Seafarer work stress and performance: Empirical evidence of shipping safety of Indonesia national shipping companies

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A B S T R A C T

The main problem in this research, among others, was the lack of attention given by the company management to the seafarers' demands concerning health, social aspects, work stress, work environment, work facilities, and working hours that increased seafarers' pressure. The aim of this research was to analyze the influence of job satisfaction and work stress on shipping safety with seafarer performance as the intervening variable. The research was carried out in *Balai Pendidikan dan Pelatihan Ilmu Pelayaran* (Center for Maritime Education and Training) Tangerang with the samples of 93 seafarers working in several shipping companies. Data was processed using Path analysis. The result of this research showed that job satisfaction and work stress directly influenced seafarer performance. Meanwhile, job satisfaction and work stress had an indirect influence on shipping safety through seafarer performance, and seafarer performance had a direct influence on shipping safety. The result of Path analysis showed that work stress rather than job satisfaction had a bigger influence on seafarer performance, and seafarer performance had the biggest direct influence on shipping safety.

1. Introduction

The development of a national and international strategic environment requires shipping operations which are in line with the development of science and technology, the role of private sector and business competition, regional autonomy, and the accountability of state administrators while still prioritizing shipping safety and security for the sake of national interests. In shipping, there are ship operation procedures concerning shipping safety and security and environment pollution referring to the Safety Life at Sea (SOLAS) which regulates human life safety at sea, The International Regulations for Preventing Collisions at Sea (Collision Regulations/COLREGS) that regulates necessary actions to avoid ship collisions, handling actions that must be taken when a ship experiences an accident, and provides the requirements for the use of ship safety facilities, Marine Pollution (MARPOL) which regulates the prevention of pollution in the sea, International Safety Management (ISM Code) which regulates ship safety management, and Standard for Training, Certification and Watchkeeping for Seafarers (STCW), and others which provide guides and instructions for ship crew to ensure safety, environment protection, security and comfort of ship crew, goods, and the ship itself

Hetherington et al. (2006a) state that the shipping industry is known as having high potential and risk related to safety. In addition, Hetherington et al. (2006a), and Lune and Berg (2004) state that human errors are frequently caused by misjudgment

and inappropriate supervision or misunderstanding in the guard duty between the master and the officer on duty. Based on the investigation report, since 2010 in the Indonesian waters, the number of ship accidents such as ship sinking, capsizing, running aground, fires and collisions continue to increase. The information from Shipping Court shows that the factors causing ship accidents are 65 percent of human error, 24 percent of natural factors, and 11 percent of others. A study by Lucero-Prisno (2014) on the Philippines seafarers discusses the nature of routine work, long working hours, stress among ship crew, and the problem of being away from family, which is considered the primary source of stress.

The study by Carotenuto et al. (2014) revealed that the 24-hour work in the ship's work shift pattern causes a number of obstacles such as limited rests and becomes the main source of stress among seafarers. Sánchez-Beaskoetxea and Coca García (2015) found that the public generally have a negative image of seafarers since their mistake is often considered as the main cause of accidents. Ohana and Meyer (2010) proved that satisfied employees tend to maximally come to work, make less mistakes, be more productive, and have stronger intentions to stay in the organization. Fahmi et al. (2022) revealed that work stress impacts worker performance.

Study by Koldemir (2005) shows that being equipped with navigation tool aids and up-to-date safety equipment on board, they are still always considered as the cause of main accidents in water navigation. Rothblum (2000) shows that the most serious problems in the human factor analysis are fatigue, lack of communication and coordination among crew, and poor skills in technology, for example in the use of radar, Horck (2010) adds that the main reasons for accidents are poor communication, loss of situational awareness, poor decision making and lack of effective leadership as well as obstacles in teamwork. The theory of affectivity, according to Fetzner et al. (2012), is a tendency to experience a positive mood, such as becoming happy and self-confident, or a negative attitude, such as anxiety and depression. In general, someone showing positive affectivity or internal locus of control is more satisfied at work. Finally, Kalbers and Fogarty (2005) say that the tendency to be stressed refers to the individual tendency to experience emotional and physical fatigue from doing the job.

Based on the problem background, various problems can be identified as follows: (1) Lack of seafarers' job satisfaction with the company management concerning compensation, work climate, promotion, employment status, job placement and job characteristics, (2) Lack of attention from the company management to the seafarers' demands related to health, outing, social aspect, work stress, work environment, work facilities, and working hours that increase the seafarers' stress, (3) Incompatibility between jobs and the seafarers' ability decreasing the seafarer performance, (4) Lack of effective and efficient ship management that becomes a threat for sea transportation in term of shipping safety, and (5) Lack of job satisfaction and seafarers' poor performance increasing stress and subsequently causing ship accidents.

2. Literature Review

2.1. Shipping Safety

Hetherington (2006a) states that several human factors that influence shipping safety are fatigue, automation, situational awareness, communication, decision-making, teamwork, as well as health and stress. A study by Zohar (2010) found that a safe climate is an expression of safety within an organization. The research report of Horizon project on marine insurance statistics reveals that human error is the main contributing factor of around 60 percent of ship accidents (Hay et al., 2011). In general, Theotokas and Progoulaki (2007) emphasize that human aspects such as good communication, team spirit, trust, and low conflict among seafarers are associated with shipping safety. Very high-depth water in the harbor is expected to ensure shipping safety and security (Paulauskas et al., 2023). Rahmanita et al. (2023) revealed the importance of understanding the storage of safety equipment and the availability of instructions for using safety equipment.

2.2. Seafarer Performance

Theoretically, performance shows that employee behavior contributes positively or negatively to achieving organizational goals (Colquit et al., 2019; Ricardianto et al., 2023). Ship safety management process is always repetitive in operation and considers ship condition during the voyage which is frequently beyond the ship operator's control (Liwång et al., 2015; Wahyuni et al., 2022). In general, a seafarer's job is much related to the performance during the voyage (Ricardianto et al., 2020). In their research, Hetherington et al. (2006b) show that human factor monitoring and modification can contribute to maritime safety performance. Mathis and Jackson (2011) state that there are three factors influencing individual employee performance, namely: (1) individual ability to do the job, (2) the level of effort made, and (3) organizational support.

2.3. Job Satisfaction

Theoretically, Robbins (2016) and Spector (2008) define job satisfaction as an employee's emotion enjoying the work related to his job. Yuen et al. (2018a) states that job satisfaction has a positive impact on seafarer performance. Compensation element, stress, job placement, and job characteristics also have positive influence on job satisfaction (Riyanto et al., 2021). Job satisfaction is conceptualized as an affective variable obtained from working experience (Fritzsche & Parrish, 2005). Whereas Luthans (2015) divides the job dimensions that have relations with job satisfaction such as the job itself, reward, promotion,

work group supervision and working conditions. In addition, Tella et al. (2007) explain a high level of job satisfaction which is observed in the profession regarded as having a good reputation in the society. In line with the enhancement of people status, their purpose of life and satisfaction level also change. Therefore, social status can be regarded as a significant indicator of seafarers' job satisfaction. Fenstad et al. (2016) say that the prospect and pleasure to visit other territories/countries have much decreased because of faster rotation in the port as the consequence of efficient cargo handling operation and of increasing demand from shipping companies to maximize profit. In addition, Winn and Lewis (2017) say seafarers get less incentives today because the salaries and allowances offered are equally competitive between those sea-based and land-based. Thai and Latta (2010) state that the reward can be salary, bonus, job promotion, training and development, and on-board welfare. Pauksztat (2015) states that this approach is recommended as the most effective strategy to motivate and attract seafarers. Li et al. (2014) concluded that satisfaction with management, work climate, and promotion positively influences seafarers' job satisfaction. Fei and Lu (2015) revealed that a career as a seafarer may be challenging. However, it has obvious attractiveness and benefits, such as a high salary and the opportunity for international voyages.

2.5 Work Stress

Riyanto et al. (2021) state that stress is an essential psychological concept that can influence health, welfare, and performance in a negative dimension. In addition, Carotenuto et al. (2014) state that seafarer's level of stress is much related to the level of anxiety, higher level of self-control and level of vitality. Researches by Rengamani and Murugan (2014), Papachristou et al. (2015), Chung et al. (2017), Alsa et al. (2021), and Vizano et al. (2021) explain the stress experienced by seafarers due to various causes such as: high workload, less rest time, work environment with noise or ship movement, changes in climate and weather, work shift, long and irregular working hours, away from family in another research, Slišković and Penezić (2015) state that study physical stressors, psychosocial stressors, social stressors and high job demand, and find the most important job related stressors in the ship, namely the heat of workplace and long working hours. Wu (2011) states that working on board the ship also influences the social life of seafarers. Seafarer is described as a profession isolated from human interaction because of limited direct contact with family, rare and limited frequency on land, low manning scale, and one-man assignment.

Based on the framework and hypothesis above, a theoretical model of causal research can be developed as in the following figure.
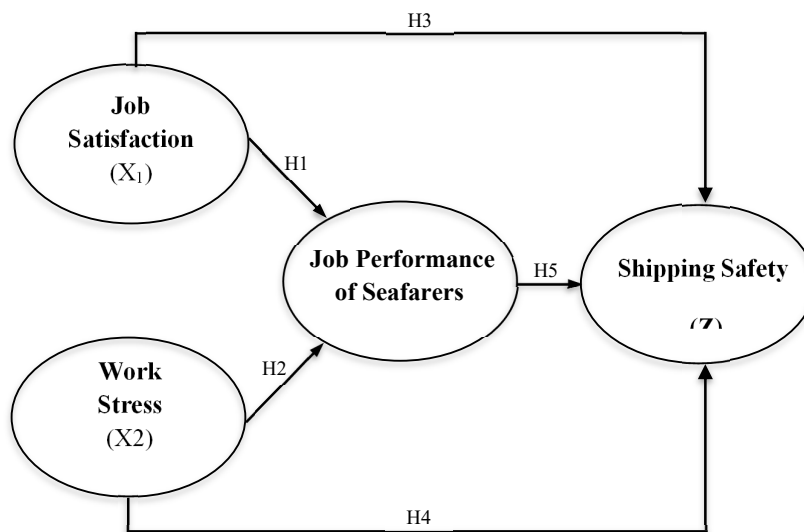

Fig. 1. Research Model

2.1. Hypotheses

Based on the theory and framework, some hypotheses can be proposed as tentative answers for the problems being faced, namely:

H₁: *Job satisfaction directly influences seafarer performance.*
H₂: *Work stress directly influences seafarer performance.*
H₃: *Job satisfaction directly and indirectly through seafarer performance influences shipping safety.*
H₄: *Work stress both directly and indirectly through seafarer performance influences shipping safety.*
H₅: *Seafarer performance directly influences shipping safety.*

3. Research Method

This research uses path analysis with a trimming model path analysis. The population in this research is the seafarers graduated from Balai Pendidikan dan Pelatihan Ilmu Pelayaran (Center for Maritime Education andTraining, Tangerang numbering 1,232 seafarers. The number of samples in this research is 93 seafarers graduated from the Tangerang Maritime Science Education and Training Center. In this research, the sampling used is Simple Random Sampling technique. This technique is used because the population is homogenous. Job satisfaction, as the first exogenous variable, uses seven variable dimensions namely; (1) Compensation; (2) Promotion; (3) Work climate; (4) Satisfaction with management; (5) Status; (6) Job placement; and (7) Job characteristics (Li et al., 2014; Yuen et al., 2018b). The second exogenous variable is work stress with six variable dimensions namely; (1) Physical stressor, (2) Psychosocial stressor, (4) Social stressor, (5) High workload, and (6) High management demand. Whereas seafarer performance as the intervening variable has four variable dimensions, namely; (1) Work quality; (2) Work quantity; (3) Discipline; and (4) Cooperation. The endogenous variable is shipping safety with four variable dimensions, namely; (1) Ship's seaworthiness; (2) Navigation; (3) Seafarer's competence; and (4) Standard Operating Procedure. Instrument Test Calibration is conducted through validity test and reliability test.

4. Results and Discussion

4.1. Validity and Reliability Tests

Based on the validity test on the job satisfaction variable, it can be known that 31 question items are stated to be valid, and one question item is not correct or *drop*ped. A question item is stated to be valid if $r_{statistics} > r_{table}$ at the significance of 5%, that is 0.356. From the result of the validity test on 32 statement items, 31 statement items are valid, and one statement item (item number 22) is not valid or *dropped*, so that only 31 statement items will be used as research instruments. Based on the validity test on the work stress variable, it can be known that 23 statement items are valid and one statement item is not valid or *dropped*. A statement item is considered to be valid if $r_{statistics} > r_{table}$ at the significance of 5%, that is 0.356. From the result of the validity test on 24 statement items, 23 statement items are valid, and one statement item (item number 22) is not valid or dropped, so that only 23 statement items will be used as research instruments.

Based on the validity test on seafarer performance variable, it can be known that 16 statement items are valid. A statement item is considered to be valid if $r_{statistics} > r_{table}$ at the significance of 5%, that is 0.356. From the result of the validity test on 16 statement items, all of them are valid and will be used as research instruments. Based on the validity test on shipping safety variables, it can be known that 21 statement items are valid. A statement item is considered to be valid if $r_{statistics} > r_{table}$ at the significance of 5%, that is 0.356. From the result of the validity test on 21 statement items, all of them are valid and will be used as research instruments. From the result of reliability test on the questionnaire, the reliability coefficients of each of four variables are obtained respectively 0.923, 0.880, 0.919, and 0.922, which are bigger than r_{table} at the significance of 5% , that is 0.361 so that all the questionnaire items are stated to be reliable and the coefficient values of the four variables are categorized as high. Thus, it can be concluded that this questionnaire is very reliable.

4.2. Results of Model Testing
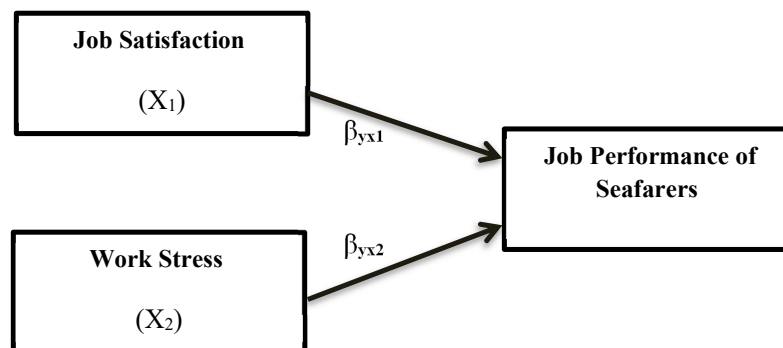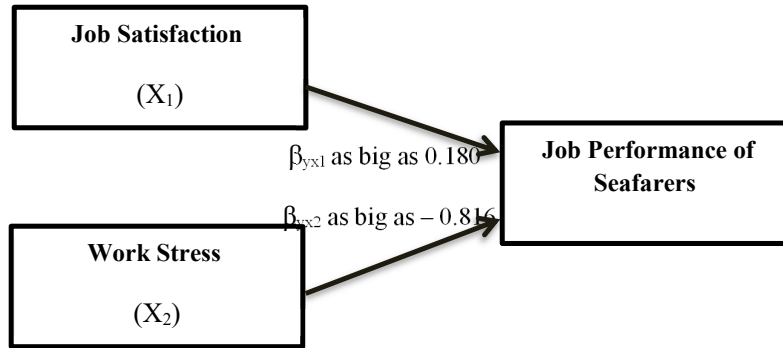
4.2.1. Result of Path Coefficient in Sub-Structure 1

Fig. 2. Causal Relationship in Sub-Structure 1

Table 1
Summary of the Result of Path Coefficient Test Sub-Structure 1

Path	Path Coefficient	Statistics	table ⟨ 0.05	Remarks
βyx1	0.180	3.075	1.990	Significant
βyx2	- 0.816	- 13.907	- 1.990	Significant

The analysis result proves that all the path coefficients are significant, so the model does not need to be improved by a trimming method. Based on the analysis result in Table 1, it is found that the value of path coefficient X_1 to Y as βyx1 is 0.180 and X_2 to Y as βyx2 is – 0.816. Whereas the coefficient of determinant or combination of X_1 and X_2 to Y as R_{square} is 0.987, meaning that 98.7 % of seafarer performance variable (Y) can be explained by job satisfaction variable (X1) and work stress (X2). The residual coefficient βy∑1 is (1 – 0.987 equals 0.114) is the influence from other than X_1 and X_2.

Fig. 3. Causal Relationship in Sub-Structure 1

4.2.2.   Path Coefficient in Sub-Structure 2
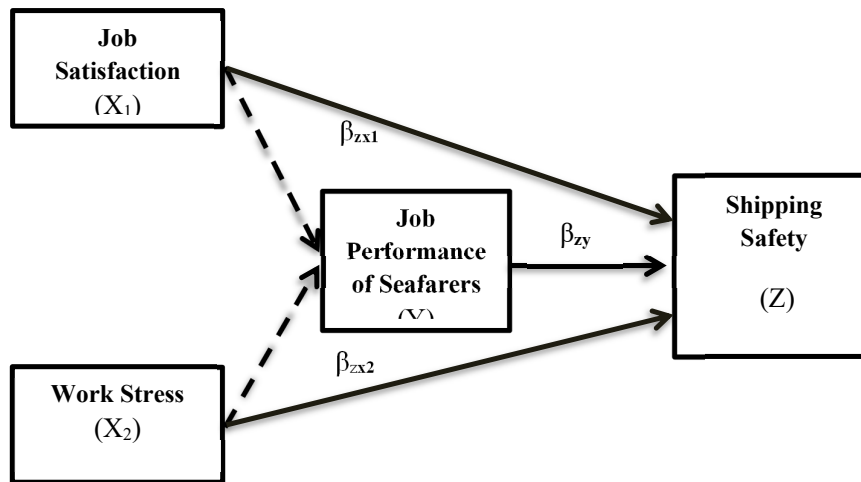
Fig. 4. Causal Relationship in Sub-Structure 2

Table 2
Recapitulation of Path Coefficient of Model 1 Sub-Structure 2

Path	Path Coefficient	statistic	table ⟨ 0.05	Remarks
®yx1	0.044	0.674	1.990	Not Significant
®yx2	- 0.186	- 1.691	- 1.990	Not Significant
®yy	0.765	6.867	1.990	Significant

Table 2 shows that there is one significant path, namely the path coefficient between seafarer performance and shipping safety (®zy), and two insignificant path coefficients, namely between job satisfaction and shipping safety (®zx1) and path coefficient between work stress and shipping safety (®zx2). The analysis result proves that because there are insignificant path coefficients, namely between job satisfaction (X_1) and shipping safety (Z) and between work stress (X_2) and shipping safety (Z), then the model in Figure 4 needs to be improved by a trimming method. The necessary improvement to be made is by not including the variables of job satisfaction (X_1) and work stress (X_2) in the next statistical analysis because its path coefficient is not significant. Subsequently, a repeat test is done without including exogenous variables of job satisfaction (X_1) and work stress (X_2). Based on the result of path coefficient analysis in sub-structure 1 and sub-structure 2, the whole causal relationships among the variables of X_1, X_2, and Y with Z can be described (Fig. 5).
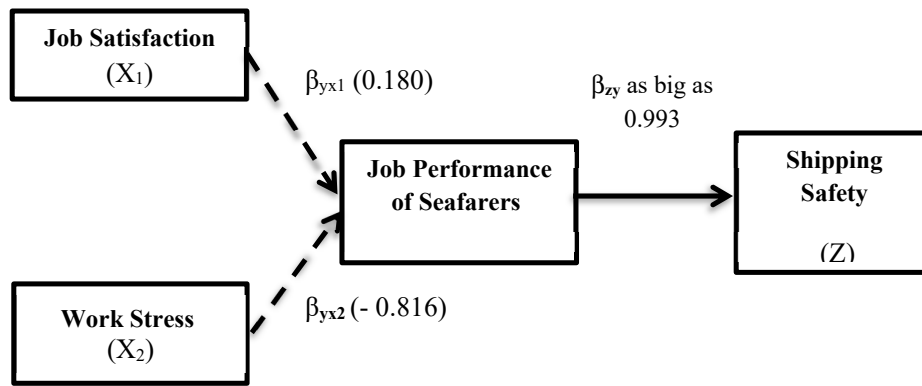

Fig. 5. Causal Relationship among the Variables of X_1, X_2, and Y to Z

4.3. Result of Hypothesis Testing

Hypothesis testing is conducted to know the direct and indirect influences among the variables. The proposed hypothesis will be concluded through a calculation of path coefficient value and the significance of each path being studied. The result of decision against all the hypotheses proposed is explained as follows:

H1. *Job Satisfaction (X_1) on Seafarer Performance (Y)*

From the analysis result, the value of path coefficient β_{yx1} is 0.180 with the value of $t_{statistics}$ as big as 3.075 > t_{table} as big as 1.990, and the significance 0.003 < 0.05, then the path coefficient is considered as significant. This finding is interpreted that job satisfaction (X_1) directly influences seafarer performance (Y). From the first hypothesis testing it is known that the regression direction coefficient of job satisfaction variable (X_1) on seafarer performance (Y) is 0.180. Thus, it can be said that the variable of job satisfaction has a positive influence on seafarer performance, which means if the seafarer's job satisfaction is high, it will increase the level of seafarer performance and vice versa. Based on $t_{statistics}$, the value of $t_{statistics}$ is found 3.075. Then the first hypothesis is accepted. This shows that the variable of job satisfaction directly influences seafarer performance.

This research is in line with the opinion of Nguyen et al. (2014) that by having competent seafarers and fulfilled job satisfaction, shipping companies get profit through seafarers' high work productivity, less absenteeism, and minimum conflict. Seafarer performance is measured by productivity and quality that makes less mistakes. Furthermore, such a condition can benefit shipping companies, such as significant cost savings and service improvement. This research also supports the research by Christen et al. (2006) that job placement and work characteristics also positively influence job satisfaction. This research also aligns with the studies by Hancock et al. (2013) and Lannoo and Verhofstadt (2016), revealing the importance of studying job satisfaction in organizational behavior research related to positive correlation with employee performance, which finally boosts organizational performance. This research is also in line with the results of analysis carried out by Yuen et al. (2018b) and An et al. (2020) that job satisfaction has a positive impact on seafarer performance. Thus, the findings of this research support several theoretical studies and the results of previous relevant research.

H2. *Work Stress (X_2) on Seafarer Performance (Y)*

From the result of analysis, the value of path coefficient β_{yx2} is -0.816 with $t_{statistics}$ as big as -13.907 > t_{table} as big as -1.990, and significance of 0.000 < 0.05, so the path coefficient is stated to be significant. This finding is interpreted that work stress (X_2) directly influences seafarer performance (Y). From the result of the second hypothesis testing, it is known that the regression direction coefficient of the work stress variable (X_2) on seafarer performance (Y) is -0.816, so it can be said that the work stress variable has a negative influence on seafarer performance, meaning that if seafarer's work stress is high then seafarer performance will be lower and vice versa. Work stress variable (X_2) directly influences seafarer performance (Y).

Based on $t_{statistics}$, its value is found -13.907, the $t_{statistics} > t_{table}$, so that the second hypothesis is accepted. This indicates that work stress variable directly influences seafarer performance.

The result of this research supports the theory proposed by Iaffaldano and Muchinsky (1985) saying that appropriate interaction will result in high performance, satisfaction and low stress, whereas disharmonious interaction causes poor job performance, dissatisfaction and high stress. The same thing is stated by Hidayati and Rahmawati (2016) in her finding that shows a negative correlation between work stress and employee performance. It means the higher the work stress, the lower the employee performance will be. Work stress becomes very important because if a seafarer experiences stress, it can reduce his enthusiasm to perform his obligation totally. Therefore, stress becomes a seafarer's actualization to increase his productivity. So, it can be predicted that work stress directly influences seafarer performance. Thus, the result of this research supports several theoretical studies and the results of previous relevant research.

H3. *Job Satisfaction (X_1) on Shipping Safety (Z)*

From the result of analysis, the value of path coefficient β_{yx1} is obtained 0.044 with $t_{statistics}$ as big as $0.674 < t_{table}$ as big as 1.990 and the significance at $0.502 > 0.05$, then H_0 is accepted or the path coefficient is considered as not significant. This finding is interpreted that job satisfaction (X_1) indirectly and insignificantly through seafarer performance influences shipping safety (Z). From the result of the third hypothesis test it is known that the regression direction coefficient of job satisfaction variable (X_1) on shipping safety (Z) is 0.044. So, it can be said that job satisfaction variable has a positive influence on shipping safety, meaning that if the level of seafarer job satisfaction is high then it will increase the shipping safety and vice versa. Based on $t_{statistics}$, the $t_{statistics}$ is found as big as 0.674, so the hypothesis is clearly accepted. This shows that the job satisfaction variable indirectly, through seafarer performance, influences shipping safety.

The result of this research is stated as not significant, different from the opinion of Österman et al. (2020) that low employee satisfaction and seafarer fatigue play an effective role in causing accidents and contribute to safety. Hapsari et al. (2021) found that the factor influencing safety behavior is employee satisfaction with safety activities. Ayim Gyekye and Salminen (2010) that job satisfaction is related to safety indicators and safety perception. Mišković et al. (2022) state that the relations between job satisfaction and safety awareness perceived by seafarers, and this can influence seafarer's safety behaviour. Even though many researchers state that job satisfaction influences work safety, the finding of the third hypothesis in this research does not support some theoretical studies and previous relevant research.

H4. *Work Stress (X_2) on Shipping Safety (Z)*

From the result of analysis, the value of path coefficient β_{zx2} is obtained -0.186 with $t_{statistics}$ as big as $-1.691 < t_{table}$ -1.990, then the path coefficient is considered as not significant. This finding is interpreted that work stress (X_2) insignificantly and indirectly through seafarer performance influences shipping safety (Z). From the result of the fourth hypothesis test it is known that the regression direction coefficient of work stress variable (X_2) on shipping safety (Z) is -0.186. So, it can be said that work stress variable has a negative influence on shipping safety, meaning that if the level of seafarer work stress is high then it will decrease the shipping safety and vice versa. The $t_{statistics}$ is found as big as -1.691, then the fourth hypothesis is rejected. This indicates that work stress variable insignificantly and indirectly through seafarer performance influences shipping safety.

In fact, this research is not in line with the opinion of Jepsen et al. (2015) and Majid et al. (2022), stating that some human factors concerning shipping safety, such as fatigue, communication, decision-making, teamwork, and health are interrelated with work stress. Safety at sea is threatened if the ship crew are fatigued and not fully alert or taking a shortcut. Therefore, fatigue due to stress experienced by seafarers will influence the rate of ship accidents, which finally impacts the shipping safety. So, it can be predicted that work stress both directly influences shipping safety and indirectly influences shipping safety through seafarer performance. Thus, the finding of this research supports some theoretical studies and the results of previous relevant research.

H5. *Seafarer Performance (Y) on Shipping Safety (Z)*

From the result of analysis, the value of path coefficient β_{zy} is as big as 0.765 with $t_{statistics}$ as big as $6.867 > t_{table}$ 1.990, then the path coefficient is considered as significant. After the model has been changed and re-analyzed, the value of path coefficient β_{zy} is obtained as big as 0.993 with $t_{statistics}$ as big as $78.729 > t_{table}$ 1.990, then the path coefficient is considered as significant. This finding is interpreted that seafarer performance (Y) directly influences shipping safety (Z). From the result of the fifth hypothesis test it is known that the regression direction coefficient of seafarer performance variable (Y) on shipping safety (Z) is as big as 0.993. So, it can be said that seafarer performance variable has a positive influence on shipping safety, meaning that if the level of seafarer performance is high then it will increase the shipping safety and vice versa. The $t_{statistics}$ is found as big as 6.867, so it is clear that the fifth hypothesis is accepted, indicating that seafarer performance variable directly influences shipping safety.

The result of this research supports the finding of Fenstad et al. (2016), explaining that the increase in seafarer performance can improve a ship's completion time, fulfill the demand of the ship's owner for efficiency, and fulfill ship safety. Thus, the finding of this research supports some theoretical studies and previous studies.

After the results of analysis and statistical tests on the proposed hypotheses are obtained, they are summarized as presented in Table 3 below.

Table 3
Recapitulation of Hypotheses Test Results

No	Hypothesis	Statistical Test		Decision on H_0	Conclusion
1.	Job Satisfaction directly influences Seafarer Performance	H_0	: $\beta_{yx1} \leq 0$	H_0 is rejected	Directly influences
		H_1	: $\beta_{yx1} > 0$		
2.	Work Stress directly influences Seafarer Performance	H_0	: $\beta_{yx2} \leq 0$	H_0 is rejected	Directly influences
		H_1	: $\beta_{yx2} > 0$		
3.	Job Satisfaction directly influences Shipping Safety	H_0	: $\beta_{zx1} \leq 0$	H_0 is accepted	Indirectly influences
		H_1	: $\beta_{zx1} > 0$		
4.	Work Stress directly influences Shipping Safety	H_0	: $\beta_{zx2} \leq 0$	H_0 is accepted	Indirectly influences
		H_1	: $\beta_{zx2} > 0$		
5.	Seafarer Performance directly influences Shipping Safety	H_0	: $\beta_{zy} \leq 0$	H_0 is rejected	Directly influences
		H_1	: $\beta_{zy} > 0$		

Table 5
Percentage of Exogenous Variables' Influence (X_1, X_2, and Y) on Endogenous Variable (Z) in Sub-Structure 2

Variable	Direct Influence on Z (%)	Indirect Influence through Y (%)
Job Satisfaction (X_1)	-	17.87
Work Stress (X_2)	-	81.03
Seafarer Performance (Y)	98	-

5. Conclusion

It has been explained that the shipping safety variable is most dominantly and directly influenced by seafarer performance. Job satisfaction and work stress indirectly influence shipping safety through seafarer performance. Whereas seafarer performance variable is most dominantly influenced by seafarer work stress. It would be better if the improvement of shipping safety is carried out by improving job satisfaction and seafarer performance as well as decreasing the level of seafarer work stress. Out of those variables, the most dominantly having direct influence on shipping safety is seafarer performance. Therefore, the management should pay attention to that factor. Even though job satisfaction and work stress indirectly influence shipping safety, attention should be paid to the indirect influence on seafarer performance. Work stress variable in this research has a quite big influence on improving seafarer performance. Work stress is the factor that has a negative influence on seafarer performance. Based on this condition, the company needs to evaluate its policies that can potentially cause stress for seafarers. It needs real sustainable efforts to lower seafarer's stress, for example by providing adequate work facilities and infrastructures, ensuring the sufficient number of seafarers to handle various jobs, implementing good management to the seafarer work system including clear job description for each job, maintaining good work pattern and relations among seafarers, ensuring two-way communication and good cooperation between the management and seafarers, providing enough outing time and other efforts that can lower seafarer's stress. In this research, seafarer performance variable have a very big influence on the improvement of shipping safety. Based on such a condition, the company needs to evaluate its policies so as to improve seafarer performance in order to enhance shipping safety. It needs a policy on job division in accordance with seafarer's competence, target to achieve in accordance with seafarer's working hours, a good cooperation and communication system between crew and management, and so on so as to reduce the rate of ship accidents. This research can become a reference for other researchers who will conduct similar research, so that the results of research can be studied comprehensively against the limitations of research, such as the variables of communication information technology, organizational culture, etc. that influence shipping safety.

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