact to the level of tropic marine organisms, the existence of the fish resources are very urgent to be study with regard to the availability of food, especially the fish resources of high economic value. In addition, Li et al [3] argued that the oil spilled into the sea not only wastes scarce oil resources, causing huge economic



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

losses, but also severely damages the marine ecological environment. Therefore, an effective and timely governance and management of coastal marine ecosystems is fundamentally important for maintaining the valuable functions and services they provided, as stated by Lu et al [4].

The estimate for the amount of oil entering the world's marine environment is about 2.4 million tonnes per year, with yearly variations depending on the frequency of oil spills. Sources of oil pollution include natural seeps and anthropogenic sources such as discharges from storage facilities and refineries, discharges and deballasting activities from tankers and other vessels, accidental oil spills and pipeline ruptures, stated by Tong et al [5]. The waters of the Kepulauan Riau have a strategic position. This is because Kepulauan Riau water position is the entry and exit point of the Malacca Strait and connecting Middle Eastern which known as oil producer countries regions and East Asian Industrial countries such as China, Korea, Japan and Taiwan. The main commodity in trade that crosses the waters of the Riau Archipelago is petroleum which originates from the Middle East with destinations in East Asia, stated by Qu et al [6]. This make Kepulauan Riau' waters are often polluted by oil valleys that damage the marine ecosystem in the Kepulauan Riau.

Oil spill in generally caused by accidents such as ship collisions or crushed by sea corals. This is due to the heavy traffic of ships crossing the Straits of Malacca and shallow sea in the waters of the Kepulauan Riau. Oil spills due to ship accident generally release large amounts of oil spills. Other sources of marine oil spills are derived from deliberate oil spills from tankers cleaning activities. Many tankers use illegal oil cleaning services because they are cheaper than legal ones. After the tanker has cleaned up its remaining oil, the tanker can enter Singapore without the threat of fines or other additional costs. However, the organizers of illegal oil cleaning services will dispose of their oil in secret in order not to be caught by the authorities and law enforcement. In contrast to oil spills resulting from accidents, oil spills resulting from deliberate illegal oil disposal are difficult to account for because of the difficulty of identifying the perpetrators. When compared with oil spills due to accidents, the responsible party will be asked for fines along with compensation for oil clean up and its impact on the community around the coast.

The impact of oil spill in the sea threatens the marine ecosystem in the waters of Kepulauan Riau and also threatens the livelihood of Bintan People especially fishermen. Oil waste also threatens the tourism sector of Kepulauan Riau Province, which relies on maritime tourism. In other words, the oil spill has a serious impact not only on marine ecosystems but also Kepulauan Riau citizens who rely on the fisheries and tourism sectors as a source of livelihood. The main role to keep the environment and implement the licies and regulations of government is the local community. Therefore, this preliminary analysis based on survey to the people of Bintan, as the region impacted the most, is important to be explored and discussed in order to assess the preparedness to fight against the marine pollution, especially oil spill in Kepulauan Riau waters.

2. Methodology

This study applied quantitative method to investigate public perceptions towards oil waste-related issues. Our data are collected through survey by distributing questionnaires to 100 respondents determined through clustered random sampling. Polls are public survey conducted in July 2020. The surveys were administered in Bintan Island, Kepulauan Riau Province for less than one month. In total, 100 surveys were administered providing 100% of total sample size. Surveys were administered in pencil-and-paper format via an interview method. We were assisted by 10 trained research assistants (RAs) who administered the surveys to participants in the location and the whole process of the surveys were supervised by the authors. After the surveys were administered, RAs sent the questionnaires to 1 of the authors—as survey coordinator—who in charge for collecting data and create the dataset for the analysis. Collected data was coded numerically to obscure identifying information on participants. We also used correlation analysis to see whether there is any significant relation between certain variables based on the descriptive statistics that we have run.

In this study, we identify knowledge, attitude, perception about impact and future condition foreseeing, attribution of responsibility, political perception, and political attitudes. Moreover, we arrange indicators for each variable. Socio-demographic variable consists of gender, job/occupation, income, and number of dependent(s). Knowledges include seven indicators, attitude includes six indicators, each impact and future condition foreseeing include three items, attribution of responsibility includes twenty items, political perception with seven items, and political attitude with eight items.

Table 1. Kaiser-Meyer-Olkin measure and factor analysis

<i>KMO and Bartlett's Test</i>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.672
Bartlett's Test of	Approx. Chi-Square	3914.171
Sphericity	df	1540
	Sig.	.000

KMO Measure of Sampling value is greater than .5 (KMO = .672) and indicates the research instrument was meritorious and statistically significant (<.001). With value that was less than 0.50, the results of the factor analysis will be useful with the data. We also examine the 56 items that were used in the research instruments with reliability analysis with 40 respondents for pilot test. The test showed reliable with 0.918 Cronbach's Alpha value. 56 items of the instruments were adequate to proceed with further analyses.

Table 2. Reliability analysis using IBM SPSS 26

<i>Reliability Statistics</i>	
Cronbach's Alpha	N of Items
.918	56

3. Results and Discussion

3.1. Characteristics of Respondents

Research respondents more likely to be male (71.4%). Majority of respondents are student (32.1%), some work in fishery sector (28.6%) while the others work as private sector employee (11.9%), freelancer (6%), housewives (4.8%), laborer (2.4%), local government (2.4%), and state//government employee (1.2%). 47.6% respondents were living alone, while others have 2 dependents (17.9%), 3 dependents (13.1%) and more than 3 dependents (21.4%).

In term of income, 33.3% of the respondents make less than one million rupiah per month. 13.1% make one to two million rupiah per month, 33.3% make two to three million rupiah per month, and 21.4% make more than three million rupiah per month.

3.2. Knowledge and Attitude

Knowledge was the first items that were asked to the respondents, after socio-demographic. We delivered seven trivia questions regarding the oil waste related issues. We gave 'Yes' and 'No' questions with 'Don't Know' choice as well. All the answered were coded with correct for true answers and incorrect for false and don't know answers. These items indicate how well-informed and/or insightful respondents regarding the issues.

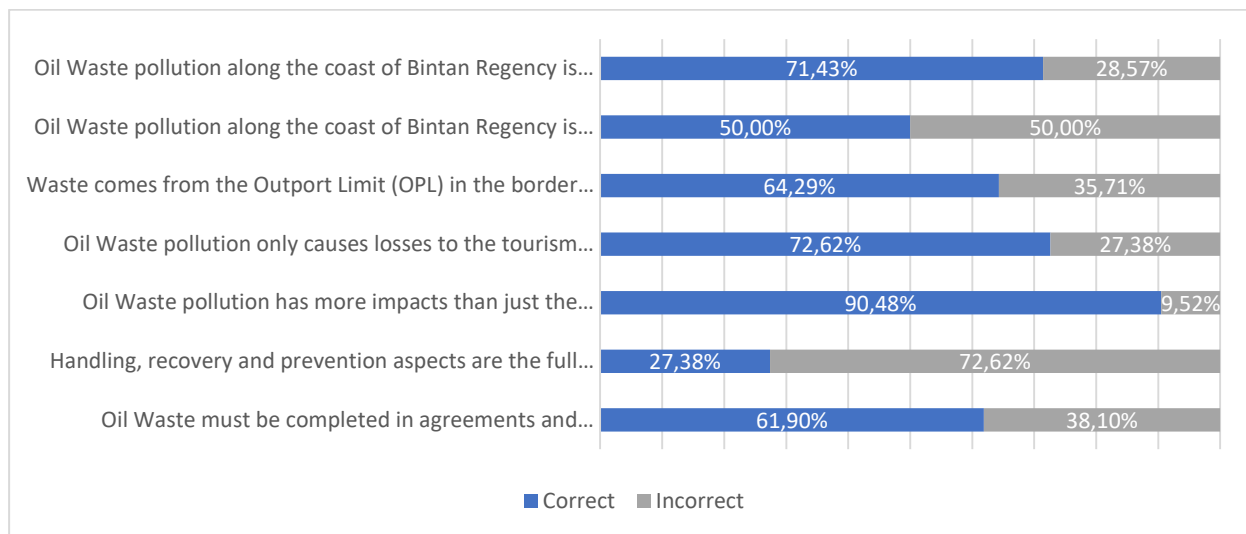


Figure 1. Knowledge on oil waste related issues

As can be seen in the Figure 1, 71.43% respondents know that Oil Waste pollution along the coast of Bintan Regency is annually during the North season. Half of the respondents were split regarding the intention aspect of Oil Waste pollution. Half of the respondents still believe that oil waste pollution along the coast of Bintan Regency was a natural case. 64.29% of the respondents know that the issue is an international issue involving Indonesia, Singapore, and Malaysia. 72.62% of the respondents also know that oil waste pollution is not only about damaging the tourism, but also the others. Despite most of respondents know the issues involve international actors, many of them (72.62%) still believe that this issue was a full responsibility of the regional government instead of national and international actors. However, 61.90% of the respondents understand this issue must be completed with agreements and cooperation between countries.

From our survey, Bintan communities affected by Oil waste strongly agree that oil waste threatens health as much as 34.52% and agrees as much as 40.48%. The local community also strongly agreed to want to be proactive from the community as much as 30.95% and 54.76% agreed. The people of Bintan, 38.10%, agreed and 29.76% agreed that they were worried about waste oil every day.

We also analyze to what extent the knowledge was associated with attitude. While knowledge refers to the understanding, attitude refers to the feelings about the subject or issues. To explore this relation, we ran a correlation between the knowledge and attitude. There was no significant relation between both variables (Pearson's $r = -.172$, $p = .119$). It means that knowledge does not necessarily lead to such attitude regarding the oil waste issues among the respondents. When we analyze deeper to each item, we found correlation between Know7 and Attit1 (Pearson's $r = .235$, $p = .031$), Attit2 (Pearson's $r = .289$, $p = .008$), Attit3 (Pearson's $r = .227$, $p = .038$), Attit5 (Pearson's $r = .226$, $p = .039$) and Attit6 (Pearson's $r = .251$, $p = .021$). Respondents who feel afraid of their health and security as well as their loved ones, sad with polluted nature condition, think it should take protective and proactive against pollution, feel haunted/imagined and even feared for next/upcoming pollution, at the same time, know and believe Oil waste management must be completed with agreements and cooperation between countries.

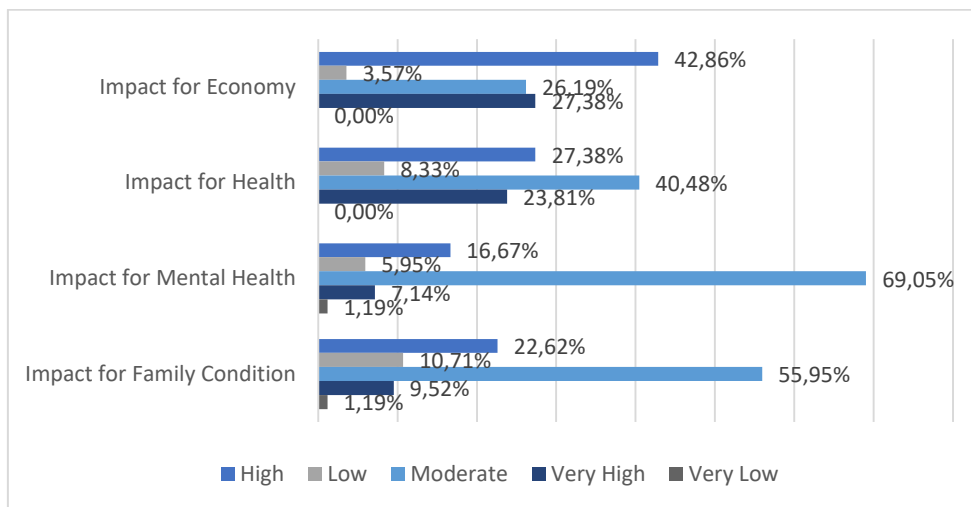


Figure 2. Current impact perspectives on several conditions related oil waste issues

Consistency with the impact section, economy was rated with 36.90% saying much worse and 34.5% saying somewhat worse. The others were rated as ‘same as now’ with various percentage above 50%. Most of the respondents were worried about their economic condition and were pessimistic about its future since they perceived there will be no any significant change in the future. Below 4% believed that they will have a better condition in the future in term of economy, below 2% in term of health, mental health, and family condition.

Bintan people who live on the coast which are the most affected by oil waste. Based on our survey, 42.86% agreed that waste oil has a bad impact on the economy. This is because most residents on the coast depend on fisheries and tourism as a source of income. However, coastal communities doubt the impact of oil waste on health (40.48%), mental health (69.05%), and family conditions (55.95%).

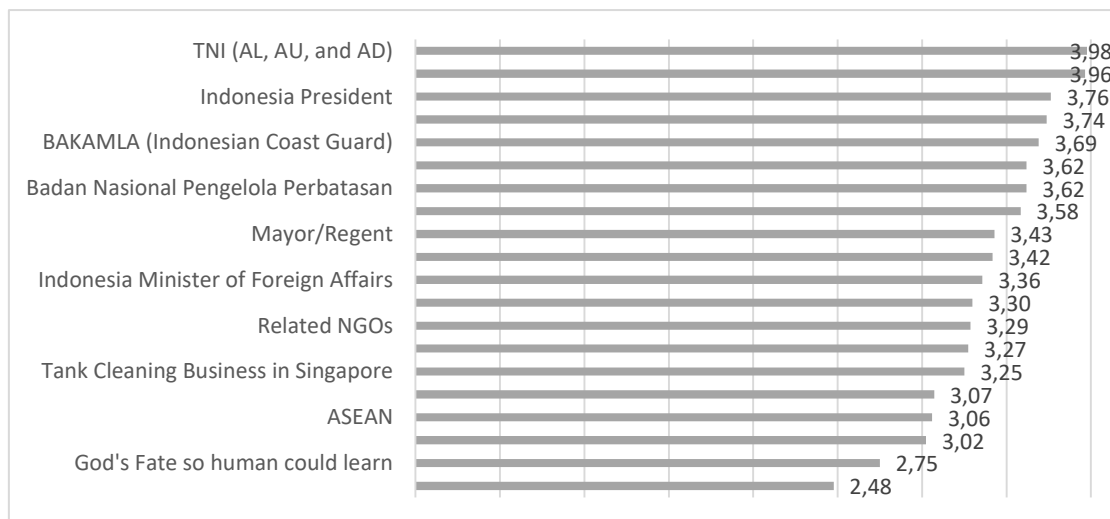


Figure 3. Attribution of responsibility

3.3. Political Perception and Attitude

As can be seen in the following figure 4, the majority of Bintan people who are affected by waste oil want a regional head candidate who has a solution and an idea of the handling problem of oil waste (48.18%) and has high hopes for the candidates chosen in the election for handling oil waste (41.67%). However, the majority of people affected by neutral oil waste regarding the views of whether the

President (54.67%), the Governor (51.19%) and the Regent (50%) successfully handled the problem of waste oil well.

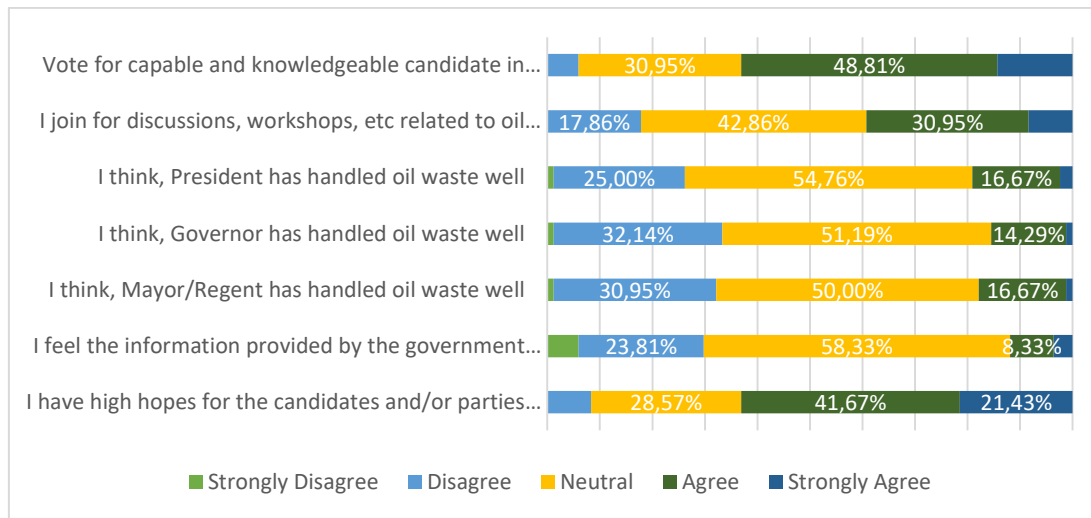


Figure 4. Political perception

As can be seen in fig. 5, Bintan people who are affected by oil waste are optimistic about supporting government policies (45.24%) even though they do not feel close to political parties and politicians (41.67%), but on the other hand the majority of neutral citizens are optimistic if their voices are heard by the government (52, 38%), neutral that trust in politicians and central and regional government (50%).

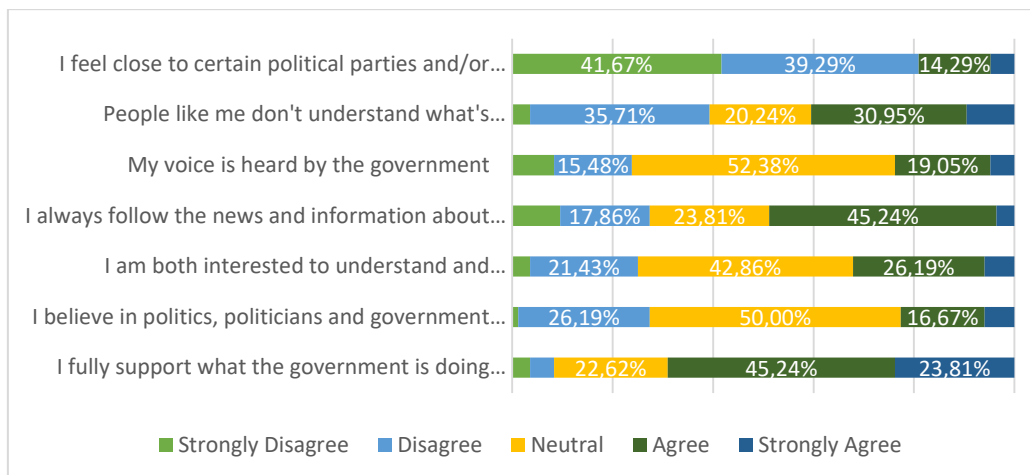


Figure 5. Political attitude

In term of political perception and attitude, we found a high positive correlation (Pearson’s $R=.700$, $p<.001$) between the two variables, see Fig. 6. Respondents who agree to vote for capable and knowledgeable candidate in term of waste pollution management, think President, Governor, and Mayor/Regent have done a good job, feel government is transparent, and have high hopes for candidates and/or parties that they have chosen in the election, will likely to feel close with certain political parties and/or politicians, aware with what is happening in politics and government, feel their voice were heard by government, follow the news, interested to understand and participate in politics

and government, believe in it, and fully support the government regarding the oil waste governance and pollution management.

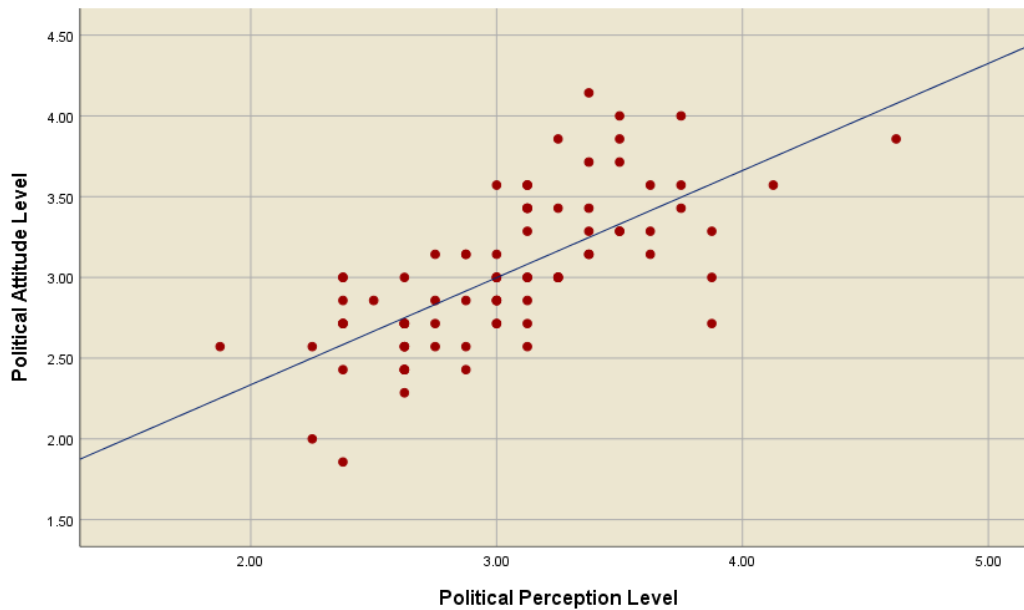


Figure 6. Correlation plot between political perception and attitude level

4. Conclusion

High score in attribution of responsibility to TNI indicates a potential further analysis on behalf of securitization theory from Copenhagen School of International Security and International Relations. Respondents tend to believe and demand that security sector must take a major role within the issues since a normal political process was perceived to be not quite enough to overcome the problems. This high score was not correlated with Indonesia Minister of Defense which is in the medium score range.

Even though respondents believe in agreements and cooperation between other countries (i.e. Singapore and Malaysia), ASEAN has low score related to attribution of responsibility, even below the Higher Education institution, Indonesia Minister of Defense, and Indonesia Minister of Foreign Affairs. It means that securitization will be perceived to succeed in the bilateral or trilateral framework instead of multilateral one. Business sector was in the medium range of attribution of responsibility score. Singapore Prime Minister was considered to be more responsible than Malaysia Prime Minister.

In regard to politics, a positive political perception will lead to a positive political attitude. Regarding these political aspects, 91.7% of the respondents took part in the last 2019 election and will take part in the upcoming 2020 local election. By this number of responses, people who aware with the oil waste issues, are potential voters for the upcoming 2020 local election. It was also associated with the knowledge aspect that respondent believe that regional or local government has full responsibility to manage and handle the oil waste related issues.

Prevention, reduction and control enforced along with International Act should be applied, as the Merchant Shipping Act 1998 and International Fund for Compensation for Oil Pollution Damage 1992, which both are related to the pollution of the sea and pollution from ships, stated by Hananto [7] The mode of third-party governance over environmental pollution proposed all enterprises are classified as the pollution emitters and controllers. Implementation mechanism is proposed to promote the efficiency of pollution control and regularize the environmental protection service offered by the third-party enterprise. Bingsheng et al found [8] remote sensing technology has the characteristics of high efficiency, timely, large-scale monitoring, and has great application value in monitoring areas such as oil spills on the sea, stated by Ning et al [9].

References

- [1] Ishak I C, Ishak N A L, Ali N M, and Ishaisa A S N I 2020 A study on preparedness and response of oil spill *J. Phys. Conf. Ser* **1529(3)** 1-10
- [2] Haryono F E D, Ambariyanto, and Sulistyio I 2018 Sex diversity approach of spiny lobster (panulirus spp) to marine oil spill pollution in southern waters of java *IOP Conf. Ser. Earth Environ. Sci* **116(1)** 1-9
- [3] Li K, Yu H, Yan J, and Liao J 2020 Analysis of offshore oil spill pollution treatment technology *IOP Conf. Ser. Earth Environ. Sci* **510** 1-6
- [4] Lu Y, Yuan J, Lu X, Su C, Zhang Y, Wang C, Cao X, Li Q, Su J, Ittekkot V, Garbutt R A, Bush S, Fletcher S, Wagey T, Kachur A and Sweijd N 2018 Major threats of pollution and climate change to global coastal ecosystems and enhanced management for sustainability *Environment Pollution* **239** 670–680
- [5] Tong S L, Goh S H, Abdulah A R, Tahir N M and Wang C W 1999 ASEAN marine water quality criteria for oil and grease *ASEAN-Canada CPMS-II AMWQC Oil Grease Coop. Program. Mar. Sci* 1–28
- [6] Qu X and Meng Q 2012 The economic importance of the straits of malacca and singapore: an extreme-scenario analysis *Transp. Res. Part E Logist. Transp. Rev* **48(1)** 258–265
- [7] Hananto P W H 2019 Current developments of legal instruments to prevent and control of pollution in the straits of malacca *Administrative Law and Governance Journal* **2(4)** 721–732
- [8] Bingsheng X, Ling L, Jin H, Geng W, Jianhua C, Shuo Y and Huiting G 2017 Performance evaluation on air pollution reducing facilities and mechanism research on the third-party governance on environmental pollution *IOP Conf. Ser. Earth Environ. Sci* **94(1)** 1-9
- [9] Ning J L, Chen Z L, Wang C Y and Xie W J 2018 Analysis of marine oil spill pollution monitoring based on satellite remote sensing technology analysis of marine oil spill pollution monitoring based on satellite remote sensing technology *IOP Conf. Ser. Mater. Sci. Eng* **392** 1-6

Certificate

Awarded to:

No:B/2482/UN19.5.1.3/PT.01.06/2020



Dhani Akbar

Universitas Maritim Raja Ali Haji

as a Presenter entitled

Community Preparedness on Transboundary Oil Spill Governance in
Bintan Island



in

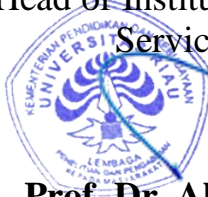
**Universitas Riau International Conference
on Science and Environment – 2020 (URICSE-2020)**



Institute of Research and Community Services
Universitas Riau

Pekanbaru, 12 September 2020

The Head of Institute of Research and Community
Services Universitas Riau



Prof. Dr. Almasdi Syahza, SE., MP
NIP 196008221990021002

Chair of the Conference



Prof. Dr. Nur Islami, S.Si., MT
NIP 197403221999031002



LPPM Universitas Riau
Meneliti, Berkarya dan Mengabdikan

