

Reliability of International Safety Management (ISM) Code Implementation in Operational Risk Management of Shipping Industry

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Abstract. In an industrial scope, the industry itself cannot be separated from a risk, and the shipping industry is no exception. The risk itself can possibly emerge from the company's internal environment and there is a risk that emerge from company's external environment. Therefore, companies are required to be able to manage the risks that may arise and give various impact. Basically, if the company can manage the risks, then the risks can potentially become opportunity, or it can also be said that it is a positive risk. On the other hand, if the risks lead to losses and the company cannot manage properly, this is a negative risk that needs to be managed by the company. In a shipping industry, there is an internationally recognized safety management system, namely the ISM Code, where the code regulates aspects of safety management in ships. With the implementation of an optimal safety management system, shipping company can basically apply the ISM Code instrument as a risk management effort, particularly in operational risk. Shipping company need to understand that they are obliged to create a safe work environment for their employees.

Keywords: Risk management, ISM Code, Integration

I. Introduction

The shipping industry is currently experiencing a lot of significant changes. It should also be understood that as an industry engaged in services, water transportation, shipping companies are often faced with various types of risk, both operational risk and non-operational risk. One example of operational risk that often arises in this industry is related to accidents during shipping operations. The accidents that occur during shipping operations basically occur in various forms; one example of the risk is the occurrence of an accidents to ship's crew members. Another example such as collisions between ships, collisions between ships and port facilities, pollution at sea, ships aground, ships sinking, and so on. From all the risks that are predicted to occur, shipping companies basically have to bear the impact on various aspects. Starting from the financial aspect of the company, with the occurrence of an accident in the ship's operations, the company has the potential to bear compensation claims or bear the costs of unplanned repairs. Another kind of example from the impact of accident is that the shipping company also has a massive potential to bear the risk of bad reputation due to accident. According to initial explanation, in general, risk management system can be applied for the company. This implementation has a good purpose for the company. By implementing risk management, the business goals can be achieved, and also the efficiency can be carried out optimally. Therefore, in this paper, we will discuss fundamentally how risk management patterns are applied optimally so that shipping companies are able to achieve the business targets that have been set, including discussing several recommendations for risk mitigation actions that can create a safe work environment and increase the possibility of efficiency inside the company.

II. Literature Review

In reality, there is a possibility that a company has basically understood that in every operational process, the company will face various risks. The first thing that must be understood in this paper is what risk is. Risk is a danger that arises, the result or consequence that may occur due to an ongoing process or an impending event [1]. Returning to the context of the company, from the previous explanation, it can simply be understood that risk is an uncertainty. Still closely related to risk, a company when making decisions for its operations, then most likely the company will be faced with a risk. From the risks that may arise, the company basically has to manage the risks so that the impacts that arise can be controlled, if the risks are negative, it will cause losses, delays, failures, and so on. However, if the risk is positive, it can be an opportunity that encourages the company to achieve the target set. With the initial explanation related to the risks and obligations of the company to manage this, there is a mechanism, namely risk management. In simple terms, risk management is a mechanism that is applied with the aim of knowing, analyzing and controlling the risks that may arise. Back in the shipping company, after understanding the basic concepts of risk and risk management, the shipping company is basically faced with various uncertainties. In its operational management, a shipping company often faces risks such as accidents to ships, both in the form of collisions between ships and other port facilities while operating. If the risk is not managed optimally, then what happens next is the possibility of claiming claims in the form of liability. Another example of

negative risk is the unpreparedness of the ship fleet. This can have an impact on the company, ranging from bearing unplanned costs, service delays, a bad reputation for the company to lawsuits. From some of these basic concepts, an effective risk management process is needed that can be applied within the company. The risk management process itself involves identifying various risks that a company may face, then evaluating so that these risks can be a priority to manage. From the results of the risk analysis, the company must develop an action strategy to respond to risks with a mechanism that the company can accept [2]. The risks that occur in question can come from 2 sides, namely internal and external. Simply put, risk management can be illustrated with the following chart:



Figure 1. The Mechanism of Risk

From Figure 1, it can be understood that risk has its own way of working, the factors that influence the occurrence of risk can vary so that it can cause uncertainty which then has an impact on the targets that have been set by the company. So, if the risk is identified in the beginning, the company probably can do something that can manage the impact of the risk.

In the maritime world, there is a regulation issued by the International Maritime Organization (IMO), where this regulation regulates the safety management system, the regulation in question is called the International Safety Management Code (ISM Code). The application of the ISM Code on board ships basically has a crucial purpose, namely to ensure safety at sea, prevent injury and death to humans, and avoid environmental damage, especially the marine environment and property. The ISM Code requires a company to provide a secure mechanism in the operation of the ship's fleet and work environment. Not only that, but the ISM Code also requires companies to identify risks on board, other risks that personnel may face. The safety management system that is prepared must be able to ensure that emergency readiness is in accordance with the plans and regulations that have been set. This management system must be understood and continued to be practiced by personnel [3]. Still in the realm of the ISM Code, there is the term Designated Person Ashore (DPA). This DPA is one or several people on land who have a direct relationship with the highest official in the company. A DPA in this case has quite important functions, namely:

1. A DPA is obliged to supervise the safety and pollution prevention aspects in the operation of each ship; and
2. DPA is also obliged to guarantee the availability of adequate resources and support from the company as required.[4]

Safety itself has the meaning of being a culture, life attitude and values that care about the sense of safety and security in life [5]. With the ISM Code standard which contains safety mechanisms, as well as periodic implementation and evaluation, shipping companies can basically make this an action to manage the risks that may arise during shipping operations. As explained, risk has its own mechanism so that risk must be measured and managed so that the company's targets that have been set are not significantly disturbed. Of course, in the risk management process, it takes the commitment of all parties in company management. The company need to understand the very basic of risk and risk management first before they make a decision that may affect the company. Not to mention, the risk management are strongly related to the financial condition of each company. With the implementation of optimal risk management followed by the implementation of the ISM Code and its evaluation, the company has hereby strived to create a safe work environment, so this can be categorized with one of the main objectives of the Sustainable Development Goals, namely goal number 9 which talks related to Industry, Innovation and Infrastructure.

III. Research Method

This research was carried out by collecting a variety of literature, related regulations, information from the internet, supporting books related to risk management and the ISM Code for later from the literacy that has been collected, an assessment and analysis is carried out. The purpose of this study is to obtain information and relevance of how the ISM Code becomes an instrument of risk management actions in the shipping industry to create a safe work environment. Here are some of the methods applied in compiling this study:

1. Collecting a various source of information in the form of scientific journals, books, regulatory documents, personal experiences and other types that are still associated with this study;
2. Reading the literature already collected;
3. Identifying existing literature;
4. Collecting important points from each literature;
5. Begins the writing process.

IV. Results and Discussion

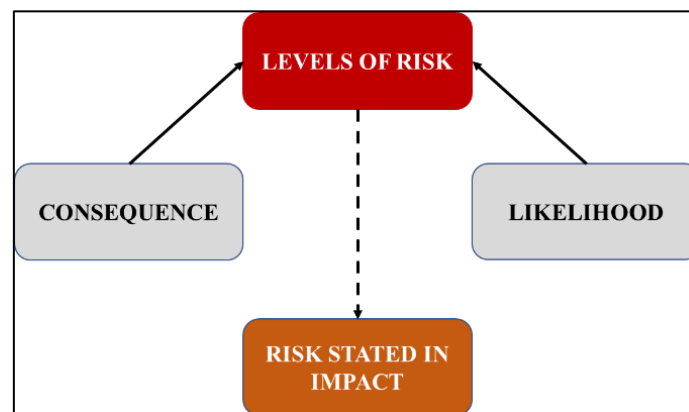
Back to the basic concept of risk, where risks can arise with the support of external factors as well as internal factors. Based on these 2 factors, the following can be mapped a small part of the operational risks that shipping companies may face:

Table 2. Examples of Risk Event that Possibly Occur in Shipping Industry

No	Example of Risk Event	Example of Risk Cause	Example of Possible Risk Factor
1	Fleet of ships has a collision with another ship	Bad weather	External factor
2	Fleet of ships hit by storms	Bad weather	External factor
3	Fleet of ships crashes into port facilities	Ship experienced a blackout during operation	Internal factor
4	The company receives complaints from external parties	The company does not carry out the regulations that have been set	Internal factor
5	The crew of the ship had a work accident	The crew has not yet received familiarization	Internal factor

Source: Author's Development

From the example in table 2, it can be understood that shipping companies are faced with a variety of risks that come from internal and external. From this initial identification process, shipping companies can go deeper and conduct risk analysis by measuring the consequence and the likelihood of risks. Every risk analysis process carried out must be based on the right basis. This is necessary so that shipping companies can provide effective control measures and in accordance with the condition of the company, both financially and non-financially. When control measures are deemed effective, this can have an influence on the risks that arise. Referring to the example in table 2, risk events derived from external factors, seem more difficult for shipping companies to control.



Source: Author's Development
Figure 2. Basic Element of Risk Measurement

By understanding the basics related to risk management, the company can take more measurable decisions and steps, so that the impact that may arise is more controllable. From the measurement concept displayed in figure 2, it can bring up the risk value which is often expressed in the form of an impact. This statement should be in accordance with the risk appetite as well as the tolerance of the internal company. If the results of the risk measurement show that the risk is still within the limits of management tolerance, then management can carry out regular monitoring and focus on other risks that are more significant, the

decision are depending on risk appetite and risk tolerance from the company itself. When the company can implement risk management properly, the company can determine what are the priorities for risk mitigation and control actions. That way, the company will also know the estimated financial needs needed and increase the possibility of efficiency, the company also able to control the impact of the risk itself. However, when the company does not understand how the risk management pattern is suitable, then the company is potentially unable to identify things that should be a priority for risk control, it will continue to incur losses that may be significant for the company's financial condition.

Before entering the realm of implementing the ISM Code system, shipping companies must first understand how safety aspects are crucial in the shipping world. The following data shows a recapitulation of accidents that occurred on board ships that occurred in 2020 - 2021. The data is taken from the website of the National Committee for Transportation Accidents of the Republic of Indonesia (KNKT):

Table 3. List of Ship Accidents in 2020 - 2021

No	Date of Occurrence	Ship Name	Types of Accidents	Location of Accident
<i>YEAR 2021</i>				
1	May, 15 th 2021	Perahu Gako	Boat capsized	Waduk Kedung Ombo, Central Java
2	April, 12 th 2021	Asian Champion	Fatality	Anyer
3	April, 3 rd 2021	Habco Pioneer & Barokah Jaya	Collision	Northern Waters of Indramayu
4	February, 11 th 2021	Gemilang Perkasa Energi	Ship explosion	Mahakam River, Samarinda
<i>YEAR 2020</i>				
1	July, 21 st 2020	Bahari Indonesia	Fire	Java sea
2	November, 17 th 2020	Cape Kallia & kerinci Indah 02	Ship Capsized	Eastern Indian Ocean
3	April, 18 th 2020	Nusa Putera	Ship ran aground	Merak Crossing Port Entrance, Banten
4	Januar, 12 th 2020	EL No.2	Sink	Mandulu Island Waters, Belitung

Source: http://knkt.dephub.go.id/knkt/ntsc_maritime/maritime_investigation_report1.htm)

Whenever a shipping accident occurs, the National Committee for Transportation Accidents of the Republic of Indonesia always investigates the accident. From the results of the investigation carried out, the National Committee for Transportation Accidents of the Republic of Indonesia always lists the findings and factors that contributed to the accident. Referring to table 3, there are several factors that contribute to shipping accidents in 2020 - 2021, namely as follows:

Table 4. List of Ship Accidents in 2020 - 2021 Added with Contributing Factors

No	Date of Occurrence	Ship Name	Types of Accidents	Contributing Factors Based on KNKT's Report
<i>YEAR 2021</i>				
1	May, 15 th 2021	Gako Boat	Boat capsized	1. The absence of regulations regarding the maximum capacity of Gako Boat; 2. The disruption of the stability of the Gako boat.
2	April, 12 th 2021	Asian Champion	Fatality	There were no specific guidelines on how to ensure the workers on the resting platform are safe from the crane when the crane operator operates the crane
3	April, 3 rd 2021	Habco Pioneer & Barokah Jaya	Collision	1. None of the two ships to inform the other of its intentions at the right time in creating a safe voyage; 2. Both ships took measures to avoid collisions when the distance between the two ships was very close; 3. The mentality of Habco Pioneer's navigation guard crew model is not appropriate in establishing an

				<p>understanding of the situation with fishing vessels so that its assumptions have placed the ship in a collision situation;</p> <p>4. Failure to maintain continuous observation in cross-legged situations has delayed updating information for navigation guard crews to make decisions avoiding the risk of collisions.</p>
4	February, 11 th 2021	Gemilang Perkasa Energi	Ship explosion	<p>1. The existence of a hot work outside the established work plan;</p> <p>2. Lack of supervision when the Gemilang Perkasa Energi ship was declared finished undergoing repairs.</p>
YEAR 2020				
1	July, 21 st 2020	Bahari Indonesia	Fire	<p>1. The fire started on the deck of the vehicle and likely originated from a truck in the far-right lane near the right ramp door;</p> <p>2. Fires from cargo on the decks of passenger Ro-Ro ship vehicles currently have a very high risk due to the unavailability of a surveillance system for the safety of vehicles and their cargo before they are loaded on Ro-Ro ships.</p>
2	November, 17 th 2020	Cape Kallia & Kerinci Indah 02	Ship Capsized	<p>1. The inappropriate mental model amongst the officer on watch of Cape Kallia regarding the habit of fishermen;</p> <p>2. The insufficient manning of Kerinci Indah 02;</p> <p>3. The fatigue on the skipper on duty of Kerinci Indah 02.</p>
3	April, 18 th 2020	Nusa Putera	Ship ran aground	<p>1. The shift of the red buoy of the Great Peacock was about 78 meters from the starting position and was unknown to the Duty Officer;</p> <p>2. Bridge Resource Management on board the Nusa Putera ship is not running well, including the use of electronic navigation aids on board the ship is not carried out optimally.</p>
4	January, 12 th 2020	EL No.2	Sink	<p>1. Anchor pipe holes and anchor chain connection pipe holes located in the front deck is not closed. Waves that break because they hit the bow of the ship causing seawater breaking through the unclosed anchor pipe, as well as the sea water that flushed directly onto the front deck. The sea water then enters the space anchor chain storage through an open anchor chain connection hole pipe resulting in flooding inside the front room of the ship;</p> <p>2. Inundation that occurs inside the anchor chain storage chamber, recess tank bow and water tank reply number 1 cause the ship to tilt or lean towards front as the ship's laden trim turned forward. The flooding that occurs makes the stomach arise less so that seawater the easier it is to reach the deck. Things continued until the seawater entered the charge chamber through the hatch cover gap and access into the inside hatches, and other rooms through access or channels that are not of a waterproof type.</p>

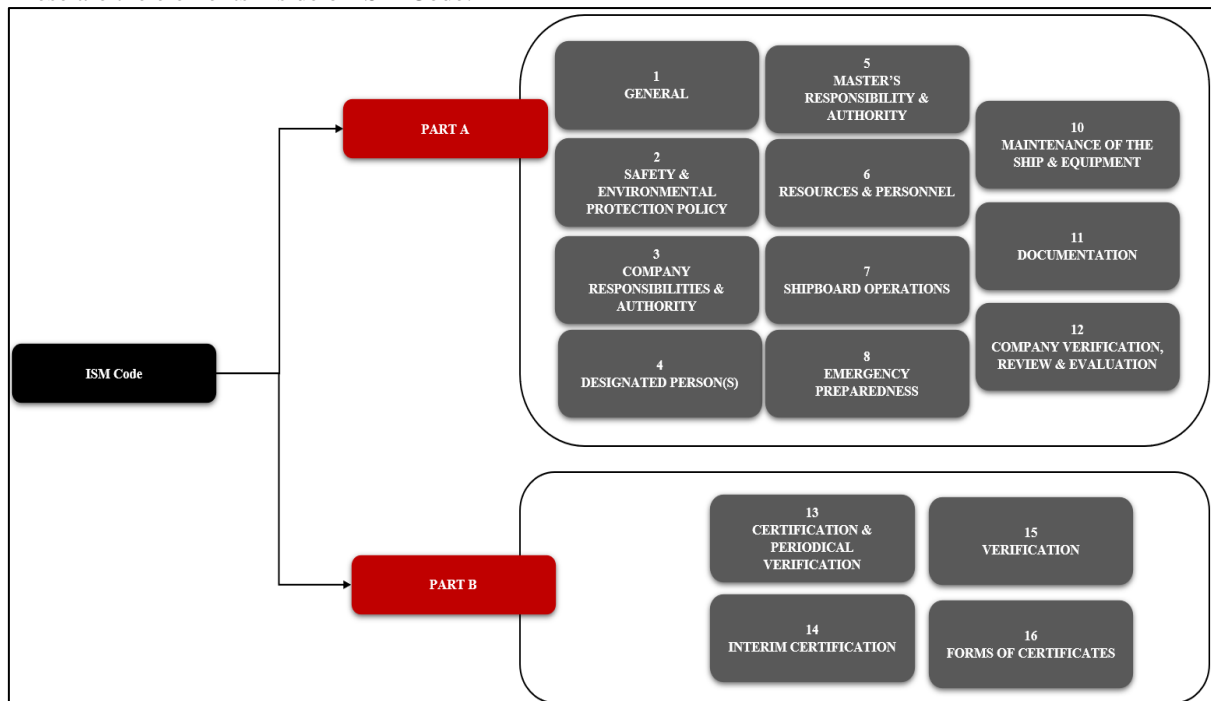
Source: http://knkt.dephub.go.id/knkt/ntsc_maritime/maritime_investigation_report1.htm

Looking back from table 4 related to the list of ship accidents in 2020 - 2021 along with the factors that contributed to the accident, it can be understood that there is no regulation or safety management system standard that optimally regulates ship operational activities. It can also be seen that, in addition to damage in the form of assets, shipping companies also have the possibility of accidents that cause death to ship crews due to accidents during the operational process. Most of these accidents, internal risk factors are more often the drivers of an accident, where there are still shortcomings in terms of the management system in the form of the absence of appropriate standard operating procedures or human negligence. Up to this point, shipping companies must be able to understand the risk mechanisms that may be faced as well as their risk management patterns.

Basically, the ISM-Code itself is intended for ships with the following details: [6]

1. Passenger ships, including high-speed passenger ships;
2. Oil tankers, chemical material transport agile vessels, and gas carriers with gross tonnage sizes greater than or equal to GT 150 (one hundred and fifty Gross Tonnage);
3. Other freighters, high-speed freighters, bulk carriers, fishing vessels, mobile offshore drilling units (Mobile Offshore Drilling Units), and floating storage units (Floating Storage Units and Off-loading/Floating Production Storage and Off-loading Facilities) including manned barges with gross tonnage sizes greater than or equal to GT 500 (five hundred Gross Tonnage).

These are the elements inside of ISM Code:



Source: ISM Code 2018 edition) [7]

Figure 3. The Elements of ISM Code

From the explanation of figure 6, ISM Code regulate safety aspect. ISM Code itself plays an important role in safety management inside the shipping company. Under ideal conditions, the ISM Code can basically help shipping companies to be able to improve and provide a standard safety management system that allows it to be applied to the entire fleet of ships. This can be seen from the various elements in the ISM Code. Of all the elements contained in the ISM Code, it systematically requires shipping companies to be able to integrate the company's operational mechanisms. With the implementation of the ISM Code and evaluations that are carried out optimally, shipping companies can control the risks that may arise, especially in operational risks.

In carrying out the ISM Code, the shipping company has the right to appoint personnel to be designated as a DPA (Designated Person Ashore), where a DPA in a shipping company must be able to communicate directly to the company's top leadership, especially on matters related to ship safety. In the ISM Code, there are 2 (two) basic responsibilities of a DPA, namely:

1. DPA is obliged to supervise safety aspects and pollution prevention in the operations of each ship; and
2. Ensure the availability of adequate resources and support from the company as required.

With the DPA set by the company, the internal supervision function related to the implementation of the ISM Code will be more controlled because the DPA has full responsibility for the safety management system implemented. Many shipping companies already understand the importance of the role of DPA in terms of ship operational safety. Supervision on the aspects of shipping safety in this case is closely related to the DPA, therefore a DPA must get full support from the management of the shipping company so that the supervisory function can be carried out in accordance with the established regulations.

In its implementation, the ISM Code must go through various stages of supervision carried out by the company's internal ISM Code auditors and external auditors recognized by the government. Shipping companies that will apply the ISM Code for companies and their ships must meet all the requirements that have been set for verification by the auditor. If the auditor in his audit process declares that all requirements have been met, then the shipping company will get recognition in the form of a safety management certificate (SMC) document. When the certificate has been obtained, the shipping company is obliged to remain consistently committed to meeting the requirements of safety standards in accordance with the ISM Code. To ensure that this is carried out by shipping companies, external auditors recognized by the government will conduct audits aimed at supervisory audits. The audits carried out generally aim to ensure the existence of a safety management system document on board the ship along with its implementation. When the safety management system on board the ship is carried out according to the established guidelines, the possibility of an accident can be minimized and minimize the possibility of impacts that arise when an accident occurs. This can basically be an instrument for the shipping industry in managing its operational risks.

Back to the concept of risk, risk management and management. Handling a risk can be considered as one of the functions of management. There are several basic management functions that are quite widely known, namely planning, organizing, directing and controlling [8]. This simple study aims to elevate the ISM Code as a risk management instrument for shipping companies. With a risk mitigation pattern that is in accordance with risk, the company can optimally manage control priorities. The nature of the ISM Code and risk management tend to be similar, namely that it requires integration across all layers of company management. Shipping operational risks can basically be mitigated in several patterns that can be adjusted to the company's capabilities both operationally and financially. In addition to implementing the ISM Code optimally, there are several mitigation measures that may be applied to manage the risks that exist in shipping companies such as the example in figure 2 related to examples of risk events that may occur in the shipping industry. Some of the mitigation measures described below are basically regulated in the ISM Code in general and can be adapted to the conditions that exist in their respective shipping companies.

Risk transfer to insurance party by using protection & indemnity standard insurance

This is important for most shipping company, because by transferring risk to the insurance party, this will help the shipping company to make compensation claims and make compensation to the opposing party in the event of a collision, both between ships and with Port facilities. This insurance policy also has coverage related to pollution and the removal of shipwrecks if only the ship is sink and causes pollution at sea. By applying this insurance policy, the shipping company has the obligation to pay insurance premiums and cover the cost of the deductible if the claim is received by the insurance company.

Risk transfer to insurance party by using hull & machinery insurance

This insurance policy is also important, when there is damage inside the ship's internals, this policy can be used by shipping companies to make claims to the insurance company. Claims must be accompanied by damage review documents and estimates of repairs that may arise. By applying this insurance policy, the shipping company has the obligation to pay insurance premiums and cover the cost of the deductible if the claim is received by the insurance company.

Implementing safety drills periodically and scheduled

By carrying out safety drill activities regularly, the crew will quickly get used to handling emergencies. Examples of safety drill activities are such as evacuation drills, ship leaving drills, pollution handling drills and so on. This safety drill activity is basically also a form of commitment to meet the regulatory obligations set by the government.

Carry out daily toolbox meetings before starting operational activities

Toolbox meeting before operational activities take place are very important, especially for the crew. With the toolbox meeting, the skipper as the highest leader on the ship will know important information about the condition of the ship. By knowing the condition of the ship, the crew can be more

alert when something unexpected happens during the operational process. Another benefit of this toolbox meeting activity is that the captain of the ship can find out the physical condition of the crew. When the crew visually shows signs of fatigue, then the captain has the right to warn the crew to rest for a while. This is important, because if the crew is exhausted in carrying out their work, then there will be a potential accident both to the crew and to the safety of the ship.

Carry out management reviews related to the safety management systems

Management reviews also need to be carried out, especially regarding safety management systems. This is crucial for shipping companies because the company has an obligation to always ensure that the existing safety management system must be up to date and socialized as a whole to the crew. With this obligation, the company is also responsible for creating a safe work environment.

Providing emergency response infrastructure

A ship must be equipped with emergency response equipment, such as fire extinguishers, firefighting systems, gas detectors, etc. Apart from being an emergency response infrastructure, this also fulfills the obligations of shipping companies to government regulations.

Ensure that all ship documents are active

Ship documents are also an important part of a ship's operations. In simple terms, with the activeness of all ship documents, it is certain that the ship has met all operational and safety requirements. It is the relevant authorities who have the right to issue and verify ship documents. Apart from being a medium of verification, ship documents are also a form of commitment to shipping companies' compliance with government regulations.

Ensure the establishment of competency standards for crew members in accordance with applicable regulations

Basically, the competence of the crew has been established. By carrying out the established regulations, shipping companies have basically also carried out risk mitigation in several ways, ranging from the possibility of accidents due to human negligence or competence, to aspects of compliance with applicable regulations.

This mitigation action will certainly vary between companies because establishing a risk mitigation must first identify the risk and then the company must measure the likelihood and impact. It should also be remembered that, risk mitigation measures basically run before a risk event occurs. This means that the risk mitigation measures that have been set by a shipping company do not necessarily eliminate a risk, but aim to control the risk so that the impact and probability become lower. Back in the ISM Code, as a regulation that regulates the safety management system, the application of the ISM Code can be adjusted to the company. However, the company must still meet all the provisions that have been determined in the regulations, and to ensure that this is implemented appropriately, an external auditor recognized by the government is needed so that its implementation can always be monitored and maintained reliability.

V. Conclusions

Creating a safe work environment for all workers is an obligation of a company, including shipping companies. Referring to Sustainable Development Goal number 9 which talks about industry, innovation and infrastructure, at that point explains that creating a safe work environment for workers is a must for industry players. A safe work environment is not only related to safety and emergency response infrastructure, but also closely related to workers in the work area. Workers who have awareness of safety, then the worker has been able and understands the provisions that have been set by the company.

ISM Code and risk management have some similarities in aspects of the organization, namely requiring a company to be able to integrate all its functions. With the integration of all existing business processes in shipping companies, the implementation of the ISM Code safety management system can be an act of mitigating risks to risks that may arise from shipping operations. Apart from mitigating risks to shipping safety, implementing the ISM Code is also a risk mitigation for aspects of compliance with regulations set by the government for shipping companies. It should also be understood that in implementing the ISM Code as a risk mitigation measure, an active role of shipping company management is needed. As an extension of management, DPA also plays an important role in overseeing the conformity between the established safety management system documents and operational realization. Evaluation must

also be carried out so that the implementation can run optimally and on target. The results of this short study can basically still be developed again. Returning to the relevance of Sustainable Development Goal number 9 which talks about industry, innovation and infrastructure, by implementing the regulations regulated in the ISM Code optimally, it can be understood that this is risk management for shipping operations. One of the important points of Sustainable Development Goal number 9 which talks about industry, innovation and infrastructure is related to creating a safe work environment for workers.

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