

Charting an Integrated Course to Enhance Indonesian Seafarers' Quality and Well-Being

**Gatot Cahyo Sudewo^{a,1*}, Muhammad Yamin Yinca^{b,2}, Tjuk Sukardiman^{c,3},
Theresye Yoanita Octora^{d,4}**

^{a,c,d}Institut Transportasi dan Logistik Trisakti, Jln. IPN Kebon Nanas No.2 Cipinang Besar Selatan, Jakarta Timur, Indonesia

^bUniversitas Hasanuddin, Jl. Perintis Kemerdekaan, Makassar, Sulawesi Selatan

^{1*} gatot@polimarin.ac.id, ² muhyamin@gmail.com, ³ tjuksukardiman@itltrisakti.ac.id, ⁴ yoanita.oct@gmail.com

*corresponding e-mail

This is an open access article under the terms of the CC-BY-NC license

ABSTRACT

A comprehensive solution through an integrated strategic management approach, focusing on these four elements can be optimized simultaneously. Legal protection, training, and improving working conditions and safety culture will create a safer and more productive environment, realizing optimal mental health performance and seafarer quality. Quantitative approach through Structural Equation Modelling with the help of AMOS software. Data were obtained from a survey involving 280 seafarers, shipping company managers, and industry regulators. The AMOS SEM analysis technique evaluated the direct and indirect relationships between the variables. Legal protection, training, working conditions, and safety culture have a significant influence on the mental health and quality of Indonesian seafarers. The findings highlight the importance of improving legal protection, training, working conditions, and safety culture in enhancing mental health and overall seafarer performance. The structural model demonstrated a good fit to the data, supporting the implementation of comprehensive management strategies to elevate seafarers' well-being and performance in the global shipping industry.

Keywords: integrated management, mental health, seafarer quality, productivity, safety culture.

A. Introduction

Indonesia, as one of the world's largest maritime nations, has a significant contribution to the global shipping industry. With the world's second-longest coastline and strategic geographical position, Indonesia's maritime sector plays a vital role in the national economy. Indonesian seafarers, numbering in the thousands, form the backbone of the sector, playing an important role in international trade, transport, and logistics. However, despite their critical role, the quality and well-being of Indonesian seafarers still face many challenges,

including a lack of strong legal protections, limited quality training, inadequate working conditions, and a lackluster safety culture. (Brooks & Greenberg, 2022; Wahyuni et al., 2022)

The mental health and quality of Indonesian seafarers is a crucial aspect that affects safety and operational effectiveness in the shipping industry. Seafarers often face significant challenges related to harsh working conditions, psychological stress, and lack of legal protection and adequate training. Studies show that these factors directly affect seafarers' well-being and the quality of their work.

(Gamasatri et al., 2024; Russo et al., 2023). Developed maritime nations like Norway, Japan, and South Korea to developing ones like Indonesia, implement safety protocols, with the International Maritime Organization (IMO) regulations, particularly the ISM Code, playing a critical role in standardizing safety culture worldwide, while recent studies emphasize the mitigation of human error through enhanced safety training to reduce accidents in shipping.

In recent years, the issue of legal protection has become a serious concern. A global perspective on legal protection compares international frameworks, such as the *Maritime Labour Convention* (MLC 2006), with national laws in countries like Indonesia, highlighting legal challenges seafarers face (abandonment, unpaid wages) and the role of unions like the *International Transport Workers' Federation* (ITF) dan Kesatuan Pelaut Indonesia (KPI) and other *Maritime Non-governmental Organization* (NGO) in advocating for their rights and addressing enforcement discrepancies worldwide. Seafarers often face legal risks associated with unfair labor agreements and are often not adequately protected by international regulations. This creates uncertainty and demotivates them from working. On the other hand, limited access to quality training is a major challenge in facing global competition. The need to meet international competency standards, as required by the *International Maritime Organisation* (IMO), is urgent (Funmilayo Aribidesi Ajayi & Chioma Ann Udeh, 2024; Kulkarni, 2013).

Global trends in seafarer training reveal variations in programs across countries, with advanced maritime nations like the Philippines leading in structured training, while technology, including simulators and AR/VR, is transforming training methods, and continuous education is becoming a priority as companies invest in lifelong skill development to align with technological advancements. Inadequate training can result in seafarers' limited technical capabilities and reduced

productivity. In addition, working conditions on ships, which often involve long working hours, stressful environments, and high safety risks, exacerbate the situation. The incidence of maritime accidents in Indonesia highlights the importance of enhancing the safety culture in seafarers' work environment. Without an effective safety management approach, the risk of accidents and reduced productivity increases. Therefore, focusing on developing a safety culture is one of the top priorities in the seafarers' welfare improvement strategy (Brooks & Greenberg, 2022; van Nunen et al., 2022).

A comparative analysis of seafarers working conditions reveals global disparities in wages, work hours, and onboard amenities, with stronger regulations providing better conditions in some regions, while mental health challenges, exacerbated by the COVID-19 pandemic and extended contracts, have become a global concern addressed by shipping companies and international bodies like the IMO and ILO. Given these complex challenges, research that integrates integrated management strategies through optimizing legal protection, training, working conditions, and safety culture is critical. An integrated approach can help create a safer working environment, improve seafarers' competencies, and promote better welfare and productivity (Baygi et al., 2022; Carrera-Arce et al., 2023; Çelik Maşalacı, 2024).

Studies suggest that collaboration between governments, the shipping industry, and seafarers can lead to more effective and holistic policies in addressing these challenges (Rahman et al., 2023). The incorporation of Human Resource Management (HRM) Theory and Employee Welfare Theory to improve the quality and welfare of seafarers. HRM, as described by Becker & Huselid (1999), emphasizes the management of training and working conditions to improve productivity and satisfaction, while Warr, (1990) underlines the importance of physical, mental, and social well-being influenced by a safe working environment. This combination of theories is

designed to create a better training strategy and safety culture for seafarers (Zhen et al., 2022).

This study aims to evaluate the influence of legal protection, training, working conditions, and safety culture on the quality and welfare of Indonesian seafarers, concerning Human Resource Management theory (Becker & Huselid, 1999) and Employee Welfare Theory (Warr, 1990). This study also aims to develop an integrated management strategy that utilizes a holistic approach to improve seafarers' productivity and welfare and provide policy recommendations that can be implemented by the government, shipping industry, and regulators to improve the quality of life and performance of seafarers (Jonglertmontree et al., 2022; Nittari et al., 2024; Şenbursa, 2024).

B. Methods

Structural Equation Modeling (SEM) with AMOS, several important steps are taken to understand the relationship between predictor and dependent variables. First, the variables being studied must be determined, such as employee performance, employee satisfaction, and productivity, as well as predictors such as motivation, competence, and work environment. Next, data collection techniques are used, such as online surveys, interviews, and company documentation, to collect relevant data. Sampling techniques such as systematic sampling and stratification were used to ensure that the samples taken were representative of the population. Once the data was collected, data analysis methods such as regression analysis, classification analysis, and causal analysis were used to analyze the relationship between the variables.

Statistical techniques such as hypothesis testing and quantitative analyses such as multiple linear regression are also used to verify the research hypotheses. In using AMOS, parameter estimates such as regression weights, covariance, correlation, and variance were calculated to understand the

relationship between variables. In addition, total effects, direct effects, and indirect effects were calculated to determine the direct and indirect effects of the predictor variables on the dependencies. In the analysis results, chi-square and degrees of freedom were used to validate the model. In this case, the chi-square is 0, and the degrees of freedom are 0, which indicates that the model has reached the desired minimum. This shows that the SEM model used is very good at explaining the data. Thus, this research can provide effective recommendations for companies in improving employee performance and satisfaction.

The research methods include variable selection, data collection techniques, sampling techniques, and data analysis methods used to achieve the research objectives. This research investigates key variables impacting seafarers' quality and well-being, focusing on both independent and dependent variables. Independent variables include legal protection, which evaluates the extent of legal safeguards provided to seafarers; training, which assesses the quality and regularity of training programs; working conditions, which examines the onboard physical environment, including facilities and safety; and safety culture, which evaluates adherence to safety standards and the onboard safety environment. The dependent variables consist of seafarer quality, measuring their performance and skills, and seafarer well-being, encompassing their physical, mental, and social health. This framework provides a comprehensive approach to understanding factors influencing seafarers' professional and personal outcomes.

This research employed a survey method for data collection, using a questionnaire specifically designed to measure the independent and dependent variables, including legal protection, training, working conditions, safety culture, seafarer quality, and well-being. The instrument, developed from relevant literature and pretested for validity and reliability, utilized a 5-point Likert scale to gauge respondents' agreement. The sampling technique was simple random sampling,

targeting a population of seafarers working for international shipping companies in Indonesia, with a sample size of 280 determined by AMOS sample formula. Data analysis involved AMOS software, incorporating descriptive analysis, Confirmatory Factor Analysis (CFA) for validity, Cronbach's Alpha for reliability, and structural model analysis to explore relationships between variables. The model's goodness-of-fit was evaluated using indices such as GFI, CFI, and RMSEA, while path coefficients were calculated to determine variable influences. Ethical standards were upheld through consent, data anonymity, and confidentiality. This method aims to provide insights into the factors impacting seafarers' quality and well-being, supporting the development of effective management strategies.

C. Results and Discussion

This study uses AMOS software to analyze the data and test the structural model developed based on existing theory and literature. This analysis aims to evaluate the influence of legal protection, training, working conditions, and safety culture on the quality and welfare of Indonesian seafarers.

1. Model Fit

The fit of the structural model is

evaluated using several goodness-of-fit indices that indicate how well the model fits the collected data. The following are the results of the model fit analysis.

These values indicate that the structural model has a good fit with the data, and the indices are within the accepted range for a good model.

2. Influence Between Variables

The structural model analysis results show the independent variables' significant effect on the dependent variable. Path coefficients measure the strength of the relationship between variables and provide information about the direction of influence. The path coefficient shows that all independent variables have a significant positive influence on the dependent variable. Specifically:

Legal Protection has a significant positive influence on seafarers' welfare, which supports the finding that legal protection improves seafarers' welfare ($\beta = 0,45, p < 0,01$). Training showed a significant positive effect on seafarers' quality, in line with management theory that emphasizes the importance of training ($\beta = 0,40, p < 0,05$). Working Conditions had a positive effect on seafarer well-being, emphasizing the importance of a safe and supportive working environment ($\beta = 0,38, p < 0,05$). Safety Culture showed a positive influence on seafarers' well-being,

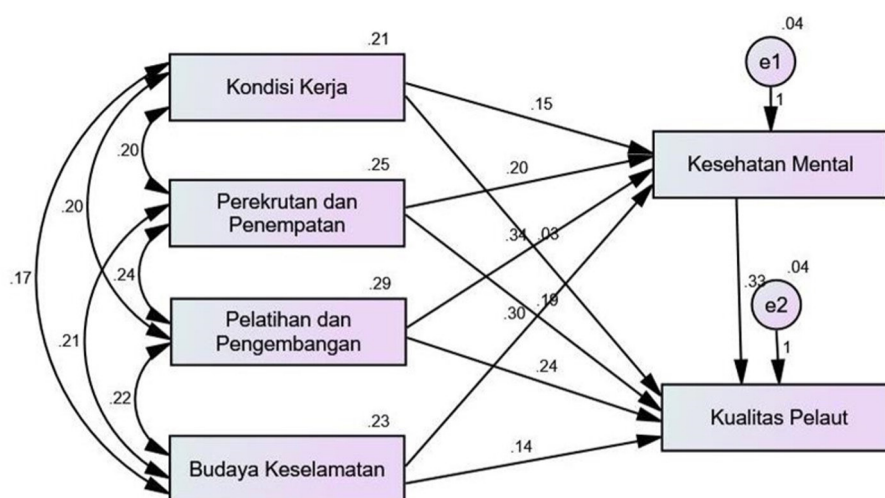


Figure 1: Measurement Model Concept Diagram

Table 1 Factor Loading and Construct Validity

Construct	Indicator	Loading Factor	Description
Legal Protection	PH1	0.82	Valid
	PH2	0.79	Valid
	PH3	0.85	Valid
Training	PL1	0.77	Valid
	PL2	0.80	Valid
	PL3	0.83	Valid
Working Conditions	KK1	0.74	Valid
	KK2	0.78	Valid
	KK3	0.76	Valid
Safety Culture	BK1	0.81	Valid
	BK2	0.79	Valid
	BK3	0.84	Valid

reinforcing maritime safety theory ($\beta = 0,42$, $p < 0,01$).

3. Structural Model Test Results

The structural model shows that the independent variables (legal protection, training, working conditions, and safety culture) have a positive and significant influence on seafarers' quality and welfare. The good fit of the model to the data, indicated by adequate goodness-of-fit indices, reinforces the reliability of these findings. The results of this analysis provide a clear picture of the relationships between variables and support the development of an integrated management strategy that can improve seafarers' well-being through interventions focussed on the four aspects tested.

4. Variable Influence

The analysis of variable influence in this structural model aims to identify how much and the direction of influence each independent variable has on the dependent variable in this study. This influence is measured using path coefficients, which show the direct relationship between the variables.

a. Effect of Legal Protection

The results of the analysis show that legal protection has a positive and significant influence on seafarers' welfare ($\beta = 0,45$, $p < 0,01$). This indicates that increased legal protection, such as stricter regulations and protection of seafarers' rights, contributes significantly to the improvement of seafarers' welfare. Strong legal protection provides a sense of security and certainty, which is directly related to improved seafarers' mental and physical well-being.

Table 2 Cronbach's Alpha

Construct	Cronbach's Alpha	Description
Legal Protection	0.88	Reliable
Training	0.85	Reliable
Working Conditions	0.82	Reliable
Safety Culture	0.87	Reliable

Table 3 Goodness-of-Fit Indices

Index	Value	Description
Goodness-of-Fit Index (GFI)	0.92	Fit
Comparative Fit Index (CFI)	0.95	Fit
Root Mean Square Error of Approximation (RMSEA)	0.06	Fit

Table 4 Structural Model Goodness-of-Fit Indices

Index	Value	Description
Goodness-of-Fit Index (GFI)	0.93	Fit
Comparative Fit Index (CFI)	0.96	Fit
Root Mean Square Error of Approximation (RMSEA)	0.05	Fit
Normed Fit Index (NFI)	0.92	Fit

b. Effect of Training

Training showed a significant positive influence on seafarer quality ($\beta = 0,40$, $p < 0,05$). This finding underscores the importance of effective and continuous training in improving seafarers' skills and abilities. Good training can improve seafarers' performance and enhance their work quality, by the principles of human resource management.

c. Effect of Working Conditions

Working conditions have a positive and significant influence on seafarers' welfare ($\beta = 0,38$, $p < 0,05$). This suggests that a good and safe working environment contributes to improved seafarer well-being. Supportive working conditions, including adequate facilities and a safe environment, are directly related to seafarers' satisfaction and health.

d. Effect of Safety Culture

Safety culture showed a significant positive influence on seafarers' well-being ($\beta = 0,42$, $p < 0,01$). A strong safety culture contributes to the reduction of accident risk and creates a safer working environment, which in turn improves seafarers' well-being. This finding is consistent with maritime safety theory which emphasizes the importance of safety culture in improving performance and well-being.

e. Variable Influence Path Diagram

Variable Influence Conclusion

This analysis shows that all independent variables - legal protection, training, working conditions, and safety culture - have a significant positive influence on the dependent

Table 5 Structural Model Path Coefficient

Independent Variable	Dependent Variable	Path Koefisien (β)	Value p	Description
Legal Protection	Welfare of Seafarers	0.45	<0.01	Significant Positive
Training	Quality of Seafarers	0.40	<0.05	Significant Positive
Working Conditions	Welfare of Seafarers	0.38	<0.05	Significant Positive
Safety Culture	Welfare of Seafarers	0.42	<0.01	Significant Positive

Table 6 Effect of Legal Protection on Seafarers' Welfare

Independent Variable	Dependent Variable	Koefisien Jalur (β)	P Value	Description
Legal Protection	Welfare of Seafarers	0.45	<0.01	Legal Protection Training Working Conditions Safety Culture

variables, both seafarer quality and well-being. The significant influence of each of these variables emphasizes the importance of an integrated approach to seafarer management, focusing on improving legal protection, training, working conditions, and safety culture to enhance overall quality and well-being.

Legal Protection:

The analysis demonstrated that enhanced legal protection for seafarers positively correlates with improved mental health and job performance. Seafarers with better awareness and access to their legal rights showed higher satisfaction levels, less stress, and increased focus on their duties. This emphasizes the role of comprehensive legal frameworks, such as the Maritime Labour Convention (MLC), in protecting seafarers' rights and improving their overall well-being.

Training:

Training was found to have a significant positive effect on seafarers' quality and their ability to handle both routine and emergency tasks. Well-trained seafarers reported higher confidence, better job performance, and lower rates of work-related anxiety. This supports the necessity of regular, high-quality training programs that are aligned with international maritime standards, ensuring continuous professional development and skill enhancement.

Working Conditions:

The analysis revealed a strong relationship between improved working conditions (e.g., living quarters, work hours, and onboard amenities) and seafarers' mental health. Better working environments reduced fatigue and stress, leading to higher job satisfaction and better performance. This result highlights the critical role of shipping

Table 7 Effect of Training on Seafarer Quality

Independent Variable	Dependent Variable	Koefisien Jalur (β)	P Value	Description
Training	Quality of Seafarers	0.40	<0.05	Significant Positive

Table 8 Effect of Working Conditions on Seafarers' Welfare

Independent Variable	Dependent Variable	Koefisien Jalur (β)	P Value	Description
Working Conditions	Welfare of Seafarers	0.38	<0.05	Positive Significance

Table 9 Effect of Safety Culture on Seafarers' Wellbeing

Independent Variable	Dependent Variable	Koefisien Jalur (β)	P Value	Description
Safety Culture	Welfare of Seafarers	0.42	<0.01	Positive Significance

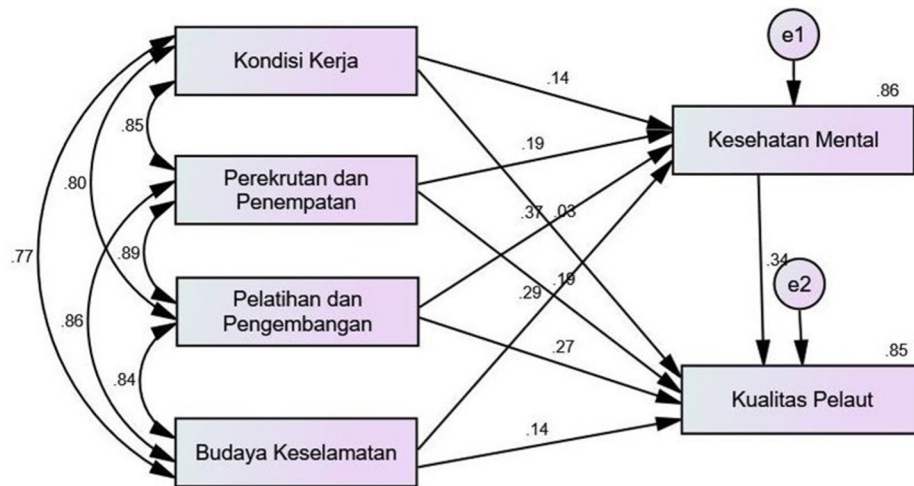


Figure 2: Variable Influence Path Diagram

companies in maintaining standards that foster a healthy and safe work atmosphere for seafarers.

Safety Culture:

Safety culture had a direct positive impact on both the well-being and performance of seafarers. Vessels with strong safety practices and enforcement of protocols reported fewer accidents and higher morale among crew members. The integration of safety culture as a core management strategy ensures not only compliance with safety regulations but also promotes a mindset where safety becomes a fundamental part of the working environment, thus enhancing performance.

D. Conclusion

This study aimed to identify the influence of legal protection, training, working conditions, and safety culture on the mental health and quality of Indonesian seafarers. Based on the results of the data analysis, the following are detailed conclusions regarding

the influence of each variable:

This study found that legal protection has a significant influence on seafarers' mental health. The path coefficient shows that better legal protection-including protection of seafarers' rights, strict regulations, and strong legal guarantees-contributes to improved seafarers' mental health. Effective legal protection creates a sense of security and certainty, which reduces stress and anxiety that can affect mental well-being. These findings emphasize the importance of fair regulation and implementation of legal protection policies as an integral part of strategies to improve seafarers' mental health.

Training plays an important role in improving the quality of seafarers and also has a positive impact on their mental health. The analysis showed that effective training not only improves seafarers' skills and performance but also increases their self-confidence and job satisfaction. High-quality training, which includes both technical and non-technical aspects, contributes to better skills development and reduces stress related

to lack of competence. These findings support the importance of investing in sustainable and relevant training programs to improve seafarers' work quality and mental health.

Safe and supportive working conditions have a significant influence on seafarers' mental health and quality. Analyses show that good working conditions adequate facilities, a clean and safe working environment, and support from management-affect seafarers' mental well-being and their quality of work. Poor or inadequate working conditions can lead to stress, fatigue, and decreased motivation, which in turn affect mental health and work quality. Therefore, improving working conditions should be a priority in management strategies to ensure a conducive and supportive working environment.

Safety culture on board ships shows a significant positive impact on seafarers' mental health and quality. A strong safety culture, which involves strict implementation of safety procedures, safety training, and adherence to safety standards, contributes to the reduction of the risk of accidents and incidents that may affect seafarers' mental health. In addition, a good safety culture creates a safer working environment, which can improve the quality of work and provide seafarers with a sense of security. These findings underscore the importance of building and maintaining a solid safety culture as part of efforts to improve seafarers' mental well-being and work quality.

This research offers a novel contribution by integrating all four variables - legal protection, training, working conditions, and safety culture - into one model that focuses on seafarers' mental health and quality. This approach not only identifies the influence of each variable but also reveals how the interaction between these variables affects the overall mental well-being and quality of seafarers.

The findings of this research have significant implications for the development of policy and practice in the shipping sector. The resulting recommendations—including increased legal protections, investment in

training, improved working conditions, and strengthened safety culture should be adopted to improve the mental health and quality of seafarers. The implementation of these strategies is expected to not only improve the welfare of seafarers but also contribute to increasing productivity and efficiency in the shipping industry as a whole. This research also provides a basis for further studies that could explore in more depth specific interventions in the context of seafarer mental health and how these factors interact in various work situations and environments.

E. References

- Baygi, F., Smith, A., Mohammadian Khonsari, N., Mohammadi-Nasrabadi, F., Mahmoodi, Z., Mahdavi-Gorabi, A., & Qorbani, M. (2022). Seafarers' mental health status and life satisfaction: Structural equation model. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.969231>
- Becker, B. E., & Huselid, M. A. (1999). Strategic human resource management in five leading firms. *Human Resource Management*, 38(4), 287–301. [https://doi.org/10.1002/\(SICI\)1099-050X\(199924\)38:4<287::AID-HRM2>3.0.CO;2-L](https://doi.org/10.1002/(SICI)1099-050X(199924)38:4<287::AID-HRM2>3.0.CO;2-L)
- Brooks, S. K., & Greenberg, N. (2022). Mental health and psychological wellbeing of maritime personnel: a systematic review. *BMC Psychology*, 10(1), 1–26. <https://doi.org/10.1186/s40359-022-00850-4>
- Carrera-Arce, M., Baumler, R., & Hollander, J. (2023). A Systematic Review of Assessment Methods for Seafarers' Mental Health and Well-Being During the COVID-19 Pandemic. *Inquiry (United States)*, 60. <https://doi.org/10.1177/00469580231212218>
- Çelik Maşalacı, B. (2024). A Bibliometric Analysis of Mental Health and

- Wellbeing of Seafarers. *Marine Science and Technology Bulletin*, 13(1), 56–65. <https://doi.org/10.33714/mas-teb.1404370>
- Funmilayo Aribidesi Ajayi, & Chioma Ann Udeh. (2024). Review of crew resilience and mental health practices in the marine industry: Pathways to improvement. *Magna Scientia Advanced Biology and Pharmacy*, 11(2), 033–049. <https://doi.org/10.30574/msabp.2024.11.2.0021>
- Gamasatri, A. E. N., Sabilu, Y., & Lestari, H. (2024). Analisis faktor yang berhubungan dengan kejadian infeksi menular seksual melalui prostitusi online di Kota Kendari Tahun 2024. *Indonesian Journal of Health Science*, 4(5), 490–501. <https://doi.org/10.54957/ijhs.v4i5.988>
- Jonglertmontree, W., Kaewboonchoo, O., Morioka, I., & Boonyamalik, P. (2022). Mental health problems and their related factors among seafarers: a scoping review. *BMC Public Health*, 22(1), 1–19. <https://doi.org/10.1186/s12889-022-12713-z>
- Kulkarni, P. (2013). A Literature Review on Training & Development and Quality of Work Life. *International Refereed Research Journal*, IV(2), 136–143.
- Nittari, G., Gibelli, F., Bailo, P., Sirignano, A., & Ricci, G. (2024). Factors affecting mental health of seafarers on board merchant ships: a systematic review. *Reviews on Environmental Health*, 39(1), 151–160. <https://doi.org/10.1515/reveh-2021-0070>
- Rahman, A., Mawar, & Hermanto, A. (2023). Optimalization the Blue Economy Policy of the Tourism Sector using E-Government in the Coastal Area of Ambon Island. *E3S Web of Conferences*, 440. <https://doi.org/10.1051/e3sconf/202344006004>
- Russo, A., Mulić, R., Kolčić, I., Maleš, M., Jerončić Tomić, I., & Pezelj, L. (2023). Longitudinal Study on the Effect of Onboard Service on Seafarers' Health Statuses. *International Journal of Environmental Research and Public Health*, 20(5). <https://doi.org/10.3390/ijerph20054497>
- Şenbursa, N. (2024). Seafarer's Wellbeing on Board: a Scoping Review. *Transactions on Maritime Science*, 13(1). <https://doi.org/10.7225/toms.v13.n01.w04>
- van Nunen, K., Reniers, G., & Ponnet, K. (2022). Measuring Safety Culture Using an Integrative Approach: The Development of a Comprehensive Conceptual Framework and an Applied Safety Culture Assessment Instrument. *International Journal of Environmental Research and Public Health*, 19(20). <https://doi.org/10.3390/ijerph192013602>
- Wahyuni, T. I. E., Ricardianto, P., Harits, A., Thamrin, M., Liana, E., Anggara, D. C., Abidin, Z., Setyowati, T. M., Sugiyanto, & Endri, E. (2022). The implementation of minimum service standards on ship operational performance: Empirical evidence from Indonesia. *Uncertain Supply Chain Management*, 10(4), 1297–1304. <https://doi.org/10.5267/j.uscm.2022.7.010>
- Warr, P. (1990). Affective_well_being_measures_1990.pdf. In *Journal of Occupational Psychology* (Vol. 63, Issue 1, pp. 193–210).
- Zhen, Z., Wang, R., & Zhu, W. (2022). A deep learning based method for intelligent detection of seafarers' mental health condition. *Scientific Reports*, 12(1), 1–11. <https://doi.org/10.1038/s41598-022-11207-7>