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The Influence of Training and Competence on Crew Readiness in Using Fire Extinguishers and Its Impact on Ship Safety at Bourbon Offshore Greenmar Company

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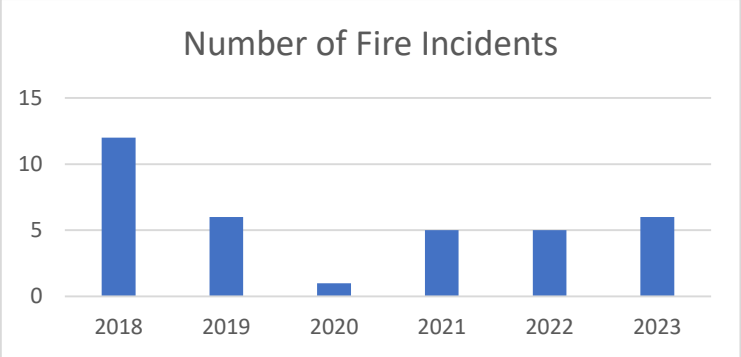
Abstract: Fire is one of the disasters that often occurs, especially in sea transportation. Based on data from the National Transportation Safety Committee 2024, although there was a decline in 2018-2020, it then experienced a slight increase again in 2021-2023. Fires that occur on ships can occur due to unpreparedness and negligence of the ship's crew or can also be caused by other factors. This study aims to analyze the factors that influence the readiness of the crew in the use of fire extinguishers, namely whether there is an effect of training on the readiness of the crew in the use of fire extinguishers, whether there is an effect of competence on the readiness of the crew in the use of fire extinguishers and the readiness of the crew in the use of fire extinguishers affects ship safety. The study was conducted at the Bourbon Offshore Greenmar company with a sample of 84 crew members taken by convenience. Data collection was carried out by distributing questionnaires with a Likert scale. Data analysis carried out in addition to descriptive analysis, also carried out partial least square analysis to see valid indicators that can be used to measure variables, see the relationship model between existing variables. The results of the analysis show that there is an influence of training on the readiness of the crew in using fire equipment and there is an influence of competence on the readiness of the crew in using fire equipment where the readiness of the crew in using fire equipment will have an impact on ship safety.

Keywords: Training, Competence, Readiness, Safety, Partial Least Square

INTRODUCTION

Fire is one of the disasters that often occurs, especially in sea transportation. Fire prevention efforts have also been fulfilled by conducting ship inspections before sailing (pick tests) and providing complete fire extinguishers. According to data from the National Transportation Safety Committee (KNKT) from 2018 - 2023, 35 cases of ship fires were recorded. Figure 1. shows the number of ship accidents each year:



Source : National Transportation Safety Committee
Figure 1. Number of Fire Incidents 2018-2023

Fire extinguishers are one of the tools for dealing with and minimizing the risk of fire. According to (Wilastari & Wibowo, 2021)(Wilastari & Wibowo, 2021), it is very necessary to improve the skills of officers, namely by improving discussion materials on fire extinguishers, carrying out fire extinguishing exercises and maintaining and checking fire extinguishers. Training for crew members is stated in regulations related to work safety on ships, including the Standard Training Certificate and Watchkeeping (STCW) Amendment 2010, concerning training standards for sailors (Firdaus Sitepu, 2017).

Based on this, a study will be conducted with the following problem formulations:

1. Is there an effect of training on the readiness of crew members in using fire equipment at the Bourbon Offshore Greenmar company?
2. Is there an effect of competence on the readiness of crew members in using fire equipment at the Bourbon Offshore Greenmar company?
3. Is there an effect of crew members' readiness in using fire equipment on ship safety at the Bourbon Offshore Greenmar company?

According to Noe (2020), training refers to a company's planned efforts to facilitate learning, competencies, knowledge, skills and behaviors emphasized in training and apply them in daily activities. Training aims to improve employee performance from the last task and is useful for developing individual and organizational capabilities in the future. According to Roger and Caple (2007), training is a systematic and planned effort to change or develop knowledge, skills, attitudes through learning experiences in order to increase the effectiveness of the performance of activities or various activities. In a work situation, the purpose of the study is to enable an employee to gain the ability to perform tasks or jobs adequately and realize their potential.

Competence is a character of attitude and behavior, or the ability of workers who are relatively stable when facing a situation in the workplace, which is formed from the synergy between character, self-concept, internal motivation, and contextual knowledge capacity. (Spencer and Spencer, 2011) In carrying out their duties on board, the crew must know several important things in work safety.

Increasing the readiness of the crew for safety is very important to know the following things:

1. International Safety Management Code (ISM CODE)
   Implementing international safety management standards involves a management system that includes operational procedures, operations, and division of tasks for equipment on board. This includes ship maintenance and handling emergencies such as accidents, fires, pollution, and other emergency situations. The approach taken involves establishing a management system that is able to encourage strong cooperation between shore and on-board management, to carry out operations with optimal safety. This management system

must be supported by personnel who are knowledgeable, have the appropriate skills, and have adequate supporting facilities. It is important to realize that decisions taken on board must consider all possible consequences related to safety and pollution.

2. Safety Of Life At Sea 1974 (SOLAS 1974)

   A portable fire extinguisher is a fire extinguishing device that is in the form of a cylindrical tube and is easy to use by a person. This has been regulated in chapter II-2 SOLAS (Safety of Life at Sea), rule 2. The small size of the APAR and its light weight, this tool is designed as a device that is easy to move. Portable fire extinguishers are not recommended for large-scale fires that can threaten lives but can be used to extinguish fires in the early stages of a fire.

3. AFF Module

   In the effectiveness of fire prevention and control, it is necessary for fire extinguishing equipment to function optimally. Therefore, maintenance of these tools must be carried out periodically to ensure the readiness of the use of extinguishers when a fire occurs. In addition, routine training is needed to overcome this by referring to the SOLAS 74 guidelines.

   a. On passenger ships, at least fire extinguishing exercises have been carried out at least once a week for officers and crew. This aims to improve skills and readiness in dealing with fire situations, in accordance with SOLAS 74 regulations.
   b. On cargo or goods ships, at least fire drills must be carried out at least once a month for the crew. Through the implementation of this regular training, it can form discipline among the crew, increase the level of skill and alertness, and the effectiveness of each ship's team. In addition, through this training, the readiness and completeness of the fire extinguishing equipment on board can also be evaluated for use, in accordance with the guidelines presented in the Advance Fire Fighting Module by Michael Jay.

Occupational safety and health is a thought and effort to ensure the integrity and perfection of both the physical and spiritual workforce in particular, and humans in general, the results of work and culture towards a just and prosperous society. (Mangkunegara, 2011) Occupational safety is a series of efforts to create a safe and peaceful working atmosphere for employees who work in the company concerned. (Suma'mur, 2015). Occupational safety is a safety condition that is free from the risk of accidents and damage where we work which includes building conditions, machine conditions, safety equipment, and worker conditions. (Simanjuntak, 2010). States that safety refers to the protection of a person's physical well-being against work-related injuries. Health refers to the general physical, mental and emotional stability conditions in general. (Mathis, 2016).

The research model that describes the relationship between variables in this study is as follows:

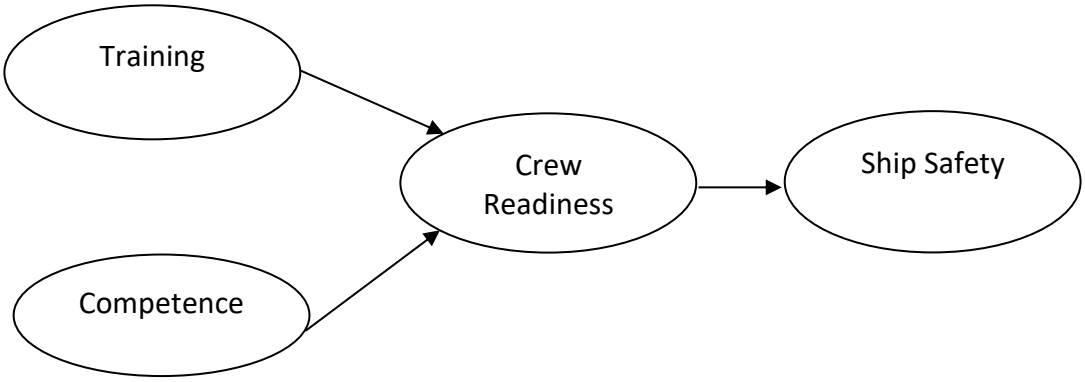


Figure 2. Conceptual Framework

The hypotheses put forward in this study are:

H_1: Training affects crew readiness.

H_2: Competence affects crew readiness.

H_3: Crew readiness affects crew safety.

METHOD

The research method used in this study is a quantitative causal method. The variables in this study consist of:

1. Independent variable Training
   According to Noe (2020), training indicators include:
   a. Training can improve self-readiness in handling ship accidents.
   b. Training can increase knowledge and insight.
   c. By participating in training, the ship's crew is able to carry out their duties and responsibilities well.
2. Independent variable Competence
   Competence indicators according to Spencer and Spencer (2011) are:
   a. Obtaining certificates of expertise and skills.
   b. Increasing motivation, personal character, self-concept, knowledge and skills
3. Mediating variable crew readiness
   According to Wilastari & Wibowo (2021), crew readiness indicators are:
   a. Increasing the readiness of the ship's crew in dealing with fires on board ships
   b. Time efficiency in dealing with incidents on board ships
4. Dependent variable Ship Safety
   Indikator ship safety menurut Mathis (2016) adalah sebagai berikut:
   a. The crew feels safe in working.
   b. The welfare of the crew.
   c. Procedures for using safety equipment on board, especially fire extinguishers.

Each indicator will be measured using a Likert scale. The study was conducted during September - December 2024 at the Bourbon Offshore Greenmar company. The population in this study was the crew with a sample of 84 people taken using convenience sampling techniques. Data were collected by distributing questionnaires to respondents, namely the crew at the Bourbon Offshore Greenmar company. The analysis was carried out using partial least square analysis.

RESULTS AND DISCUSSION

Results

Deskriptive Respondent

The study was conducted on 84 ship crews as respondents. Most of the respondents were under 30 years old with education levels mostly D3 and most of them had positions in the deck department. The crew's perception of the training conducted was that the training could improve self-readiness in handling ship accidents. The crew's perception of ship crew competence was that competence could improve motivation, personal character, self-concept, knowledge and skills. The crew's perception of ship crew readiness was that the time in dealing with incidents on board was very efficient. The crew's perception of ship crew safety was that the crew understood very well how to use safety equipment on board, especially fire extinguishers.

Partial Least Square

1. Measurement Model

a. Validity Test

Convergent Validity test result

Table 1. Convergent Validity

No	Indicator	*Loading Factor*	Result
1	P1	0.819	*Valid*
2	P2	0.797	*Valid*
3	P3	0.783	*Valid*
4	Q1	0.839	*Valid*
5	Q2	0.839	*Valid*
6	R1	0.859	*Valid*
7	R2	0.859	*Valid*
8	S1	0.822	*Valid*
9	S2	0.794	*Valid*
10	S3	0.786	*Valid*

Source: Questionnaire results, data processed

Based on the analysis results, all indicators are valid for each variable so they can be used for subsequent analysis.

b. Reliability

Reliability test result

Table 2. Reliability Test

No	Variable	Composite Reability	Cronbach's Alpha	Result
1	Training	0,842	0,718	Reliabel
2	Competence	0,826	0,780	Reliabel
3	Readiness	0,849	0,744	Reliabel
4	Safety	0,843	0,720	Reliabel

Source: Questionnaire results, data processed

Berdasarkan hasil analisis maka semua responden reliabel dalam menjawab semua indikator sehingga dapat digunakan untuk analisis berikutnya.

2. Structural Model

Hasil pengujian Path Coefficient

Table 3. Path Coefficient

No	Variable	Path Coefficient	T Statistics	P Values
1	Training -> Readiness	0,525	4,201	0,000
2	Competence -> Readiness	0,232	1,875	0,061
3	Readiness -> Safety	0,677	12,954	0,000

Source: Questionnaire results, data processed

Based on the test results in Table 3, with a sig of 0.000 the research hypothesis H1 is correct, meaning that training has an effect on the readiness of the ship's crew, with a sig of 0.061 the research hypothesis H2 is correct, meaning that competence has an effect on

the readiness of the ship's crew and with a sig of 0.000 the research hypothesis H3 is correct, meaning that the readiness of the ship's crew has an effect on ship safety..

3. **Model Analysis**

Model analysis result

Table 4. Model Coefficient

No	Variable	R^2	*R^2 adjusted*
1	Readiness	0,518	*0,506*
2	Safety	0,458	*0,451*

Source: Questionnaire results, data processed

Based on the analysis results in Table 4. The readiness model has a coefficient of 0.518, meaning that 51.8% of the increase/decrease in the crew's readiness in using fire extinguishers is 51.8% influenced by the training and skills of the crew. While the safety model has a coefficient of 0.458, meaning that 45.8% of the increase/decrease in ship safety is 45.8% influenced by the crew's readiness in using fire extinguishers..

Discussion

1. The effect of training on crew readiness in using fire fighting equipment at Bourbon Offshore Greenmar company

The results of the study showed that there was a positive and significant influence of training on the readiness of the ship's crew in using fire equipment, so that the first hypothesis (H_1) was accepted. This is in line with the research of Mahendra, at all (2024) that every member of the ship's crew must participate in training in accordance with international requirements to reduce the consequences of fire with proper instructions for training and exercises and for those responsible for implementing ship procedures in emergency conditions, purpose, SOLAS CpII-2 Reg 15. This is a way to make ship personnel familiar with the equipment and methods that will be used during a crisis situation.

2. The influence of competence on crew readiness in using fire extinguishing equipment at Bourbon Offshore Greenmar company

The results of the study showed that there was no statistically significant influence, namely crew competence on crew readiness and safety, so the second hypothesis (H_2) was rejected. This is not in line with the research of Fa'uzobihi. (2023) that the crew as the spearhead of the company is expected to have good competence so that in operating the fleet of ships safely, securely and contributing to the company. And one of the factors that determines the success of the crew in carrying out their duties is the competence of the crew. In this study, there were still few crew members who had training certificates that referred to the International Seafarers' Convention (STCW - Standards of Training, Certification, and Watchkeeping for Seafarers) which is a mandatory competency for sailors in handling fires on ships.

3. The influence of crew readiness on ship safety at Bourbon Offshore Greenmar company

The results of the study showed that there was a positive and significant influence of crew readiness on ship safety at the Bourbon Offshore Greenmar company, so that the third hypothesis (H_3) was accepted. This is in line with the research of (Handoko & Suhalis, 2020) that it is very necessary for every crew to be aware of implementing good work safety

standards, so that every accident can be anticipated with readiness to face every emergency condition of the ship. Readiness to face emergency conditions is essential for ship operations to increase in relation to natural factors, so the synthesis of readiness to face emergency conditions is a condition of all situations that require a response in all matters due to unpredictable, unexpected and unsatisfactory disasters that can cause major damage and other damage.

CONCLUSION

The conclusion of this research is:

1. Training has an impact on the readiness of ship crews in using fire fighting equipment.
2. Competence influences the readiness of the ship's crew in using fire fighting equipment.
3. The readiness of the ship's crew in using fire equipment has an impact on ship safety.

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