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The Effect of Personnel Competency and Work Environment on the Level of Effectiveness of the Safety Management System (Sms) Mediated with Compliance with Safety Procedures on Vessels Owned By Pt. Lautan Jaya Hasana

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Abstract: This study aims to analyze the influence of personnel competency and work environment on the effectiveness of the Safety Management System (SMS) mediated by safety procedure compliance on PT. Lautan Jaya Hasana's ships. The main issue raised in this research is the low level of compliance by ship crew members with safety procedures, as well as the suboptimal implementation of SMS, which impacts the operational safety of the ships. This study employs a quantitative approach with an explanatory research design. The population in this research consists of 83 ship crew members of PT. Lautan Jaya Hasana, with a sample selected using purposive sampling technique. Primary data were obtained through the distribution of questionnaires measuring respondents' perceptions of personnel competency, work environment safety, safety procedure compliance, and SMS effectiveness. Data analysis was performed using Structural Equation Modeling (SEM). The results show that personnel competency and work environment safety have a positive and significant impact on safety procedure compliance. Furthermore, safety procedure compliance was found to significantly influence the effectiveness of SMS. These findings emphasize the importance of enhancing personnel competency and improving work environment conditions to increase compliance with safety procedures, which ultimately leads to the effectiveness of Safety Management System (SMS) implementation on the ships. This study provides practical contributions to safety management in the maritime sector and enriches the empirical body of knowledge on the implementation of safety management systems in the shipping industry.

Keyword: Personnel Competency, Work Environment Safety, Safety Procedure Compliance, Safety Management System (SMS) Effectiveness.

INTRODUCTION

PT Lautan Jaya Hasana is a crew manning agency company, a shipping company that provides professional and qualified crew to several ship owners, both domestic and international. In addition to providing crew, the crew manning agency company also acts as a

recruitment agent and manages regular crew changes. PT Lautan Jaya Hasana focuses on providing crew for KSS Line. It can be seen that the companies collaborating with PT Lautan Jaya Hasana are foreign companies that require competent crew. Therefore, the company is required to provide crew who have the ability, skills, and knowledge that are experts in their fields and meet international standards. Therefore, shipping companies, especially ship manning agencies, must continue to improve the quality of crew competencies in accordance with current developments.

PT Lautan Jaya Hasana collaborates with Doriko, a maritime company involved in ship management and operations. Doriko, through its fleet management division, has significantly expanded its fleet, operating vessels registered in countries such as Korea, the Marshall Islands, and Panama. These vessels include cargo and tanker vessels such as the SJ Asia, SJ Busan, SEA Grace, SEA COEN, and G Poseidon. With Gross Tonnage (G/T) ranging from 28,073 to 88,494, these vessels are equipped with high-performance engines from manufacturers such as Mitsubishi, Wärtsilä, and MAN B&W, and operate worldwide, covering regions such as Korea, the Middle East, Australia, and Indonesia. This diversification supports PT Lautan Jaya Hasana's operations and growth in global shipping and logistics services. With the following vessel types:

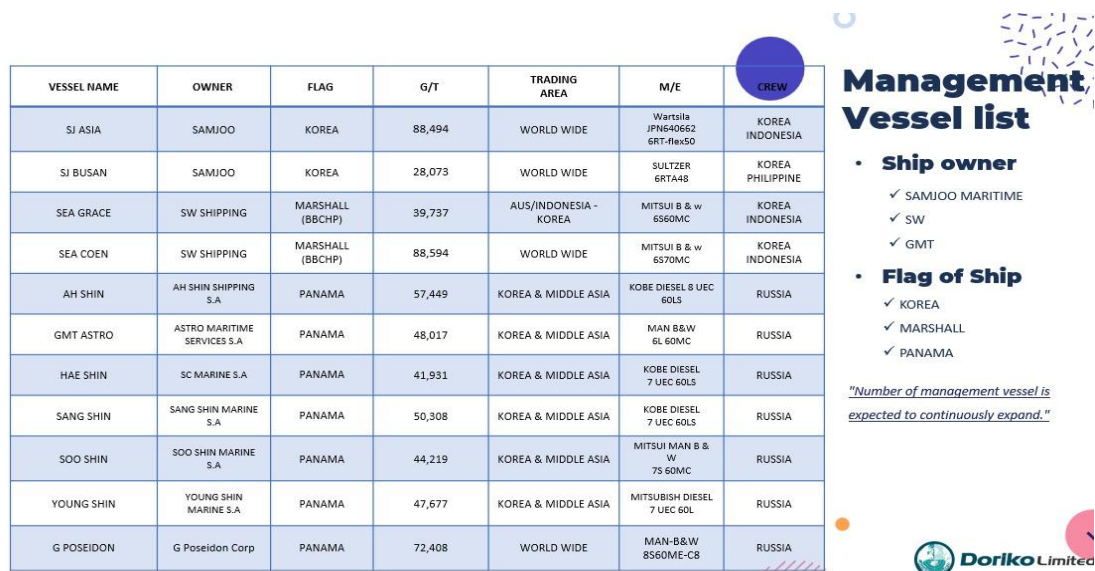


Figure 1. Management Vessel List

Regarding the Safety Management System (SMS), where an incident occurred on the PT Lautan Jaya Hasana vessel, it is clear that the Safety Management System (SMS) has not been implemented optimally. This is indicated by the unpreparedness in identifying risks, the lack of safety communication, and the weak mitigation system in preventing work accidents. In the crane hook incident at Incheon Port, no specific mitigation procedures were created to prevent the risk of the crane hook getting caught, which ultimately caused serious injuries to workers. Meanwhile, fires due to oil leaks in diesel engines and overheating in ACBs on other vessels indicate that poor maintenance and minimal post-repair inspections were the main factors causing the incidents. This condition reflects that the SMS has not been effective in detecting potential hazards before incidents occur, which result in material losses and serious injuries to workers.

Based on the data, the company provides SOPs that comply with existing international regulations, namely:

Tabel 1 Standard Operational Procedure for Safety of PT Lautan Jaya Hasana

No.	Safety SOP	SOP Description	International Regulations Reference	Implementation Frequency	Problem
1	Occupational Safety Training	Safety training program for all crew regarding emergency procedures, use of personal protective equipment (PPE), and accident response.	SOLAS (Safety of Life at Sea)	Every 6 months	Occupational safety training is carried out every 8 months.
2	Fire Extinguisher (APAR) Inspection	Regular inspection of fire extinguishers and other firefighting equipment to ensure proper function.	ISPS Code (International Ship and Port Facility Security Code)	Monthly	APAR inspections are often late and have not been carried out monthly.
3	Emergency Evacuation Procedures	Emergency evacuation procedures in the event of fire or other accident on board, including the use of life rafts.	SOLAS (Safety of Life at Sea)	Annual	Emergency evacuation simulations sometimes fall behind the annual schedule.
4	Use of Personal Protective Equipment (PPE)	Procedures to ensure that all crew use PPE according to the type of work, such as life jackets, masks and helmets.	IMO (International Maritime Organization)	Every time the work is in progress	Some crew do not always use PPE according to procedure.
5	Ship Security System Inspection	Routine inspections of ship safety systems, including evacuation training, fire fighting and safety equipment maintenance.	ISM Code (International Safety Management Code)	Every 3 months	Inspections of ship security systems are often not carried out in a timely manner.
6	Storage of Hazardous Materials	Procedures for safely storing and managing hazardous materials, including chemicals and fuels.	MARPOL (Marine Pollution)	According to the needs	Storage of hazardous materials is sometimes not up to standards.
7	Navigation and Communication Equipment Inspection	Routine checks of ship navigation and communication equipment, such as radar, radio and GPS systems.	SOLAS (Safety of Life at Sea)	Every 6 months	Navigation equipment checks were not carried out in a timely manner.

No.	Safety SOP	SOP Description	International Regulations Reference	Implementation Frequency	Problem
8	Engine Room Inspection	Regular inspection and maintenance of the engine room to ensure the engine system is functioning properly and safely.	ISM Code	Each month	Engine room inspections are sometimes not performed every month.
9	Preparation of Accident Reports	Procedures for reporting and analyzing safety-related accidents or incidents for follow-up and system improvement.	ISM Code	According to the incident	Some accident reports were submitted late or incomplete.
10	Ship Waste Management	Ship waste management and disposal procedures comply with international environmental regulations.	MARPOL (Marine Pollution)	Every voyage	Ship waste management sometimes does not comply with international regulations.

Although PT. Lautan Jaya Hasana has implemented various safety Standard Operating Procedures (SOPs) in accordance with international regulations, in reality, not all procedures are implemented properly. One of the main problems that arises is individual non-compliance with the established SOPs. This is primarily due to the lack of an effective enforcement mechanism. For example, in a ship collision incident, the 2nd Officer failed to assess the risk of collision and did not immediately report the dangerous condition to the captain, indicating that the system for monitoring compliance with navigation procedures was not yet effective. Although the Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) has set out clear procedures for avoiding collisions, compliance with these regulations remains low among some crew members.

This situation worsens safety standards and can increase the risk of more serious accidents in the future. Therefore, companies need to tighten oversight of workers' compliance with existing safety procedures. One step that can be taken is to implement a routine evaluation system to assess safety performance on board ships, as well as conducting regular compliance inspections. Furthermore, imposing strict sanctions on workers who fail to follow safety procedures is necessary to ensure safety is a top priority. Without consistent enforcement of SOPs, companies will face significant challenges in maintaining workplace safety and preventing incidents that could harm both the crew and the company.

METHOD

A research method is a systematic procedure or scientific technique used to obtain data for a specific purpose. Sugiyono (2024) defines descriptive research as a methodology that uses observation, interviews, or questionnaires to determine the current state of the subject being studied. Data is collected through surveys and similar methods to evaluate theories or answer questions. Descriptive research aims to explain the existing conditions being studied.

Sugiyono (2024:116) states that the population is divided into a sampling population, also called the research population, and a target population, which is larger than the sampling population. The sample population serves as a unit of analysis that provides information or data needed for a study or research. The target population consists of all analysis units in the research area. The general population of this study is all crew members on ships owned by PT. Lautan Jaya Hasana, with a target population of 83 crew members belonging to PT. Lautan Jaya Hasana in 2024 with ships at PT Lautan Jaya Hasana. The sample in this study used a saturated sampling technique with a target population of 83 crew members belonging to PT. Lautan Jaya Hasana in 2024. The sampled population consisted of crew members on the following vessels: MV. Sj Asia (20 crew), MV. Seagrease (20 crew), MV. Seacoen (20 crew), and MV. Gas Ivory (23 crew). This saturated sampling technique was chosen because all members of the population who met the research criteria were sampled.

This research uses the method partial least squares (PLS) for data analysis. In addition to validating hypotheses, PLS can explain the absence of relatedness between latent variables. PLS can simultaneously analyze constructs consisting of reflective and formative dimensions. This research will utilize software SmartPLS 3 for data analysis using the SEM-PLS methodology. PLS allows researchers to describe complex causal models that combine latent variables (shown as circles) and observable variables (shown as rectangles). Latent variables manifest as unobservable phenomena, including perceptions, attitudes, and intentions, while observable variables manifest as responses to questionnaire.

RESULTS AND DISCUSSION

This study was conducted through a survey using a questionnaire instrument. Distributed via Google Forms, the survey yielded 85 respondents who answered and were eligible for the research sample. Of the 85 respondents involved in this study, the majority were male (49 people) (57.6%), while 36 respondents were female (42.4%). This male dominance reflects the workforce structure in the merchant shipping sector at PT. Lautan Jaya Hasana, which has historically been predominantly male, particularly in technical and operational positions.

The high level of male involvement in the implementation of the Safety Management System (SMS) on board ships underscores the importance of understanding their competency and compliance with safety procedures. Based on age group, the majority of respondents were in the 20–30 years range, amounting to 38 people (44.7%), followed by 32 people aged 31–40 years (37.6%), and the remaining 15 people (17.6%) were aged over 41. This age composition indicates that most respondents are in their productive age and are adaptive to system changes, including the implementation of safety systems on ships.

This is important because this age group is usually quicker in absorbing new knowledge and applying safety standards consistently. In terms of their last level of education, the majority of respondents were Bachelor's (S1) graduates (49 people) (57.6%), followed by Diploma 3 (D3) graduates (21 people) (24.7%), High School graduates (13 people) (15.3%), and one each from Junior High School and Master's (1.2%). The dominance of S1 and D3 graduates indicates that respondents have sufficient academic capabilities to understand standard work procedures and the implementation of the Safety Management System (SMS). This formal education is an important foundation in supporting the effectiveness of the implementation of the safety system through increased competence and procedural compliance.

Research Result

Evaluation of Measurement (Outer) Model

According to the PLS determination method, a full structural model path diagram is obtained as explained below.

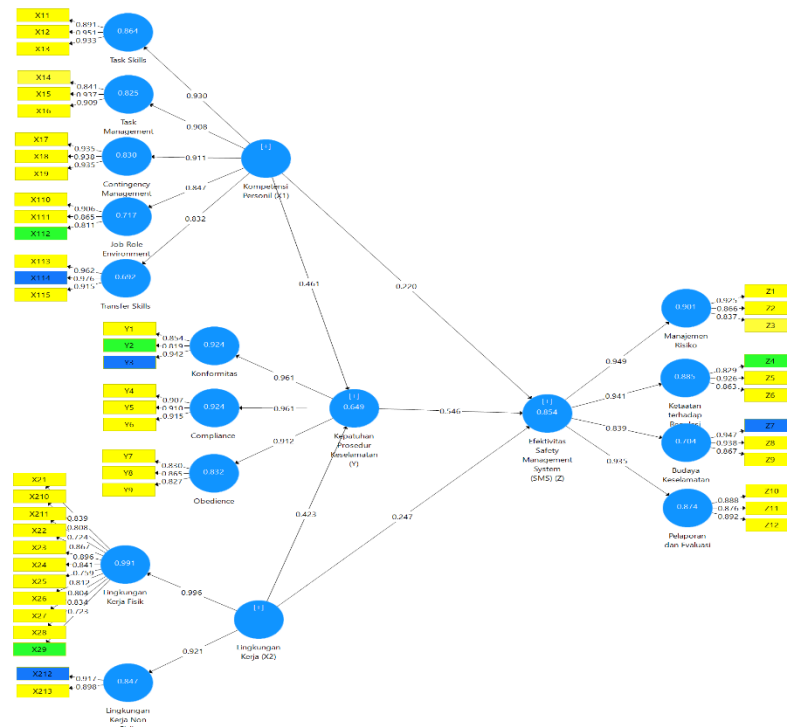


Figure 2 Full Structural Model (PLS Algorithm)

This explanation shows that the yellow boxes represent each indicator, while the blue circles represent the latent variables. Each arrow also has a number indicating the validity value of each indicator and testing the reliability of the construct of the studied variable. An indicator is considered valid if its factor weighting value is greater than 0.60.

Measurement Model Testing (Outer Model)

Covergent Validity

Presents data on the loading factor values associated with each manifest variable. All indicators included in the latent variables show loading factor values greater than 0.6, thus confirming the validity of all indicators.

Discriminant Validity Testing

Tabel 2 Discriminant Validity Testing

Variables	Average Variance Extracted (AVE)	Information
	Personnel Competence (X1)	
Work Environment (X2)	0.659	Valid
Safety Procedure Compliance (Y)	0.686	Valid
Safety Management System (SMS) Effectiveness (Z)	0.661	Valid

This test is conducted to determine the extent of the differences between variables. The value measured in this test is the average variance extracted (AVE). Overall, all variables have an AVE value > 0.5, thus being considered valid.

Tabel 3 Heterotrait-Monotrait Ratio (HTMT)

	Safety Management System (SMS) Effectiveness (Z)	Safety Procedure Compliance (Y)	Personnel Competence (X1)	Work Environment (X2)
Safety Management System (SMS) Effectiveness (Z)				
Safety Procedure Compliance (Y)	0.839			
Personnel Competence (X1)	0.819	0.775		
Work Environment (X2)	0.825	0.764	0.682	

According to the description above, it is stated that the variables used in this study have good discriminant validity in the preparation of each variable. The recommended measurement value for HTMT analysis in PLS has been set below 0.85, although values above 0.85, up to a maximum of 0.90, are still considered sufficient. In the HTMT criteria Tabel, if it is <0.9, it has met the discriminant validity test criteria.

Tabel 4 Fornell-Larcker Criterion Between Variables

	Safety Management System (SMS) Effectiveness (Z)	Safety Procedure Compliance (Y)	Personnel Competence (X1)	Work Environment (X2)
Safety Management System (SMS) Effectiveness (Z)	0.813			
Safety Procedure Compliance (Y)	0.889	0.829		
Personnel Competence (X1)	0.787	0.740	0.811	
Work Environment (X2)	0.790	0.727	0.660	0.812

The results of Tabel 4 of the Fornell-Larcker Criterion between all latent variables and the indicator variables shown in the Tabel above indicate that the value of one indicator is greater in calculating the variables of another construct. Based on these results, it can be stated that each indicator used has good discriminant validity to form its respective variables.

Tabel 5 Reliability Testing

Variables	Cronbach's Alpha	Composite Reliability	Cut of Value	Information
Personnel Competence (X1)	0.962	0.966		Reliable
Work Environment (X2)	0.957	0.962		Reliable
Safety Procedure Compliance (Y)	0.942	0.951	<0.70	Reliable
Safety Management System (SMS) Effectiveness (Z)	0.953	0.959		Reliable

Based on Tabel 5 above, it can be concluded that the constructs for all variables meet the reliability criteria. This is demonstrated by the Cronbach's Alpha and composite reliability values obtained from the SmartPLS estimation results. The resulting value is >0.70, as recommended by the criteria.

Structural Model (Inner Model)

The inner model will conduct an analysis where the causal influence between variables will be examined. In this section, several things will be tested:

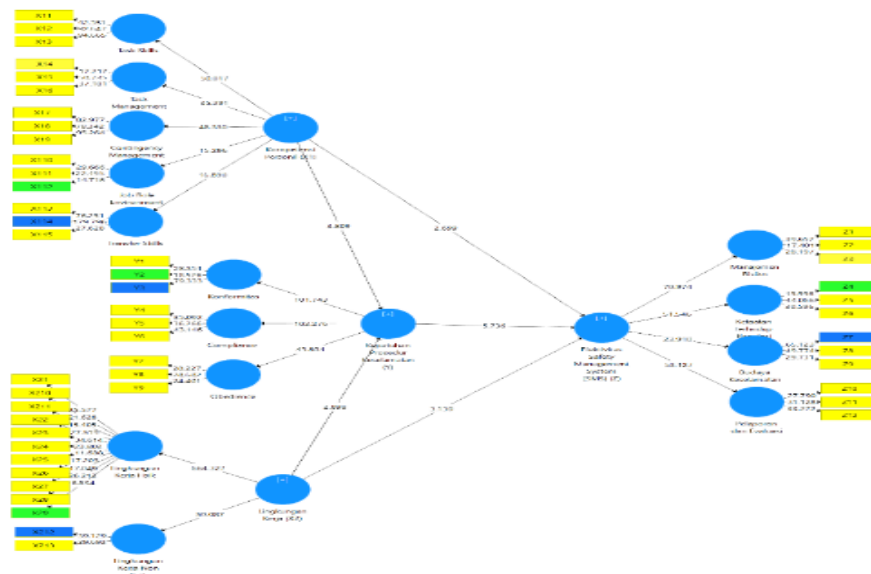


Figure 3 Bootstrapping

R-Square

Tabel 6 R-Square (R2) Test Results

	R Square
Safety Procedure Compliance (Y)	0.649
Safety Management System (SMS) Effectiveness (Z)	0.854

From Tabel 6 above it can be seen that the variables Safety Procedure Compliance has a large R2 value, the R2 value is 0.649, indicating that the contribution of the Personnel Competence and Work Environment variables is 64.9%, while the remaining 35.1% is the influence of other variables not used in this study. Variable Effectiveness of Safety Management System (SMS) chooseThe large R2 value is 0.854, indicating that the contribution of the variables Personnel Competence, Work Environment and Safety Procedure Compliance to Effectiveness of Safety Management System (SMS) selarge 85.4% while the remaining 14.6% is the influence of other variables not used in this study.

F-Square (F2)

Tabel 7 Resultsf-Square

Influence	Effect Size Value	Information
Personnel Competence (X1)-->Safety Procedure Compliance (Y)	0.342	Big Influence
Work Environment (X2)-->Safety Procedure Compliance (Y)	0.288	Moderate Influence
Personnel Competence (X1)-->Effectiveness of Safety Management System (SMS)	0.139	Moderate Influence
Work Environment (X2)-->Effectiveness of Safety Management System (SMS)	0.184	Moderate Influence

Safety Procedure Compliance (Y)-->Safety Management System (SMS) Effectiveness	0.715	Big Influence
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The results of Tabel 7 above show that Compliance with Safety Procedures has the strongest effect size in influencing Effectiveness of Safety Management System (SMS).

Predictive Relevance (Q-Squared)

Tabel 8 Q Squared Results

Variables	Q ² Square	Information
Safety Procedure Compliance (Y)	0.430	Moderate Predictive Relevance
Safety Management System (SMS) Effectiveness (Z)	0.551	Large Predictive Relevance

According to the Tabel above, the Safety Procedure Compliance variable has a Q2 value of 0.430, this Q-squared value is between 0.25-0.5, so it is said to have moderate predictive relevance. Effectiveness of Safety Management System (SMS) own The Q2 value is 0.551, the Q-squared value is above 0.5 so it can be considered to have strong predictive ability (large predictive relevance).

Hypothesis Testing Results (Boostrapping)

Hypothesis testing in this study was carried out by considering t-statistics and p-values. The hypothesis is considered accepted if the t-statistic > 1.64 (t-Tabel value) and p-values < 0.05. The following are the results. Path Coefficients direct influence:

Tabel 9 Direct and Indirect Influences

Hypothesis	Influence	Original Sample (O)	T Statistics (O/STDEV)	P Values	Information
H1	Personnel Competence (X1) -> Safety Procedure Compliance (Y)	0.461	3,642	0.000	Significant
H2	Work Environment (X2) -> Safety Procedure Compliance (Y)	0.423	2,785	0.006	Significant
H3	Personnel Competence (X1) -> Safety Management System (SMS) Effectiveness (Z)	0.220	2,592	0.010	Significant
H4	Work Environment (X2) -> Safety Management System (SMS) Effectiveness (Z)	0.247	3,096	0.002	Significant
H5	Safety Procedure Compliance (Y) -> Safety Management System (SMS) Effectiveness (Z)	0.546	5,696	0.000	Significant
H6	Personnel Competence (X1) -> Safety Procedure Compliance (Y) -> Safety Management System (SMS) Effectiveness (Z)	0.252	3,270	0.001	Significant
H7	Work Environment (X2) -> Safety Procedure Compliance (Y) -> Safety Management	0.231	2,642	0.009	Significant

Hypothesis	Influence	Original Sample (O)	T Statistics (O/STDEV)	P Values	Information
	System (SMS) Effectiveness (Z)				

The Direct Influence Of Personnel Competence On Safety Procedure Compliance.

Based on the Tabel above, it shows that the Personnel Competence variable has a direct influence on the Safety Procedure Compliance variable. This condition is clarified through the test results which show a path coefficient of a number of 0.461 (>0) and the T statistic value is 3.642 (t count > t Tabel, 5% significance = 1.64), so that Hypothesis 1 is accepted. Therefore, it can be concluded that H1 is accepted, so there is a positive and significant direct influence of Personnel Competence on Safety Procedure Compliance.

The Direct Influence Of The Work Environment On Safety Procedure Compliance.

Based on the Tabel above, it shows that the Work Environment variable has a direct influence on the Safety Procedure Compliance variable. This condition is clarified through the test results which show a path coefficient of a number of 0.423 (>0) and the T statistic value is 2.785 (t count > t Tabel, 5% significance = 1.64), so Hypothesis 2 is accepted. Therefore, it can be concluded that H2 is accepted, so there is a positive and significant direct influence of the Work Environment on Safety Procedure Compliance.

The Direct Influence Of Personnel Competence On The Effectiveness Of The Safety Management System (SMS).

Based on the Tabel above, it shows that the Personnel Competence variable has a direct influence on the Safety Management System (SMS) Effectiveness variable. This condition is clarified through the test results which show a path coefficient of a number of 0.220 (>0) and the T statistic value is 2.592 (t count > t Tabel, 5% significance = 1.64), so that Hypothesis 3 is accepted. Therefore, it can be concluded that H3 is accepted, so there is a positive and significant direct influence of Personnel Competence on the Effectiveness of the Safety Management System (SMS).

The Direct Influence Of The Work Environment On The Effectiveness Of The Safety Management System (SMS).

Based on the Tabel above, it shows that the Work Environment variable has a direct influence on the Safety Management System (SMS) Effectiveness variable. This condition is clarified through the test results which show a path coefficient of a number of 0.247 (>0) and the T statistic value is 3.096 (t count > t Tabel, 5% significance = 1.64), so that Hypothesis 4 is accepted. Therefore, it can be concluded that H4 is accepted, so there is a positive and significant direct influence of the Work Environment on the Effectiveness of the Safety Management System (SMS).

The Direct Influence Of Safety Procedure Compliance On The Effectiveness Of The Safety Management System (SMS).

Based on the Tabel above, it shows that the Safety Procedure Compliance variable has a direct influence on the Safety Management System (SMS) Effectiveness variable. This condition is clarified through the test results which show a path coefficient of a number of 0.546 (>0) and the T statistic value is 5.696 (t count > t Tabel, 5% significance = 1.64), so that Hypothesis 5 is accepted. Therefore, it can be concluded that H5 is accepted, so there is a

positive and significant direct influence of Safety Procedure Compliance on the Effectiveness of the Safety Management System (SMS).

The Direct Influence Of Personnel Competence On The Effectiveness Of The Safety Management System (SMS) Through Safety Procedure Compliance.

Based on the Tabel above, it shows that the Personnel Competence variable has an indirect influence on the Safety Management System (SMS) Effectiveness variable through Safety Procedure Compliance. This condition is clarified through the test results which show a path coefficient of a number of 0.252 (>0) and the T statistic value is 3.270 ($t \text{ count} > t \text{ Tabel}$, 5% significance = 1.64), so that Hypothesis 6 is accepted. Therefore, it can be concluded that H_6 is accepted, so there is a positive and significant indirect influence of Personnel Competence on the Effectiveness of the Safety Management System (SMS) through Safety Procedure Compliance.

The Direct Influence Of The Work Environment On The Effectiveness Of The Safety Management System (SMS) Through Safety Procedure Compliance.

Based on the Tabel above, it shows that the Work Environment variable has an indirect influence on the Safety Management System (SMS) Effectiveness variable. This condition is clarified through the test results which show a path coefficient of a number of 0.231 (>0) and the T statistic value is 2.642 ($t \text{ count} > t \text{ Tabel}$, 5% significance = 1.64), so that Hypothesis 7 is accepted. Therefore, it can be concluded that H_7 is accepted, so there is a positive and significant indirect influence of the Work Environment on the Effectiveness of the Safety Management System (SMS) through Safety Procedure Compliance.

CONCLUSION

Personnel Competence has a significant influence on Safety Procedure Compliance. Shows that increasing personnel competencies, such as skills in task and contingency management, significantly improves compliance with safety procedures. With a t-value of 3.642 which is greater than 1.64, and a significance value smaller than 0.05, this indicates a strong and significant relationship.

Work Environment has a significant influence on Compliance with Safety Procedures. These results indicate that work environment conditions, both physical and non-physical, significantly influence compliance with safety procedures. The t-test of 2.785 (greater than 1.64) and a significance value of less than 0.05 indicate a significant effect.

Personnel Competence has a significant influence on the Effectiveness of the Safety Management System (SMS). Shows that personnel's ability to manage tasks, risks, and skill transfer significantly influences the effectiveness of the safety management system. The t-count of 2.592, which is greater than 1.64 and the sig value is less than 0.05, strengthens this relationship.

The work environment has a significant influence on the effectiveness of the Safety Management System (SMS). The work environment, both physical and non-physical, also has a significant influence on the effectiveness of SMS, with a t-count of 3.096 and a sig value less than 0.05. This indicates that good working conditions contribute to more effective safety performance.

Safety Procedure Compliance has a significant impact on the Effectiveness of the Safety Management System (SMS). This conclusion reveals that the level of compliance with safety procedures directly affects the overall effectiveness of the safety management system. The t-count of 5.696 (greater than 1.64) and the sig value of less than 0.05 indicate a strong influence.

Personnel Competence has a significant influence on the Effectiveness of the Safety Management System (SMS) through Compliance with Safety Procedures. Shows that personnel competence contributes to the effectiveness of SMS, but its influence occurs through increased

compliance with safety procedures. The t-count of 3.270 which is greater than 1.64 and the sig value is less than 0.05 indicates that the direct influence of personnel competence on SMS requires procedural compliance as a mediator.

The work environment has a significant influence on the effectiveness of the Safety Management System (SMS) through safety procedure compliance.. These results indicate that the work environment, especially those that support good physical and non-physical conditions, influences the effectiveness of SMS through its influence on compliance with safety procedures. The t-count of 2.642 is greater than 1.64 and the sig value is less than 0.05, confirming that the influence of the work environment on SMS is also indirect, through increased compliance with safety procedures

REFERENCE

- Abari, J. B., Cortez, R. O. F., & Sario, J. A. (2024). Safety culture of approved training organizations: Basis for an emergency response plan manual. *SIBATIK Journal*, 3(7).
- Abdillah, W., & Jogiyanto, H. (2015). Partial Least Square (PLS) : Alternatif Structural Equation Modeling (SEM) dalam Penelitian Bisnis. Yogyakarta: ANDI.
- Adi, E. N., Eliyana, A., & Hamidah. (2021). An empirical analysis of safety behaviour: A study in MRO business in Indonesia. *Heliyon*, 7, e06122.
- Al-Amin, M. R., et al. (2020). The role of compliance to safety procedures in maritime accident prevention. *International Journal of Maritime Safety*, 12(4), 142-156.
- Almeida, J. D., et al. (2020). Maritime work environment and its impact on safety. *Journal of Maritime Operations*, 19(2), 66-75.
- Baihaki, A., Syafrizal, S., & Purnomo, A. (2022). Safety Management System dalam industri pelayaran: Implementasi dan tantangan. *Jurnal Ilmiah Wahana Pendidikan*, 8(2), 120-135.
- Bakar, A., et al. (2021). The role of personnel competence in maritime safety. *Journal of Maritime Safety*, 34(4), 123-137.
- Barasa, L., Malau, A. G., Hidayat, A., & Purnamasita, L. (2018). Pengaruh penggunaan peralatan bongkar muat terhadap produktifitas bongkar muat di PT. Pelindo II Cabang Pontianak. *METEOR STIP Marunda*, 11(2).
- Chen, C.-F., & Chen, S.-C. (2014). Measuring the effects of Safety Management System practices, morality leadership and self-efficacy on pilots' safety behaviors: Safety motivation as a mediator. *Safety Science*, 62, 376–385.
- Ghozali dan Latan, (2015) Aplikasi Analisis Multivariate dengan Program IBM SPSS 23, Badan Penerbit Universitas Diponegoro-Edisi 8
- Ghozali, I (2016) Reliabilitas dan Validitas. Yogyakarta : Pustaka Pelajar
- Ghozali, I. (2015). Aplikasi Analisis Multivariate dengan Program IBM SPSS. Badan Penerbit Universitas Diponegoro.
- Goh, C., & Cheung, D. (2021). Safety procedures and crew compliance in maritime operations. *Maritime Risk Review*, 22(3), 98-105.
- Gunawan, T., Hendriono, P., & Arief, M. (2008). Analisis faktor-faktor yang berpengaruh terhadap produktivitas bongkar muat kontainer di dermaga Berlian Surabaya (Studi Kasus PT. Pelayaran Meratus). *WIDYA TEKNIK*, 7(1), 79–89.
- Hariansyah, F. H., & Ulfa, R. (2024). Analisis Safety Management System (SMS) dalam menangani bahaya hewan liar di area airside Bandar Udara Rahadi Oesman Ketapang. *MESIR: Journal of Management Education Social Sciences Information and Religion*, 1(2).
- Harrison, S., & Lees, M. (2020). Competence and its relationship to ship safety. *International Journal of Marine Safety*, 41(1), 55-72.

- Henseler, J., Ringle, C. M., & Sarstedt, M. (2014). A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling. *Journal of the Academy of Marketing Science (JAMS)*, Vol. 43, No. 1, 115-1
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A New Criterion for Assessing Discriminant Validity in Variance-based Structural Equation Modeling. *Journal of the Academy of Marketing Science*
- Indarti, D., Laraswati, D., & Marlina, M. (2021). Influence of employee competence and work environment on the quality of fire management services with AHP method. *TELKOMNIKA: Journal of Technology and Open Source*, 4(2), 270–279.
- Jalil, A., et al. (2022). Maritime Competence and Safety: Bridging the Gap. *Journal of Seafarer Studies*, 8(3), 191-202.
- Jogiyanto & Abdillah, (2014). *Konsep & Aplikasi PLS (Partial Least Square) untuk Penelitian Empiris*. Yogyakarta: BPF.
- Johny Malisan. (2014). Pengaruh pelayanan kapal dan barang terhadap kinerja produktivitas bongkar muat Pelabuhan Sunda Kelapa. *J.Pen.Transla*, 16(2), 81–86.
- Jung, Y., et al. (2020). Effectiveness of Safety Management Systems in maritime industries. *Marine Safety Management Journal*, 27(1), 45-59.
- Kanaf, Y. R., FoEh, J. E. H. J., & Manafe, H. A. (2023). Pengaruh kesehatan keselamatan kerja (K3), kompetensi, dan lingkungan kerja terhadap kinerja tenaga kerja. *Jurnal Ilmiah Manajemen Transportasi*, 4(6).
- Kassim, S., & Zulkifli, A. (2020). Competence in Maritime Risk Management. *Journal of Transportation Safety*, 12(3), 109-123.
- Koharudin, M., Ricardianto, P., Saribanon, E., & Rafi, S. (2024). The influence of the Safety Management System (SMS) and the role of organizations on aviation safety through safety culture at XYZ airport. *Dinasti International Journal of Economics, Business, and Management Science*, 6(2).
- Kurniawan, D. A., Widanti, N. S., & Syanti, W. R. (2023). Iklim keselamatan, kompetensi, dan perilaku keselamatan pada pelaut. *Jurnal Psikologi Poseidon*, 6(2).
- Lai, Y., et al. (2021). Work environment and safety in the maritime industry: A review. *Journal of Occupational Safety and Health*, 44(2), 88-101.
- Lee, K., et al. (2021). Maritime safety: The role of safety procedures and compliance. *International Journal of Maritime Safety*, 39(2), 114-129.
- Malau, A. G. (2023). The Effect of Work-Life Balance on Higher Education Employee Performance: Moderation of Organizational Support and Job Satisfaction Level. *Journal of Innovation in Educational and Cultural Research*, 4(2), 254–263. <https://doi.org/10.46843/jiecr.v4i2.681>
- Malau, A. G., Barasa, L., & Sumali, B. (2019). Effect of competence and ship crew discipline on performance PT. Myclin Express Offshore. *International Review of Management and Marketing*, 9(5), 39-46.
- Malau, A. G., Barasa, L., & Utami, A. P. (2021). Pengaruh kompetensi dan kompensasi terhadap kepuasan kerja awak kapal PT Amas Iscindo Utama. *International Review of Management and Marketing*, 11(3), 56-63.
- Malau, A. G., Togatorop, A. L., & Sabpatari, F. (2021). Pengaruh kompetensi dan motivasi karyawan terhadap kinerja pelayanan penerbitan sertifikat kapal di Kantor KSOP Khusus Batam. *Management Science & Marketing*, 14(2), 123-130.
- Manurung, S., Keke, Y., & Ratnasari, D. (2022). Pengaruh kompetensi dan kedisiplinan terhadap keselamatan kerja awak kapal KM. Sabuk Nusantara 90 pada PT. PELNI Tahun 2020. *Journal of Current Research in Business and Economics*, 1(2), 45-57.
- Melissa, A. C., Subagyo, T. H., Suharno, H., & Majid, S. A. (2017). Penerapan Safety Management System dan kompetensi pemandu lalu lintas penerbangan. *Jurnal Manajemen Transportasi & Logistik*, 4(1).

- Nugraha, W., Amalia, D., Soleh, A. M., Masitoh, F., & Abdullah, A. (2020). Pelatihan Safety Management System bagi pegawai unit penyelenggara Bandar Udara Gusti Syamsir Alam Kotabaru. *Darmabakti: Jurnal Inovasi Pengabdian dalam Penerbangan*, 1(1).
- Nugrahayani, T., & Bunahri, R. R. (2024). The influence of safety culture on aviation safety through the implementation of Safety Management System in Papua. *Dinasti International Journal of Economics, Business, and Management Science*, 6(1).
- Nwokocha, R., et al. (2022). Effectiveness of Safety Management Systems in Maritime Safety. *Maritime Safety Review*, 14(2), 75-89.
- Palendeng, F. O., & Bernarto, I. (2022). Pengaruh iklim keselamatan, sistem manajemen keselamatan, dan perilaku keselamatan terhadap budaya keselamatan staf klinis di RS Gunung Maria. *Jurnal Ilmiah Manajemen Bisnis dan Inovasi Universitas Sam Ratulangi*, 9(3), 1599-1616.
- Park, J., et al. (2022). The influence of working environment on maritime safety. *Maritime Safety and Operations Journal*, 32(1), 45-58.
- Poerwanto, E. (2019). The analysis of implementing Safety Management System (SMS) to improve the flight safety. *Prosiding Seminar Nasional Teknologi Informasi dan Kedirgantaraan*, Vol. V.
- Rahmada, R., Sihombing, S., & Sonny, I. (2024). Pencegahan risiko kecelakaan dan kepatuhan peraturan keselamatan kapal pelayaran internasional. *Jurnal Manajemen Transportasi & Logistik*, 11(1).
- Santos, S., et al. (2021). Evaluation of Safety Management System performance in maritime operations. *Journal of Maritime Safety*, 45(3), 102-115.
- Saputra, D. P. (2023). Penerapan sistem manajemen keselamatan kapal sesuai ISM-Code. Deepublish Publisher.
- Saputra, D. P. (2023). Penerapan Sistem Manajemen Keselamatan Kapal sesuai ISM-Code. Deepublish Publisher.
- Sarwono, J. (2012). *Metode Riset Skripsi Pendekatan Kuantitatif*. Jakarta: PT Elex Media
- Sekaran, U (2017) *Research Methods for business: A Skill Building Approach*. Singapore: John Wiley & Sons, Inc.
- Selasdini, V., Barasa, L., & Wartono. (2018). Pengaruh ketersediaan utilisasi alat bongkar muat pelabuhan terhadap kinerja produktifitas di Pelabuhan Batu Ampar Batam. *METEOR STIP Marunda*, 11(2).
- Singh, R., et al. (2020). Environmental factors affecting maritime safety: A study of risk management. *Maritime Safety Studies*, 23(2), 34-47.
- Siregar, V. Selasdini., Haryati, S., & Rizq, M. D. (2021). Pengaruh kebijakan perusahaan mengenai penempatan pelaut berijazah kompetensi kelas III sebagai juru mudi dan juru minyak terhadap pengembangan karir pelaut di atas kapal milik PT Tanto Intim Line. *Jurnal Ilmu Pelayaran*, 3(1), 25-32.
- Su, W.-J. (2021). The effects of Safety Management Systems, attitude and commitment on safety behaviors and performance. *International Journal for Applied Information Management*, 1(4), 187-200.
- Sugiyono, (2024) *Metode Penelitian Pendidikan*. Bandung: Alfabeta
- Sumali, B., Barasa, L., & Gunawan, A. (2021). The influence of ship's seaworthiness and compensation system towards ship's crew job satisfaction at PT. Humpuss Bulk Transportation Jakarta. *International Review of Management and Marketing*, 11(4), 27-34.
- Thomas, M. J. W. (2012). A systematic review of the effectiveness of Safety Management Systems. *ATSB Transport Safety Report*.
- Triadmojo, A., & Haryati, E. S. (2022). Penerapan sistem manajemen keselamatan (SMS) di Bandar Udara Rahadi Oesman Ketapang. *Jurnal Kewarganegaraan*, 6(3).

- Wang, J., et al. (2021). The impact of crew competence on maritime safety performance. *Maritime Safety Technology*, 22(4), 74-88.
- Wang, X., et al. (2022). Effectiveness of Safety Management System in reducing maritime accidents. *Journal of Maritime Safety Research*, 31(1), 23-40.
- Wright, D., et al. (2022). Compliance with maritime safety procedures: A review of challenges and solutions. *Maritime Risk and Safety Review*, 25(3), 145-160.
- Zgair, L. A., Makhbul, Z. K. M., Abdullah, N. A., & Omar, A. R. C. (2023). The relationship of occupational safety management practices with employee performance: The mediating role of organisational justice. *International Journal of Professional Business Review*, 8(8), e03091.
- Zhang, Q., et al. (2020). Safety Management System in maritime: Integration and effectiveness. *Journal of Maritime Safety*, 40(2), 91-104.
- Zhao, X., et al. (2020). Maritime personnel competency and safety management. *Marine Technology Review*, 19(2), 42-56..