Research, Society and Development, v. 9, n.1, e75911651, 2020
(CC BY 4.0) | ISSN 2525-3409 | DOI: http://dx.doi.org/10.33448/rsd-v9i1.1651

A Aplicação Do Regulamento De Gestão Da Água De Lastro No Transporte Na Indonésia

The Application Of Ballast Water Management Regulation on Shipping In Indonesia

La Aplicación Del Reglamento De Gestión Del Agua De Balasta En El Envío En Indonesia

Recebido: 11/09/2019 | Revisado: 17/09/2019 | Aceito: 20/09/2019 | Publicado: 04/10/2019

Sereati Hasugian
ORCID: https://orcid.org/0000-0002-3671-5273
Merchant Marine Polytechnic Surabaya, Indonesia
E-mail: sereati9880@gmail.com
Sri Wahyuni
ORCID: https://orcid.org/0000-0002-8658-0178
Merchant Marine Polytechnic Surabaya, Indonesia
E-mail: deryaagung02@yahoo.com
Heru Susanto
ORCID: https://orcid.org/0000-0001-7060-1408
Merchant Marine Polytechnic Surabaya, Indonesia
E-mail: he_ro320@yahoo.com

Resumo

A Indonésia ratificou o regulamento de gerenciamento da água de lastro através do Regulamento Presidencial Número 132/2015 como um esforço para proteger as espécies marinhas, especialmente em áreas portuárias que devem ser implementadas até 2020. Este estudo teve como objetivo conhecer a implementação do gerenciamento da água de lastro, incluindo a tecnologia nos portos e incentivos para as empresas. Utilizaram-se questionários com perguntas fechadas relacionadas à implementação dos regulamentos de gerenciamento de água de lastro em uma micro perspectiva para coletar os dados. Método de escala Likert usado para descrever as condições de prontidão do setor de transporte que implementam a regulamentação do gerenciamento de água de lastro. O resultado mostrou a falta de preparação técnica da frota do navio e a necessidade de investimento. Além disso, as tripulações do navio estavam prontas para implementar este regulamento. Portanto, o papel do governo deve ser aprimorado novamente com várias ações que podem ser implementadas no curto prazo.

Palavras-chave: gerenciamento de água de lastro; regulação da Indonésia; indústria naval, tecnologia no porto.

Abstract

Indonesia has ratified the ballast water management regulation through Presidential Regulation Number 132/2015 as an effort to protect marine species, especially in port area that expected to be implemented no later than 2020. This study aimed to know the implementation of ballast water management including technology in ports and incentives for companies. Questionnaires with closed questions related to the implementation of ballast water management regulations in a micro perspective was used to collect the data. Likert scale method used to describe the conditions of shipping industry's readiness implementing ballast water management regulation. The result showed the lack of technical preparation of the ship's fleet and the need for investment. Moreover, the ship's crews were ready in implementing this regulation. Therefore, the role of the government must be improved again with several actions that can be implemented in the short term.

Keywords: ballast water management; Indonesia regulation; shipping industry; technology in port

Resumen

Indonesia ha ratificado la regulación del manejo del agua de lastre a través del Reglamento Presidencial Número 132/2015 como un esfuerzo para proteger las especies marinas, especialmente en el área del puerto que se espera implementar a más tardar en 2020. Este estudio tuvo como objetivo conocer la implementación del manejo del agua de lastre, incluida la tecnología en puertos e incentivos para empresas. Para recopilar los datos se utilizaron cuestionarios con preguntas cerradas relacionadas con la implementación de las regulaciones de gestión del agua de lastre en una micro perspectiva. Método de escala Likert utilizado para describir las condiciones de preparación de la industria naviera que implementa la regulación de gestión del agua de lastre. El resultado mostró la falta de preparación técnica de la flota del barco y la necesidad de inversión. Además, las tripulaciones del barco estaban listas para implementar esta regulación. Por lo tanto, el papel del gobierno debe mejorarse nuevamente con varias acciones que pueden implementarse a corto plazo.

Palabras clave: gestión del agua de lastre; regulación de Indonesia; industria naviera; tecnología en puerto.

1. Introduction

The numbers of Indonesian-flagged fleets sailing on international routes and berthing at Indonesian ports is 110 units (Perhubungan, 2012), but if added together the ships that conduct voyages with international routes are quite large and carry ballast water from waters with different characteristics that have the potential to impact the marine environment when exchange or deballast of ballast water without proper handling.

The government of Indonesia through Presidential Regulation no. 132 of 2015 has ratified the regulations of IMO regarding ballast water management for ships with international routes, one of which objectives is to protect the marine environment in Indonesia. The Indonesian government, through the Ministry of Transportation, has arranged several stages in implementing this regulation, the initial stages of implementing this regulation will be implemented in four major Indonesian ports including Belawan Port, Tanjung Priok Port, Tanjung Perak Port and Makassar Soekarno-Hatta Port. In regulation B-3.6 of the Ballast Water Management Convention, vessels carrying out ballast water exchange at the reception facility are not obliged to complete the vessel with ballast water handling equipment. Most ports in Indonesia do not have reception facilities due to various reasons, mainly due to cost problems. Therefore, the implementation of this policy on ballast water handling can only be done by adding vessel facilities by ship owners and providing reception facility services at ports by the government.

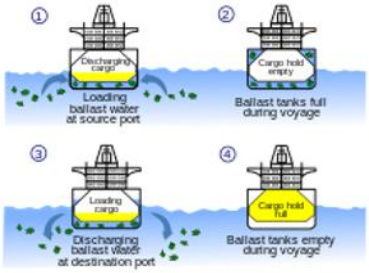
This policy will affect shipping companies because of the additional investment costs of equipment, installation and maintenance according to the requirements of the IMO which will affect the company's financial condition. Another problem faced is the condition of the ship and the knowledge of the crew and ground staff about ballast water management. From the regulator's side, it is necessary to have technical instructions regarding the implementation of ballast water management including technology in ports and incentives for companies that implement the Ballast Water Management. Thus, the objectives of the study is to describe the implementation of ballast water management including technology in ports and incentives for companies.

2. Literature Review

2.1. Ballast Water Management Regulation

Ballast system using water is an ideal system to maintain the balance and stability of the ship when the ship does not carry cargo. In this system, ballast water is pumped into tanks

that have been specially designed to carry ballast water. However, the disposal from ballast water throughout the world increases the risk of biological invasion of the environment. Microorganisms are transferred through water which has shown resistance to long-term voyage conditions. Therefore, ship ballast water has been identified as a major factor in the movement of these organisms over the past 90 years. This is what causes the need for ballast water management to minimize the movement of microorganisms from different waters. International Maritime Organization (IMO) has held a Ballast Water Management Convention as an initial step to protect the marine environment from harmful organism invasion since 2004. According to IMO's interpretation, every year ships in the world carry 3-5 trillion tons of ballast water and have the potential to damage the world's aquatic environment (Werschkun et al., 2014).



source: MaxxL, Wikipedia
Figure 1. Process of ballasting and deballasting

The Law No. 17 of 2008 on Shipping, Article 229 paragraph 1 states: “Each ship is prohibited from dumping waste, ballast water, dirt, garbage, and hazardous and toxic chemicals into the waters”. Whereas in government regulations through Government Regulation No. 21 of 2010 on Maritime Environmental Protection In Chapter 1 about General Provisions stated: "Tank vessels are closed rooms which are part of the fixed construction of vessels used to place or transport liquids in bulk including side tanks (wing tanks), fuel tanks (fuel tanks), central tanks (center tanks), ballast water tanks (water ballast tanks), dirty oil tanks (sludge tanks), deep tanks, bilge tanks (bilge tanks) and tanks that are used to load toxic liquid material in bulk."

Before the obligation to comply with this convention, seawater pollution due to ballast water can be done by means of ballast water exchange by deballasting ballast water as far as 200 nautical miles from the nearest land and with the depth of the sea as deep as 200 meters. However, after the adoption of the convention, the rules for ballast water exchange are no longer valid and ships must conduct ballast water management either by adding equipment on

board or by using facilities from the port (King & Hagan, 2013).

The ship must have a certificate and document related to the establishment of a system that is capable of handling ballast water on ships with minimum environmental impacts, which is appropriate as in the implementation instructions of this convention that ships measuring 400 GT and more must comply with the following rules (Karahalios, 2017):

1. Ballast Water Management Plan approved by class or flag
2. Having a Ballast Water Record Book
3. Surveyed and issued certificates related to International Ballast Water Management
4. Installing the Ballast Water Treatment System

This is expected to increase the demand for ballast water treatment system sex potentially (Jee & Lee, 2017).

2.2. Implementations and Facilities

The implementation of ballast water management consists of two standards, namely the D1 and D2 performance standards, the D1 performance standard is to conduct water ballast management using the ballast water exchange method, which is to exchange mid-ocean ballast water and D2 performance standards which are the use of ballast water treatment systems (ballast water treatment). Determination of the use of this performance is related to the limitation of the year of shipbuilding, because currently the convention of ballast water management has been ratified, the implementation of ship class surveys will now be carried out at the renewal of the survey, while for new ships and international shipping activities are required to install handling systems ballast water or use D2 performance (King & Hagan, 2013).

In determining the ballast water treatment equipment on the ship, the factor that must be considered is:

1. Ship characteristics and operational profiles include the amount of ballast water pumped each year;
2. Ballast water pump capacity;
3. Duration of water ballast inside ballast tanks (holding time);
4. Ballast water characteristics such as salinity and temperature;
5. Weight of ballast water handling equipment, because the weight addition from the ballast water installation will reduce the amount of cargo that can be transported by the ship.

3. Methodology

This research is a desk study combined with questionnaires with the Likert Scale method and interviews distributed with respondents from the operator side, both management and crew. The method used is a questionnaire using a Likert scale with a range of scales as follows:

0: does not know 2: negative 4: very positive

1: very negative 3: positive

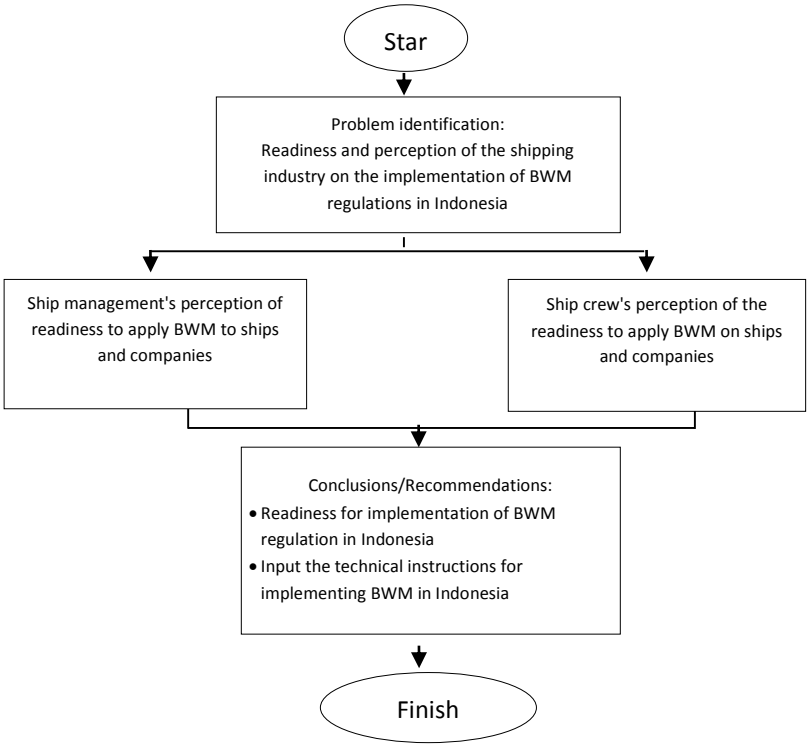
Likert method with 5 options starts from 1 (very negative), 2 (negative), 3 (positive), and 4 (very positive), and 0 as representation does not know, so the score interval is 25%. The score criteria are as follows:

Table 1. Likert Criteria

Score number	Criteria
0% - 24.99%	Very Negative
25% - 49.99%	Negative
50% - 74.99%	Positive
75% - 100%	Very Positive

Source: own study

The questionnaire was distributed online and offline to the respondents. Especially for management, discussions were held to determine the conditions and perceptions of the application of ballast water management in their respective companies. The closed question questionnaire method was used to determine the conditions for applying BWM in shipping companies according to the perceptions of the shipping company management. The questions submitted are related to the readiness of the company and the things supporting the implementation of BWM in the company or outside the company (regulator, port facilities). In general, the research plan can be seen in the flow chart below.



Source: own study
Figure 2. Flow of Research

Analysis includes:

1. Investigating the knowledge and readiness of all components of the shipping industry which aims to map current conditions using the questionnaire method with Likert scale analysis.
2. Investigate the readiness of the fleet in Indonesia with survey methods to sample ships and see physical conditions directly.
3. Investigating BWM investments in shipping companies.
4. Investigate obstacles to operator BWM rules. This investigation uses the questionnaire method and interviews with analysis using a Likert scale.

The results of the research are readiness maps for implementing BWM and recommendations regarding the implementation guidelines for BWM that are adapted to conditions in Indonesia. These instructions are short term.

4. Analysis And Discussion

4.1. Readiness Of Regulator

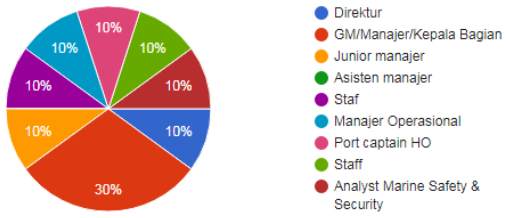
The government has ratified the ballast water management regulation (BWM) and will be implemented no later than 2020. For this reason, all supporting elements of the implementation of this rule are prepared in such a way, from technical instructions to supervision. Indonesian ships or ships from abroad will be examined by the marine inspector (PPKK) assisted by the PSC (PPKKA).

At present, the PSC is still limited to carrying out checks on certificates, management plans, and record books on board. The regulator also has not determined the coordinates of the BWM implementation, both the rules and location limits for the implementation of method D1. The Government in this case the Ministry of Transportation has also prepared an inspection report on the implementation of BWM as a guideline for officers to conduct supervision.

4.2. Application of Ballast Water Management

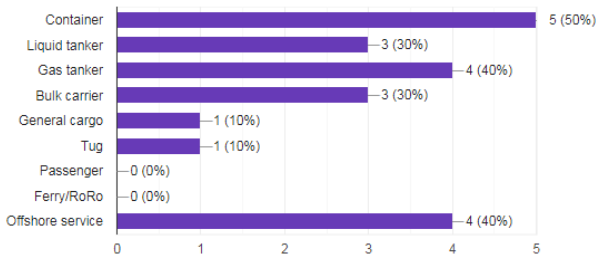
4.2.1. Perception of Shipping Company Management

The number of respondents from management is 10 people with various positions, namely as managers namely 30% and 10% for other positions.



Source: own study
Figure 2. Rank of Respondent

The respondent's company operates from one to more than one type of vessel. The proportion of vessels operated can be seen as follows:



Source: own study
Figure 3. Profile of the Ship

These vessels are operated by domestic or ocean-going routes. As many as 80% of respondent companies operate ships with domestic and ocean-going routes, while each 10% of respondent companies only operate ships with ocean going or domestic routes.

The discussion of the first question resulted in the fact that BWM must indeed be applied in Indonesia to meet international regulations (IMO - MARPOL), especially for ships sailing to and from abroad. Another reason is to avoid damaging the marine ecosystem in the port area. However, for domestic vessels, the respondents did not recommend applying this rule.

The questionnaire results of this question indicate that 40% of respondents answered strongly agree, 30% answered agree, 10% answered disagree, and as many as 20% answered strongly disagree. The index shows 72.5% with agreed (positive) criteria. So, these results can conclude that all respondents gave agreed criteria.

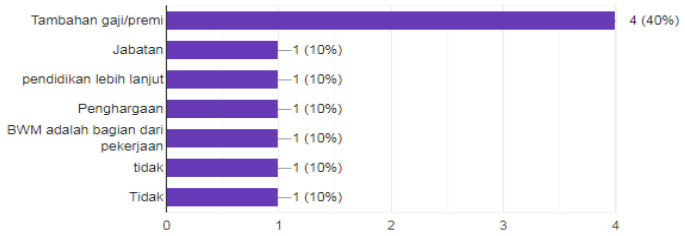
4.3. Impact of Impplementing Ballast Water Management

The second question aims to determine the positive impact of implementing BWM in the company. As many as 30% answered very large, the other 30% answered lage, 10% answered no, and 30% answered very none. The respondent stated that this BWM can maintain the cleanliness of the ballast water tanks on the ship, and have an impact on health and also make it easier for ships to dock at international ports. When viewed in an index, all respondents answered the positive impact of implementing BWM was large (positive) with an index value of 65%.

Respondents considered that Indonesian ships were still not ready for the implementation of BWM. Several factors that influence according to respondents are the condition of the existing vessels in terms of technical, management and company readiness, especially in investment matters, readiness of supporting devices including regulations and facilities at the port, and crew competency which are still low in terms of implementing BWM. The answer given by the respondents was 10% answered that the Indonesian fleet was ready to implement BWM, 50% answered that they were not ready, 20% answered that they were very unprepared, and 20% said they did not know. The index obtained shows a number of 46.88% which can be interpreted in negative answers, or ships in Indonesia are not ready to implement BWM in operational activities.

As many as 60% of respondents chose the D1 method because it was the easiest and did not require a large investment, 10% chose the D2 method because it was safer to implement, while the rest had not yet determined the use of the BWM method for operated vessels.

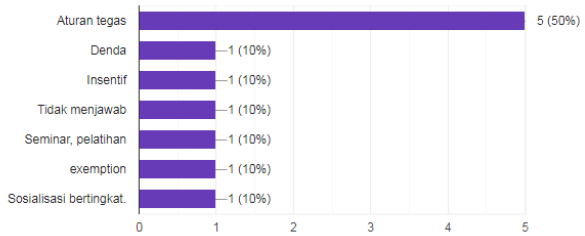
Whereas in terms of crew readiness, 40% of respondents stated that the crew on board were ready to carry out BWM, while 30% of respondents stated they were not ready, and 30% stated that they were very unprepared. This unpreparedness of the crew is caused by a lack of knowledge and ability to implement BWM, and the absence of a sustainable system in implementing this rule. The index of this question is 52.5%, which means that the management considers the crew is ready to implement the BWM rules. To support the readiness of the crew, the company needs training or outreach from the government or regulators, as well as rules regarding additional training for the crew. In addition to education, training, and socialization of BWM, the management assessed that there should be incentives given to the crew. Management considers that incentives in the form of additional salary/bonus have a large impact to encourage and motivate the crew to implement BWM.



Source: own study

Figure 4. Crew Incentives

The management provides input from the government to issue strict rules so that the shipping industry can follow the rules as expected. Limitations, awards, and sanctions must be clearly stated in the regulation.



Source: own study

Figure 5. Role of Government

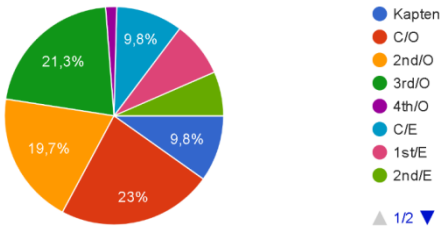
However, if at present, the government is still considered not yet fully paying attention to the implementation of BWM rules. 40% of respondents answered that the attention from

the government / regulator was not very good, while 40% of respondents answered that it was not good, and 20% responded well. So that the index of the answer to this question is 45%, which means that the management considers the government or regulator has not given good attention to the implementation of BWM in Indonesia, including lack of real action, knowledge of officers and limited number of officers and lack of direct checking in the field.

The respondents recommend that the government take the role of the private sector with experience in implementing BWM (e.g shipping companies or port companies), provide socialization and training, and enforce rules by routinely checking, and preparing the infrastructure needed to support the implementation of BWM, especially at ports.

4.4. Ship Crew Perception

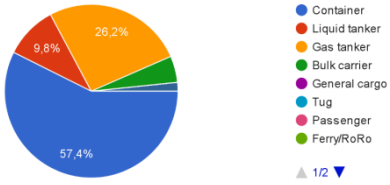
The number of respondents is 61 crews with each number of positions as Chief Officer, 3rd Officer, 2nd Officer, Master, Chief Engineer, 1st Engineer, 2nd Engineer, and 4th officers respectively 14, 13, 12, 6, 6, 5, 4 and 1 person.



Source: own study

Figure 6. Rank of crew respondent

Of the proportion of types of vessels operated by the respondents, 35 respondents worked on container ships, 16 on Gas Tanker, 6 on Liquid Tanker, 3 on ships, Bulk Carrier and 1 on passenger ships / passenger ships with ocean going and domestic routes.



Source: own study

Figure 7. Profile of crew ships

The first question about the application of ballast water management in Indonesia with the distribution of answers was 55.7% answered strongly agree, 26.2% answered agree, 13.1% answered disagree, 4.9% answered strongly disagree. Reasons given include keeping the ecosystem in the sea or the waters of the ship's destination so that it is not disturbed, such as mutations due to bacteria, microbes, and other species carried in ballast water from the ship's origin area, and considering that Indonesia is mostly marine, the risk the spread of the disease from the pollution will be even greater. The index value obtained from the questionnaire is 83%. This index shows that the answer is very positive.

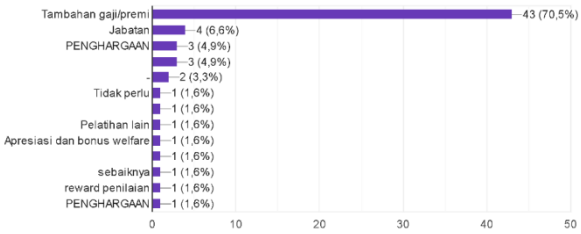
Furthermore, to find out the positive impact of the implementation of BWM for the environment, shipping companies and ship crews in Indonesia, most respondents thought that the implementation of BWM had a high level of positive impact, especially for the aquatic environment to be maintained so as to minimize pollution. There are benefits for shipping companies with ships sailing in foreign countries where the country has implemented BWM rules, so the same regulation makes no loss. While the positive impact on the crew is increasing experience and knowledge about BWM. The results of the analysis show that the opinion of respondents was that the positive impact of applying BWM showed a very positive index value of 80%. The distribution of answers was 45.9% answered very positively, 34.4% answered positively, 16.4% answered negatively, and 1.6% answered very negatively, and 1.6% said they did not know.

Respondents who consider Indonesia's fleet is not yet ready. The answer distribution is 11.5% answering very well, 14.8% answered ready, 31.1% answered that they were not ready, and 26.2% answered that they were much unprepared, while 16.4% answered that they did not know. This is because the awareness of relevant parties is minimal and the large costs that must be incurred by the owner ship. That way, the method that is considered appropriate to be applied to ballast water treatment is method D1. Respondents believed that the Indonesian fleet gap was ready because there was already a shipyard that could modify ships in implementing BWM. The index value of 45% indicates that the ship fleet is not ready to apply BWM rules.

Whereas in terms of crew conditions, respondents stated that the crew was ready to implement BWM rules with the distribution of answers. 13.1% of respondents chose very well, 39.3% answered ready, 29.5% answered that they were not ready, and 16.4% of respondents answered were unprepared. The results of the analysis show an index value of 61% which means positive. K ship has understood the marine environment, has conducted training and has a certificate. Meanwhile, to handle ship crews who are not ready to apply

BWM rules, it can be overcome by conducting seminars, socialization and oral and practical training, such as familiarization about marine environment protection, Ballast water management Plan training for seafarers, specific BWM treatment plan onboard ship, international regulation about ballast exchange, and other topics.

As many as 70.5% of respondents want incentives in the form of additional salary or bonus in exchange for the additional work, they do which can have an impact on improving the quality and intensity of the work of the crew. In addition to incentives in the form of additional salaries or bonuses, the crew also proposed several incentives, including: position, award, training.

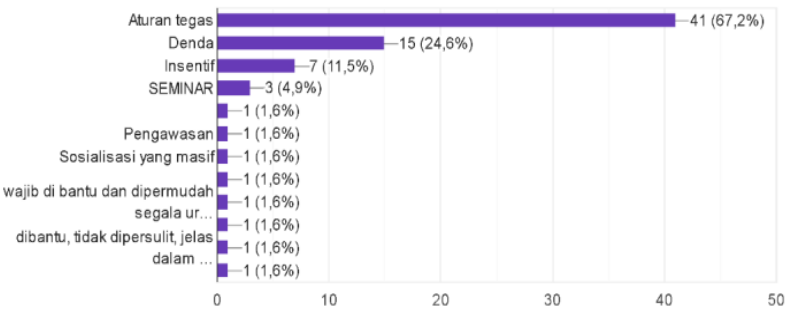


Source: own study

Figure 8. Crew incentives according to the crew

The next topic shows the seriousness of the company in paying attention to the implementation of BWM, for example providing training on BWM, there is a BWM book plan that must be read and implemented, there are officers appointed to be responsible. Sessionary results show 32.8% of respondents answered very seriously, 21.3% answered seriously, 21.3% answered not seriously, 19.7% answered very seriously. Calculation of index shows 64% with serious criteria (positive).

The implementation of BWM will be successful if there is cooperation between the government, shipping companies and ship crews in implementing BWM. The government needs to implement strict rules, such as sanctions if violated, as well as routine supervision and inspection, in addition the government can provide facilities in the form of counseling or seminars to companies and crew.



Source: own study

Figure 9. The role of the government according to the crew

5. Conclusion

The government as a regulator has ratified the IMO/MARPOL regulations on BWM and prepared technical support for the implementation of BWM in Indonesia no later than 2020. Ships from and to foreign countries have received additional checks in BWM in several large ports, but are still limited to checking documents on board. The port also has not prepared supporting facilities for implementing BWM.

Shipping companies as executors stated that the implementation of BWM must be implemented immediately because it has a positive impact on the company, especially for ships with foreign routes (ocean-going). However, vessels owned and operated by the company are not ready to implement BWM because of limited knowledge and investment. The D1 method is the most appropriate method to be implemented because it does not require a large investment, but there must be strict rules and technical guidelines to support this.

In terms of ship crew readiness, the results of the analysis show that the ship's crew is ready to apply BWM rules. Companies can provide additional salaries or bonuses to encourage crew in BWM implementation, as well as increase the knowledge and awareness of ship crews.

6. Suggestion

The suggestion here is given to the government in order to be able to encourage the implementation of BWM by conducting socialization, adding compulsory training for the crew, and making clear and explicit regulations, as well as supervision. The government must also encourage the port as the executor to prepare the necessary facilities.

References

Jee, J., & Lee, S. (2017). Comparative feasibility study on retrofitting ballast water treatment system for a bulk carrier. *Marine Pollution Bulletin*, *119*(2), 17–22.

Karahalios, H. (2017). The application of the AHP-TOPSIS for evaluating ballast water

treatment systems by ship operators. *Transportation Research Part D: Transport and Environment*, *52*, 172–184.

King, D. M., & Hagan, P. T. (2013). Economic and Logistical Feasibility of Port-based Ballast Water Treatment: A Case Study at the Port of Baltimore (USA). *Maritime Environmental Resource Centre, Ballast Water Economics Discussion Paper*, (6).

Perhubungan, K. (2012). Statistik perhubungan. *Dinas Perhubungan*.

Werschkun, B., Banerji, S., Basurko, O. C., David, M., Fuhr, F., Gollasch, S., … Kacan, S. (2014). Emerging risks from ballast water treatment: The run-up to the International Ballast Water Management Convention. *Chemosphere*, *112*, 256–266.

Porcentagem de contribuição de cada autor no manuscrito

Sereati Hasugian – 40%

Sri Wahyuni – 30%

Heru Susanto – 30%