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Work Conditions and Seafarer Performance: The Role of Occupational Safety

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ABSTRACT

This study investigates the effects of contract duration, internet connectivity, and workload on Occupational Safety and Health (OSH) and employee performance among Indonesian seafarers employed by foreign shipping companies operating on international routes. In addition, it examines the direct effect of OSH on seafarer performance and evaluates the mediating role of OSH in the relationships between contract duration, internet connectivity, workload, and employee performance. A quantitative explanatory research design was employed to examine the proposed causal relationships. Data were collected through a structured questionnaire administered to Indonesian seafarers working for 19 foreign shipping companies engaged in international maritime operations. The study population comprised 350 seafarers, from which a sample of 187 respondents was determined using the Slovin formula. The data were analyzed using Structural Equation Modeling (SEM) with AMOS software. The findings reveal that contract duration, internet connectivity, and workload significantly influence Occupational Safety and Health. Contract duration and workload do not exert significant direct effects on seafarer performance, whereas internet connectivity demonstrates a significant positive effect. Furthermore, the Sobel test confirms that OSH significantly mediates the relationships between contract duration, internet connectivity, workload, and employee performance. The study concludes that improvements in seafarer performance depend not only on organizational factors such as contract duration, internet connectivity, and workload but also on the effective implementation of Occupational Safety and Health practices. These findings highlight the strategic importance of strengthening OSH systems alongside optimizing employment policies, ensuring reliable onboard internet access, and managing workload effectively to enhance both employee well-being and organizational performance within international shipping operations.

Keywords: Contract Duration, Internet Connectivity, Workload, Occupational Safety and Health, Seafarer Performance
JEL Classifications: M31, C83, O33

1. INTRODUCTION

The maritime shipping industry is one of the strategic sectors supporting national economic growth through its role in connecting domestic supply chains and facilitating international trade. Maritime transportation remains the most efficient mode for transporting large volumes of goods, thereby contributing significantly to exports, imports, and gross domestic product (GDP). As global trade continues to expand, the demand for professional seafarers has increased substantially because they play a critical role in ensuring navigational safety, maintaining vessel operations, and sustaining global logistics networks. Therefore, improving the quality of maritime human resources has become a key factor in strengthening the competitiveness of Indonesia's shipping industry (Rafli, 2025; Harianto, 2025; Mabrori, 2023; Wijaya et al., 2024).

Indonesian seafarers employed by foreign shipping companies, particularly those serving on international merchant vessels, operate in high-risk working environments. In addition to being responsible for the safety of ships and cargo, they are required to comply with international maritime safety standards.

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Nevertheless, several challenges persist, including work-related fatigue, inadequate protection of seafarers, low compliance with safety procedures, and a high incidence of occupational accidents, all of which may reduce seafarer performance. In this context, the implementation of Occupational Safety and Health (OSH) is essential for creating a safe working environment while simultaneously enhancing seafarers' productivity (Fajri, 2025; Nittari et al., 2024).

The importance of this study is reinforced by data from the Directorate General of Sea Transportation, Ministry of Transportation of the Republic of Indonesia, indicating a high number of seafarer protection cases during the 2025-2026 period. These included 83 cases involving the repatriation of Indonesian seafarers experiencing employment-related problems overseas, 41 cases concerning insurance claims and death compensation, and 18 mediation cases. Investigation reports further reveal that most maritime accidents are associated with human error, work-related fatigue, inadequate implementation of safety procedures, and weak Occupational Safety and Health (OSH) practices. These findings suggest that maritime safety depends not only on the technical condition of vessels but also on the effective management of human resources.

One factor presumed to influence the implementation of OSH is the duration of employment contracts. Excessively long contract periods may increase physical and mental fatigue, reduce alertness, and elevate the risk of occupational accidents on board. Hannerz et al. (2022) reported that employment contract characteristics are associated with a higher risk of occupational safety problems, whereas Mansyur et al. (2021) found that the duration of service on board was not significantly related to crew fatigue. These inconsistent findings indicate that the relationship between contract duration, OSH, and seafarer performance requires further investigation.

In addition to contract duration, internet connectivity has become an essential requirement for modern seafarers. Reliable internet access enables seafarers to obtain safety information, participate in online training, support operational communication, and maintain contact with their families, thereby reducing psychological stress during long voyages. However, limitations in satellite network quality at sea frequently disrupt communication. Veisani et al. (2020) emphasized that internet access has become a fundamental necessity in the digital era, whereas Cai et al. (2023) demonstrated that problematic internet use is associated with increased depression, anxiety, and reduced well-being. Conversely, adequate internet access has also been shown to improve employee productivity (Armayanti, 2016). Therefore, further research is needed to examine its role in influencing OSH implementation and seafarer performance.

Another important factor affecting seafarer performance is workload. The nature of maritime work, characterized by long working hours, shift-based schedules, and high operational responsibilities, may increase fatigue and reduce job performance. Previous studies by Mashabai (2023), Faeni and Prayogo (2024), and Nittari et al. (2024) demonstrated that workload significantly affects both occupational safety and seafarer performance. However, Budiasa et al. (2021) reported that workload had no significant effect on crew performance. These inconsistent findings indicate the existence of a research gap that warrants further empirical examination.

Drawing upon Goal Setting Theory, clearly defined work objectives, safe working conditions, adequate organizational support, and effective workload management are expected to strengthen employees' commitment to achieving organizational goals. Within the maritime context, Occupational Safety and Health (OSH) is considered a mechanism through which contract duration, internet connectivity, and workload influence seafarer performance. A safe working environment enhances concentration, minimizes human error, and facilitates the achievement of operational objectives more effectively (Setyaningsih, 2023).

Previous studies have generally examined the direct effects of contract duration, internet connectivity, or workload on employee performance. However, relatively few studies have integrated these three variables into a single empirical model by incorporating Occupational Safety and Health (OSH) as a mediating variable, particularly among Indonesian seafarers employed by foreign shipping companies. Therefore, the novelty of this study lies in the development of an empirical model that positions OSH as a mediating mechanism linking contract duration, internet connectivity, and workload to seafarer performance. This model is expected to contribute to the advancement of maritime human resource management literature while providing practical implications for shipping companies in developing policies aimed at improving occupational safety and enhancing the performance of Indonesian seafarers.

2. LITERATURE REVIEW

2.1. Contract Duration

Contract duration refers to the agreed period of employment between a seafarer and a shipping company as stipulated in the Seafarer's Employment Agreement (SEA). In the international shipping industry, contract duration represents an essential aspect of employment because it determines the length of time seafarers perform their duties onboard under demanding operational conditions, dynamic maritime environments, and prolonged separation from their families. Appropriate management of contract duration not only provides employment certainty but also contributes to seafarers' well-being, occupational safety, and productivity (Maritime Labour Convention, 2006; International Labour Organization [ILO], 2022; Moscone et al., 2016).

According to Goal Setting Theory proposed by Locke and Latham (2019), individuals demonstrate stronger commitment and higher performance when they are provided with clear, measurable, and attainable goals. Within the maritime context, certainty regarding the duration of employment contracts constitutes an important component of work goal clarity that can enhance seafarers' motivation and organizational commitment. Consequently, effective contract duration management has become a crucial element of human resource management practices in shipping

companies (Locke and Latham, 2019; ILO, 2022; Nittari et al., 2024).

Previous studies have demonstrated that excessively long employment contracts may adversely affect seafarers' physical and psychological well-being. Moscone et al. (2016) reported that extended contract periods increase psychological distress due to prolonged family separation and limited social interaction. Similarly, Hannerz et al. (2022) found that prolonged onboard service contributes to work-related fatigue, thereby reducing alertness and increasing occupational safety risks. Nittari et al. (2024) further emphasized that extended contract duration without adequate safety management practices may increase the likelihood of both physical and mental health problems among seafarers. Nevertheless, these adverse effects can be mitigated through effective crew change management, psychosocial support, and strict compliance with the Maritime Labour Convention (MLC) 2006 standards (Moscone et al., 2016; Hannerz et al., 2022; Nittari et al., 2024).

Based on the theoretical framework and previous empirical findings, contract duration in this study is defined as the length of the employment relationship between seafarers and shipping companies that may influence workers' physical, psychological, and professional conditions throughout their onboard service. This construct is reflected through the length of the employment contract, compliance of contract duration with company regulations, certainty of crew change schedules, clarity of contractual rights and obligations, appropriateness of leave entitlement after contract completion, and flexibility of contract renewal. These dimensions collectively represent the quality of employment relationship management, which is expected to influence the implementation of Occupational Safety and Health (OSH) as well as seafarer performance (Moscone et al., 2016; Hannerz et al., 2022; Nittari et al., 2024).

2.2. Internet Connectivity

Internet connectivity has become an increasingly important communication facility in the modern maritime industry. For seafarers who spend extended periods onboard, internet access serves not only as a means of communicating with their families but also as a medium for obtaining operational information, supporting continuous learning, and alleviating the psychological consequences of prolonged separation from their social environment. With the advancement of maritime communication technologies, the provision of internet access has become an integral component of shipping companies' efforts to improve crew welfare and enhance operational effectiveness (Jubilee, 2020; Maritime Labour Convention, 2006; International Labour Organization, 2022).

According to Goal Setting Theory developed by Locke and Latham (2019), the achievement of work objectives depends on the availability of resources that facilitate task accomplishment. Within the maritime working environment, internet connectivity represents a critical organizational resource that enables seafarers to access information promptly, improve operational coordination, and maintain communication with their families, thereby strengthening work motivation and organizational commitment. Moreover, internet access can reduce stress, loneliness, and psychological strain commonly experienced during long-term onboard assignments. Consequently, high-quality internet connectivity is regarded as an important factor in creating a healthier, safer, and more productive working environment (Locke and Latham, 2019; Jubilee, 2020; International Labour Organization, 2022).

Previous research has consistently highlighted the positive contribution of internet connectivity to seafarers' well-being and job performance. Veisani et al. (2023) reported that adequate internet access strengthens seafarers' social relationships with their families, thereby reducing work-related stress during long voyages. Similarly, Cai et al. (2023) found that digital communication facilities improve job satisfaction, mental health, and employee productivity among workers in remote locations. Furthermore, Nittari et al. (2024) emphasized that easy access to online information supports compliance with occupational safety procedures and enhances seafarers' ability to respond effectively to emergency situations. Nevertheless, the effectiveness of internet connectivity remains dependent on network quality, bandwidth capacity, and company policies regarding onboard communication services (Veisani et al., 2023; Cai et al., 2023; Nittari et al., 2024).

Based on theoretical perspectives and previous empirical findings, internet connectivity in this study refers to the availability of digital communication facilities that support both operational activities and social interaction among seafarers while onboard. This construct is reflected through internet availability, connection stability, internet speed, ease of communication with family members, accessibility of operational information, and the contribution of internet services to task completion. These dimensions are considered to represent the quality of internet connectivity that may improve psychological well-being, communication effectiveness, occupational safety implementation, and seafarer performance (Jubilee, 2020; Veisani et al., 2023; Cai et al., 2023).

2.3. Workload

Workload refers to the physical, mental, and temporal demands that employees are required to fulfill in accordance with their organizational responsibilities. In the maritime industry, workload is considerably more complex than in land-based occupations because seafarers operate under watchkeeping systems, face dynamic weather conditions, and are responsible for the safety of both the vessel and its crew. Consequently, effective workload management is essential for maintaining occupational safety and ensuring employee productivity (Kasmir, 2018; Budiasa et al., 2021).

According to Goal Setting Theory, employees are more likely to achieve optimal performance when job demands are balanced with their capabilities and the resources available to accomplish their tasks. Conversely, excessive workload may increase physical and mental fatigue, reduce concentration, and elevate the likelihood of human error. Within the maritime profession, such conditions may adversely affect navigational safety and the quality of task performance. Therefore, maintaining an appropriate workload is

essential for ensuring both occupational safety and organizational effectiveness (Locke and Latham, 2019; Nittari et al., 2024).

Previous empirical studies have consistently demonstrated the influence of workload on occupational safety and employee performance. Mashabai (2023) found that excessive workload negatively affects occupational safety by increasing employees' physical and psychological strain. Likewise, Faeni and Prayogo (2024) reported that high workload reduces productivity and overall job performance. However, Budiasa et al. (2021) argued that these negative effects can be minimized when organizations provide a supportive working environment and effective human resource management practices. These inconsistent findings indicate the need for further investigation into the relationship between workload, occupational safety, and seafarer performance (Mashabai, 2023; Faeni and Prayogo, 2024; Budiasa et al., 2021).

Based on the theoretical framework and previous empirical studies, workload in this study is defined as the level of work demands experienced by seafarers while performing their duties onboard. This construct is reflected through physical workload, mental workload, working hours, time pressure, job responsibility, and task complexity. These dimensions are considered to comprehensively represent the demands placed upon seafarers and are expected to influence both Occupational Safety and Health (OSH) implementation and seafarer performance (Budiasa et al., 2021; Kasmir, 2018).

2.4. Occupational Safety and Health (OSH)

Occupational Safety and Health (OSH) is a systematic approach designed to protect employees from occupational accidents, work-related diseases, and other workplace hazards that may arise during work activities. Within the maritime industry, OSH plays a crucial role because seafarers operate in high-risk environments characterized by extreme weather conditions, rough seas, heavy machinery, hazardous materials, and continuous operational demands throughout voyages. Therefore, the implementation of OSH aims not only to protect workers' health and safety but also to ensure uninterrupted ship operations and the sustainability of maritime transportation services (International Labour Organization, 2022; Maritime Labour Convention, 2006; Nittari et al., 2024).

According to Goal Setting Theory proposed by Locke and Latham (2019), employees are more likely to achieve organizational goals when they perform their duties within a supportive working environment. A safe workplace represents an essential form of organizational support that enhances employee motivation, concentration, and commitment. In maritime operations, an effective OSH management system enables seafarers to understand safety procedures, minimize occupational risks, and perform their responsibilities with greater confidence, thereby improving the achievement of organizational objectives (Locke and Latham, 2019; International Labour Organization, 2022; Nittari et al., 2024).

Previous studies have consistently reported that the implementation of OSH contributes positively to employee performance. Nittari et al. (2024) demonstrated that a strong safety culture significantly reduces occupational accidents while improving seafarer productivity. Other studies have also shown that compliance with safety procedures, the proper use of personal protective equipment (PPE), and the availability of adequate safety facilities contribute to creating a safer and healthier working environment. Furthermore, OSH has been identified as an important mediating mechanism through which working conditions influence employee performance, as workers who perceive their workplace as safe tend to exhibit higher motivation and greater work effectiveness (International Labour Organization, 2022; Maritime Labour Convention, 2006; Nittari et al., 2024).

Based on the theoretical framework and previous empirical findings, Occupational Safety and Health (OSH) in this study refers to the level of implementation of workplace safety systems designed to protect seafarers from occupational accidents and health-related risks while working onboard. This construct is reflected through compliance with safety procedures, the use of personal protective equipment (PPE), awareness of occupational hazards, availability of safety facilities, accident prevention practices, and the maintenance of workers' physical and mental health. Collectively, these dimensions represent the implementation of a safety culture that supports the creation of a safe, healthy, and productive working environment within shipping companies (International Labour Organization, 2022; Maritime Labour Convention, 2006; Nittari et al., 2024).

2.5. Seafarer Perfomance

Seafarer performance refers to the degree to which crew members successfully carry out their duties and responsibilities in accordance with the operational standards established by shipping companies. Performance is evaluated not only by the achievement of work outcomes but also by seafarers' ability to maintain navigational safety, comply with operational procedures, collaborate effectively with fellow crew members, and complete assigned tasks efficiently. Within the maritime industry, seafarer performance is a critical determinant of operational efficiency, navigational safety, and the quality of maritime transportation services (Mangkunegara, 2017; Kasmir, 2018; International Maritime Organization, 2021).

According to Goal Setting Theory developed by Locke and Latham (2019), individual performance is influenced by goal clarity, work commitment, performance feedback, and organizational support in providing the necessary resources to achieve organizational objectives. In the maritime context, seafarer performance depends not only on individual competence but also on various working conditions, including contract duration, internet connectivity, workload management, and the effective implementation of Occupational Safety and Health (OSH). When these factors are properly managed, seafarers are more likely to demonstrate stronger motivation and commitment, resulting in superior job performance (Locke and Latham, 2019; Kasmir, 2018; International Labour Organization, 2022).

Previous studies have demonstrated that seafarer performance is influenced by both working conditions and organizational management systems. Nittari et al. (2024) reported that effective

implementation of Occupational Safety and Health (OSH) enhances productivity, reduces occupational accidents, and improves the quality of onboard operations. Moscone et al. (2016) found that excessively long employment contracts may reduce motivation and work performance due to increased physical and psychological fatigue. Furthermore, Veisani et al. (2023) revealed that adequate internet access contributes to improved psychological well-being and greater work effectiveness among seafarers. Nevertheless, previous findings regarding the effects of these factors on seafarer performance remain inconclusive, indicating the need for further investigation by incorporating OSH as a mediating variable (Moscone et al., 2016; Veisani et al., 2023; Nittari et al., 2024).

Based on the theoretical framework and previous empirical evidence, seafarer performance in this study is defined as the extent to which crew members successfully accomplish their duties in accordance with organizational targets and operational standards. This construct is reflected through work quality, work quantity, timeliness in task completion, compliance with operational procedures, teamwork capability, and responsibility for ship safety and the working environment. These dimensions comprehensively represent the effectiveness of seafarers in performing their professional duties while reflecting the achievement of organizational objectives within the maritime industry (Mangkunegara, 2017; Kasmir, 2018; Locke and Latham, 2019).

3. METHODOLOGY

This study employed a quantitative approach using an explanatory research design to examine the causal relationships among contract duration, internet connectivity, workload, Occupational Safety and Health (OSH), and seafarer performance. The research was conducted among Indonesian seafarers employed by foreign shipping companies operating international shipping routes. An explanatory research design was adopted because it is appropriate for testing causal relationships among variables based on a conceptual framework and predefined research hypotheses (Sugiyono, 2022).

The study population consisted of 350 Indonesian seafarers working for 19 foreign shipping companies. The sample size was determined using the Slovin formula, resulting in 187 respondents. Primary data were collected through a structured questionnaire employing a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument measured five latent constructs: contract duration, internet connectivity, workload, Occupational Safety and Health (OSH), and seafarer performance. The measurement indicators were developed based on relevant theories and previous empirical studies to ensure content validity (Sugiyono, 2022).

Data were analyzed using Structural Equation Modeling (SEM) with AMOS software. The analysis was conducted in two stages. First, the measurement model was evaluated through Confirmatory Factor Analysis (CFA) to assess construct validity and reliability. Construct validity was examined using standardized factor loadings, whereas construct reliability was assessed through Composite Reliability (CR) and Average Variance Extracted (AVE). Second, the structural model was analyzed to evaluate the direct, indirect, and total effects among the proposed variables. Model fit was assessed using several goodness-of-fit indices, including Chi-square, CMIN/DF, GFI, AGFI, TLI, CFI, and RMSEA, following the recommendations of Hair et al. (2022).

Furthermore, the mediating role of Occupational Safety and Health (OSH) in the relationships between contract duration, internet connectivity, workload, and seafarer performance was examined using the Sobel test. All hypotheses were tested at a 5% significance level ($P < 0.05$). The combination of SEM and mediation analysis provides a comprehensive approach for simultaneously examining direct and indirect effects, thereby generating robust empirical evidence regarding the mediating role of OSH in improving the performance of Indonesian seafarers employed by foreign shipping companies (Baron and Kenny, 1986; Hair et al., 2022.

4. RESULTS AND DISCUSSION

The findings of this study are based on data collected from 187 Indonesian seafarers employed by 19 foreign shipping companies operating on international routes. All distributed questionnaires were successfully returned, resulting in a 100% response rate, which indicates a high level of respondent participation and enhances the reliability of the collected data. Prior to hypothesis testing, respondents' demographic characteristics and descriptive statistics of the research variables were examined to provide an overview of the respondents' profiles and their perceptions of the investigated constructs. Subsequently, the measurement and structural models were evaluated using Structural Equation Modeling (SEM) to examine the effects of contract duration, internet connectivity, and workload on Occupational Safety and Health (OSH) and seafarer performance, as well as to assess the mediating role of OSH in the proposed relationships.

Table 1 presents the demographic characteristics of the respondents. All respondents were male (100%), reflecting the male-dominated workforce in the international shipping industry. The largest age group was 25-30 years (30.5%), followed by respondents aged under 25 years (20.3%) and 31-35 years (19.8%), indicating that most participants were in their productive working years.

Regarding educational background, more than half of the respondents (55.6%) held a bachelor's degree, while 20.9% had completed a maritime diploma program and 17.6% had graduated from senior high school or vocational school. This finding suggests that Indonesian seafarers employed by foreign shipping companies generally possess relatively high educational qualifications.

In terms of employment tenure, 25.1% of the respondents had worked for more than 10 years, whereas 24.1% had <1 year of employment, indicating a relatively balanced distribution between experienced and newly employed seafarers. Likewise, the length of service on board was dominated by respondents with 1-3 years of experience (27.5%), followed by those with 4-6 years (23.4%),

Table 1: Research respondent profile

Respondent characteristics	Category	F	%
Gender	Male	187	100,00
	Female	0	0
Age	<25 years old	38	20,3
	25-30 years old	57	30,5
	31-35 years old	37	19,8
	36-40 years old	22	11,8
	>40 years old	33	17,6
Education level	Senior High School/Vocational High School	33	17,6
	Diploma III in Maritime Studies	39	20,9
	Bachelor's Degree	104	55,6
	Others	11	5,9
Employment tenure	<1 year	45	24,1
	1-3 years	40	21,4
	4-6 years	35	18,7
	7-10 years	20	10,7
	>10 years	47	25,1
Marital status	Single	78	41,7
	Married	108	57,8
	Widowed	1	0,5
Jenis Kapal	Tugboat/LCT/Multicat	17	9,1
	Cargo vessel	15	8,0
	Offshore supply vessel	28	15,0
	Oil/CrudeOil/LPG/LNG/Chemical Tanker	106	56,7
	Passenger and container vessel	5	2,7
	Bulk carrier	16	8,6
Work experiences	<5 years	41	21,9
	5-10 years	58	31,0
	11-15 years	37	19,8
	16-20 years	29	15,5
	>20 years	22	11,8

Source: Processed primary data (2026)

demonstrating considerable operational experience among the participants.

Most respondents were married (57.8%), while 41.7% were single. Concerning vessel type, the majority served on oil, gas, and chemical tankers (56.7%), followed by Offshore Supply Vessels (15.0%), whereas relatively few respondents worked on passenger, container, cargo, tugboat, or bulk carrier vessels. This distribution indicates that the study primarily represents Indonesian seafarers working in high-risk maritime operations that require strict compliance with occupational safety and health standards.

Finally, regarding overall maritime experience, the largest proportion of respondents (31.0%) had 5-10 years of professional experience, followed by those with <5 years (21.9%) and 11-15 years (19.8%). Overall, the respondent profile demonstrates that the sample adequately represents Indonesian seafarers with diverse demographic characteristics, educational backgrounds, work experiences, and vessel assignments, thereby providing a reliable basis for analyzing the relationships among contract duration, internet connectivity, workload, occupational safety and health, and seafarer performance.

Table 2 presents the descriptive mean scores for each research construct, namely contract duration, internet connectivity, workload, occupational safety and health (OSH), and seafarer performance among Indonesian seafarers employed by foreign shipping companies.

Table 2: Descriptive mean scores of the research constructs

No.	Construct	Rata-Rata
1	Contract duration	3.79
2	Internet connectivity	3.52
3	Workload	3.62
4	Occupational safety and health (OSH)	3.57
5	Seafarer performance	3.72

Source: Processed primary data (2026)

Table 2 presents the descriptive mean scores for each research construct, including contract duration, internet connectivity, workload, occupational safety and health (OSH), and seafarer performance. Overall, all constructs recorded mean scores above 3.50, indicating that respondents generally expressed positive perceptions of the variables investigated. Contract duration obtained the highest mean score (3.79), followed by seafarer performance (3.72), workload (3.62), occupational safety and health (OSH) (3.57), and internet connectivity (3.52). These findings suggest that respondents perceived contract management, OSH implementation, and seafarer performance to be at relatively favorable levels. However, internet connectivity received the lowest mean score among the constructs, indicating that communication infrastructure on board remains an area requiring improvement. Overall, the descriptive results provide preliminary evidence that respondents' perceptions of the study variables are generally favorable, thereby supporting further analysis using Structural Equation Modeling (SEM) to examine the proposed relationships among the constructs.

Table 3 presents the results of the data normality test based on skewness and kurtosis statistics. At the univariate level, all indicators exhibited critical ratio (C.R.) values for both skewness and kurtosis within the acceptable range of ±2.58, indicating that the assumption of univariate normality was satisfied. Furthermore, the multivariate critical ratio was 1.436, which is also below the recommended threshold of ±2.58, demonstrating that the data satisfy the assumption of multivariate normality. Therefore, the dataset meets the normality requirements and is appropriate for subsequent analysis using covariance-based Structural Equation Modeling (SEM) (Hair et al., 2022)

The measurement model was assessed using confirmatory factor analysis (CFA) to verify that each indicator adequately represented its corresponding latent construct. As presented in Table 4, all indicators exhibited factor loadings ranging from 0.599 to 0.971, exceeding the recommended minimum threshold of 0.50 (Hair et al., 2022). These results indicate that all measurement indicators possess satisfactory construct validity and were therefore retained for subsequent analysis.

Convergent validity was further evaluated using the Average Variance Extracted (AVE). As shown in Table 5, all constructs achieved AVE values above the recommended threshold of 0.50,

Table 3: Results of the data normality test

Indicator	Min	Max	Skew	C.R.	Kurtosis	C.R.
X1_1	5	10	−0,302	−1,686	−0.677	−1.889
X1_2	5	10	0.171	0.956	−1.216	−2.395
X1_3	6	10	0.172	0.957	−1.179	−2.292
Multivariate					6.526	1.436

Source: Processed primary data (2026)

Table 4: Confirmatory factor analysis results

Construct	Indicator	LF	Threshold	Remark
Contract duration (X1)	X1_1	0.853	≥ 0.50	Valid
	X1_2	0.971		Valid
	X1_3	0.871		Valid
Internet connectivity (X2)	X2_1	0.923	≥ 0,50	Valid
	X2_2	0.862		Valid
	X2_3	0.923		Valid
	X2_4	0.599		Valid
	X2_5	0.707		Valid
Workload (X3)	X2_1	0.891	≥ 0.50	Valid
	X2_2	0.887		Valid
	X2_3	0.942		Valid
Occupational safety and health (Y) (OSH)	Y_1	0.760	≥ 0.50	Valid
	Y_2	0.929		Valid
	Y_3	0.695		Valid
Seafarer performance (Z)	Z_1	0.872	≥ 0.50	Valid
	Z_2	0.929		Valid
	Z_3	0.961		Valid
	Z_4	0.961		Valid
	Z_5	0.882		Valid
	Z_6	0.767		Valid

Source: Processed primary data (2026)

namely contract duration (0.776), internet connectivity (0.592), workload (0.743), occupational safety and health (OSH) (0.640), and seafarer performance (0.660). These findings demonstrate that each construct explains more than 50% of the variance in its respective indicators, thereby confirming adequate convergent validity.

Construct reliability was subsequently examined using Composite Reliability (CR). As reported in Table 6, the CR values ranged from 0.837 to 0.961, all of which exceeded the recommended threshold of 0.70. These results indicate that each construct exhibits strong internal consistency and reliability.

Overall, the findings from the confirmatory factor analysis (CFA), convergent validity, and construct reliability assessments demonstrate that the measurement model satisfies all recommended psychometric criteria (Hair et al., 2022). Accordingly, the measurement model is considered both valid and reliable, providing a sound basis for subsequent structural model evaluation and hypothesis testing using structural equation modeling (SEM).

The structural model was evaluated using several goodness-of-fit indices to determine whether the proposed model adequately represented the empirical data. As presented in Table 7, most goodness-of-fit criteria satisfied the recommended thresholds. The Chi-square value (201.372) was lower than the critical value (204.690), while the probability value (P = 0.069) exceeded the recommended threshold of 0.05, indicating a satisfactory model fit. Furthermore, the values of RMSEA (0.030), GFI (0.908),

Table 5: Convergent validity results

Construct	AVE	Threshold	Remark
Contract duration (X1)	0.776	≥0.50	Valid
Internet connectivity (X2)	0.592		Valid
Workload (X3)	0.743		Valid
Occupational safety and health (Y)	0.64		Valid
Seafarer performance (Z)	0.66		Valid

Source: Processed primary data (2026)

Table 6: Construct reliability results

Construct	CR	Threshold	Remark
Contract duration (X1)	0.912	≥0.70	Realibel
Internet connectivity (X2)	0.876		Realibel
Workload (X3)	0.920		Realibel
Occupational safety and health (Y)	0.837		Realibel
Seafarer performance (Z)	0.961		Realibel

Source: Processed primary data (2026)

Table 7: Goodness-of-fit indices of the overall structural equation model

Goodness of Index	Cutt-off Value	Model Value	Remark
χ^2- Chi-square	Critical χ^2 value (df=173; χ^2=204.690)	201.372	Good Fit
Sig. (ρvalue)	≥0.05	0.069	Good Fit
RMSEA	≤0.08	0.030	Good Fit
GFI	≥0.90	0.908	Good Fit
AGFI	≥0.90	0.878	Marginal Fit
Relative (CMIN/DF)	≤2.0	1.164	Good Fit
TLI	≥0.95	0.989	Good Fit
CFI	≥0.95	0.991	Good Fit

Source: Processed primary data (2026)

CMIN/DF (1.164), TLI (0.989), and CFI (0.991) all met the recommended criteria, demonstrating that the proposed structural model fits the observed data well. Although the AGFI value (0.878) fell within the marginal fit category, it remained close to the recommended threshold and therefore did not compromise the overall adequacy of the model. Overall, the structural model was considered acceptable and appropriate for hypothesis testing using Structural Equation Modeling (SEM) (Hair et al., 2022).

The results of the structural equation modeling (SEM) analysis are presented in Table 8. The findings indicate that contract duration, internet connectivity, and workload significantly influence Occupational Safety and Health (OSH). Specifically, contract duration has a significant negative effect on OSH ($\beta = -0.263$, $P < 0.001$), suggesting that longer employment contracts are associated with lower levels of occupational safety and health among seafarers. In contrast, internet connectivity has a significant positive effect on OSH ($\beta = 0.278$, $P < 0.001$), indicating that adequate internet access contributes to improved occupational safety and health practices. Likewise, workload exerts a significant negative effect on OSH ($\beta = -0.187$, $P = 0.016$), implying that excessive workload tends to reduce occupational safety and health conditions.

Regarding seafarer performance, only internet connectivity demonstrated a significant positive direct effect ($\beta = 0.260$,

P < 0.001). Conversely, contract duration (β = 0.140, P = 0.063) and workload (β = 0.121, P = 0.097) did not have statistically significant direct effects on seafarer performance. These findings suggest that communication accessibility plays a more important role in enhancing performance than either contract characteristics or workload alone.

Furthermore, Occupational Safety and Health (OSH) exhibited a significant positive effect on seafarer performance (β = 0.386, P < 0.001). This coefficient represents the strongest direct effect in the proposed model, indicating that improvements in occupational safety and health substantially enhance seafarer performance. Overall, the findings emphasize the pivotal role of OSH as a mechanism linking working conditions to the performance of Indonesian seafarers employed by foreign shipping companies

The results of the mediation analysis through occupational safety and health (OSH) are presented in Table 9. The findings indicate that OSH serves as a significant mediating variable in the relationships between contract duration, internet connectivity, workload, and seafarer performance. The indirect effect of contract duration on seafarer performance through OSH was negative and statistically significant (β = –0.101, P = 0.011), indicating that longer employment contracts tend to reduce occupational safety and health conditions, which subsequently lowers seafarer performance.

Conversely, internet connectivity exerted a positive and significant indirect effect on seafarer performance through OSH (β = 0.107, P = 0.003). This finding suggests that improved internet access enhances the implementation of occupational safety and health practices, which ultimately contributes to higher seafarer performance. In contrast, workload demonstrated a negative and significant indirect effect on seafarer performance through OSH (β = –0.072, P = 0.023), indicating that excessive workload deteriorates occupational safety and health conditions, thereby reducing performance.

Overall, the mediation analysis confirms that occupational safety and health (OSH) constitutes an important mechanism through which working conditions influence seafarer performance. These findings demonstrate that improvements in seafarer performance are not determined solely by direct workplace factors but also by the effectiveness of occupational safety and health practices. Consequently, strengthening OSH programs represents an effective strategy for mitigating the adverse effects of prolonged contract duration and excessive workload while maximizing the positive contribution of internet connectivity to seafarer performance.

The overall findings reveal that contract duration, internet connectivity, and workload significantly affect occupational safety and health (OSH), whereas internet connectivity and OSH have direct positive effects on seafarer performance. Furthermore, OSH was confirmed to function as a significant mediating variable linking working conditions to seafarer performance. These findings provide empirical support for Goal-Setting Theory proposed by Locke and Latham (2019), which argues that performance is influenced not only by clearly defined goals but also by working conditions that enable individuals to perform their duties safely, healthily, and productively. Within the context of international shipping, a supportive working environment enhances seafarers' ability to maintain focus, motivation, and commitment toward achieving organizational and operational objectives.

The findings indicate that contract duration has a significant negative effect on occupational safety and health (OSH). This result suggests that the longer seafarers remain under employment contracts onboard, the greater the risk of deteriorating occupational safety and health conditions. Extended contract periods contribute to the accumulation of physical and mental fatigue, job burnout, prolonged separation from family, and psychological stress

Table 8: Results of the direct hypothesis testing

No	Research hypothesis	Standardized effect (β)	Standar error (S.E)	Critical ratio (C.R)	Decision
1	Contract duration → occupational safety and health (OSH)	−0.263	0.076	−3.320	0.000
2	Internet Connectivity → Occupational Safety and Health (OSH)	0.278	0.056	3.594	0.000
3	Workload → Occupational Safety and Health (OSH)	−0.187	0.065	−2.403	0.016
4	Contract Duration → Seafarer Performance	0.140	0.087	1.861	0.063
5	Internet Connectivity → Seafarer Performance	0.260	0.065	3.480	0.000
6	Workload → Seafarer Performance	0.121	0.073	1.658	0.097
7	Occupational Safety and Health (OSH) → Seafarer Performance	0.386	0.105	4.415	0.000

Source: Processed primary data (2026)

Table 9: Results of the indirect effects hypothesis testing

No	Research hypothesis	Standardized			P-value	Decision
		Direct effect	Indirect effect	Total effect		
8	Contract duration → seafarer performance mediated by occupational safety and Health (OSH)	0.140	-0.101	0.039	0.011	Signifikan
9	Internet connectivity → seafarer performance mediated by Occupational Safety and Health (OSH)	0.260	0.107	0.368	0.003	Signifikan
10	Workload → Seafarer Performance mediated by Occupational Safety and Health (OSH)	0.121	- 0.072	0.049	0.023	Signifikan

Source: Processed primary data (2026)

resulting from the confined working environment at sea. These conditions may reduce situational awareness and compliance with safety procedures, thereby increasing occupational risks. This finding is consistent with the Maritime Labour Convention (MLC, 2006) and the International Labour Organization (ILO, 2022), which emphasize the importance of regulating contract duration and rest periods to safeguard seafarers' health and safety. Previous studies have likewise reported that prolonged contracts increase fatigue and occupational accident risks among maritime workers (Nittari et al., 2024; Jensen and Oldenburg, 2021).

Conversely, internet connectivity has a significant positive effect on both OSH and seafarer performance. This finding highlights that reliable communication has become an essential resource for modern seafarers. Beyond facilitating communication with family members, internet access supports operational information exchange, online safety training, continuous learning, and psychosocial support during long voyages. These benefits reduce psychological distress, loneliness, and isolation, enabling seafarers to maintain higher levels of concentration and compliance with safety procedures. The results are consistent with those reported by Nittari et al. (2024), who found that internet accessibility significantly enhances seafarers' well-being, mental health, occupational safety, and productivity. From the perspective of Goal-Setting Theory, the availability of supportive resources such as effective communication strengthens individuals' commitment to achieving organizational objectives.

The study also reveals that workload negatively and significantly affects OSH but does not directly influence seafarer performance. These findings suggest that excessive workload primarily deteriorates occupational safety and health conditions before affecting job performance. High workload increases fatigue, reduces concentration, and elevates the likelihood of operational errors. Nevertheless, professional seafarers are generally required to maintain performance standards despite demanding working conditions, which may explain the absence of a significant direct relationship between workload and performance. This finding supports ergonomic theory and the Job Demands–Resources (JD–R) Theory, which propose that excessive job demands reduce employee well-being when not balanced by adequate organizational resources. Similar conclusions have been reported by Bakker and Demerouti (2017), and ILO (2022), who argued that workload primarily influences occupational safety and health rather than performance outcomes directly.

Furthermore, the results demonstrate that occupational safety and health (OSH) exerts a significant positive effect on seafarer performance, representing the strongest direct relationship in the structural model. This finding indicates that effective implementation of occupational safety and health practices enhances physical and psychological well-being, strengthens compliance with operational procedures, and ultimately improves productivity and job performance. A safe working environment enables seafarers to perform their duties more efficiently, reduces operational errors, and supports better decision-making during maritime operations. These findings are consistent with occupational safety management theory, which considers investment in OSH as an investment in organizational productivity. Previous studies by Vinodkumar and Bhasi (2010), Christian et al. (2009), and Nittari et al. (2024) similarly demonstrated that a strong safety culture contributes to improved individual and organizational performance.

The mediation analysis further confirms that OSH significantly mediates the relationships between contract duration, internet connectivity, workload, and seafarer performance. Specifically, contract duration and workload exert negative indirect effects on performance through their adverse impact on OSH, whereas internet connectivity enhances performance indirectly by improving occupational safety and health conditions. These findings indicate that working conditions do not necessarily affect performance directly but instead influence the quality of occupational safety and health, which subsequently determines seafarer performance. Accordingly, OSH functions as the key mediating mechanism linking workplace conditions to employee performance in the maritime sector.

From a theoretical perspective, this study extends goal-setting theory by demonstrating that the achievement of work objectives in international maritime operations depends not only on individual motivation but also on safe and healthy working conditions that enable employees to perform effectively. From a practical standpoint, the findings suggest that shipping companies should reassess contract duration policies, manage workload more effectively, and provide reliable onboard internet access for seafarers. Such initiatives will strengthen the implementation of occupational safety and health programs, improve seafarer performance, reduce occupational accident risks, and ultimately support the long-term sustainability of international shipping operations.

5. CONCLUSION

This study demonstrates that contract duration, internet connectivity, and workload significantly influence occupational safety and health (OSH) among seafarers. Contract duration and workload exert significant negative effects on OSH, whereas internet connectivity has a significant positive effect. These findings indicate that prolonged employment contracts and excessive workloads may weaken occupational safety and health conditions, while adequate internet access enhances the implementation of OSH practices among seafarers.

Regarding seafarer performance, the results reveal that internet connectivity and OSH have significant positive effects, whereas contract duration and workload do not exert significant direct effects. This suggests that improvements in seafarer performance depend more on effective communication support and the implementation of occupational safety and health practices than on employment contract characteristics or workload alone.

The study further confirms that occupational safety and health (OSH) serves as a significant mediating variable in the relationships between contract duration, internet connectivity, workload, and seafarer performance. Accordingly, OSH functions

as the primary mechanism through which working conditions influence seafarer performance. These findings highlight the importance of strengthening occupational safety policies through balanced contract duration, effective workload management, and the provision of reliable onboard internet access. Such measures are expected to improve occupational safety and health, enhance seafarer performance, and support the sustainable operation of foreign shipping companies employing Indonesian seafarers.

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