Siber Journal of Transportation and Logistics (SJTL)
E-ISSN : 2987-1050
P-ISSN : 2987-1026
Siber Nusantara Research
+62 812 1046 7572 https://research.e-siber.org research.siber.info@gmail.com Jalan Marina Indah Raya No. 1 Pantai Indah Kapuk, Kamal Muara, Penjaringan, Jakarta Utara, Indonesia.
DOI: https://doi.org/10.38035/sjtl.v3i4

Maritime Safety Assessment: Analysis of Safety Management System (SMS), Ship Surveillance, and Ship Technical Condition

Honny Fiva Akira Sembiring[1]
[1]Institut Transportasi dan Logistik Trisakti, Indonesia, honny.akira@gmail.com

Corresponding Author: honny.akira@gmail.com[1]

Abstract: Maritime Safety Assessment: Analysis of Safety Management System (SMS), Ship Surveillance, and Ship Technical Condition is a scientific literature review article. The purpose of this article is to develop a hypothesis of the influence of variables that will be used in further research. The objects of this research are online libraries, Google Scholar, Mendeley, Scopus, and other academic online media. The research method uses library research sourced from e-books and open-access e-journals. The results of this article are: 1) the influence of Safety Management System (SMS) Analysis on Maritime Safety Assessment; 2) the influence of Ship Surveillance on Maritime Safety Assessment; 3) the influence of Ship Technical Condition on Maritime Safety Assessment.

Keywords: Safety Management System, Ship Surveillance, Ship Technical Condition, Maritime Safety Assessment

INTRODUCTION

Maritime safety is a fundamental aspect of shipping operations, aimed at protecting the safety of people, ships, cargo, and the marine environment. As shipping activity increases and the complexity of ship operations increases, the challenges to maritime safety also increase (Darusalam et al., 2023). Various ship accidents that have occurred show that shipping safety is influenced by various interrelated factors, both in terms of safety management, maritime authority supervision, and the technical condition of the ship itself (Putri et al., 2023). Therefore, a comprehensive maritime safety assessment is needed as a basis for increasing the effectiveness of the shipping safety system. (Fan et al., 2023).

Safety Management System (SMS) is an important instrument in maritime safety management, which is regulated through the International Safety Management (ISM) Code (Demirci & Cicek, 2022). A good SMS implementation will ensure standard work procedures, risk control, human resource readiness, and a systematic emergency response mechanism. However, SMS implementation often faces obstacles, such as a lack of organizational commitment, a weak safety culture, and a mismatch between policies and operational practices in the field, which can impact shipping safety (Priyanto & Dinata, 2025).

In addition, the quality of supervision from maritime authorities and related agencies also plays an important role in ensuring compliance with safety regulations (Akhiarullah et al.,

2023). Suboptimal supervision can lead to weak control over ship seaworthiness, compliance with operational procedures, and the implementation of international and national safety standards. On the other hand, the technical condition of a ship, including structural soundness, engine reliability, completeness of safety equipment, and navigational equipment, are key factor determining its ability to operate safely.

Based on this, this study focuses on maritime safety assessment through analysis of the implementation of the Safety Management System (SMS), the quality of supervision, and the technical condition of the ship as the main factors that influence shipping safety (Kadarisman, 2017). Supervisory activities are carried out to assess compliance with laws and regulations, the application of standard operating procedures, and the implementation of the Safety Management System (SMS) as mandated in the International Safety Management (ISM) Code (Arrafi et al., 2023). The research results are expected to provide a comprehensive picture of the level of maritime safety readiness and serve as a basis for strengthening policies, increasing supervision, and improving safety management systems to support the creation of safe and sustainable shipping.

Therefore, a comprehensive study is needed to understand the extent to which Safety Management System (SMS) Analysis, quality of supervision, and the technical condition of the ship play a role in determining the Maritime Safety Assessment. Based on this background, this study aims to analyze the hypothesis for further research on the following issues: 1) Does Safety Management System (SMS) Analysis affect the Maritime Safety Assessment? 2) Does ship supervision affect the Maritime Safety Assessment? 3) Does the technical condition of the ship affect the Maritime Safety Assessment?

METHOD

The method for writing a literature review article is carried out using library research and a systematic literature review (SLR). These methods are analyzed qualitatively, using sources from online applications such as Google Scholar, Scopus, Mendeley, and other academic applications. A systematic literature review (SLR) is defined as a series of steps to detect, evaluate, and interpret all available research evidence, to provide answers to specific research questions (Resnawita & Karmanita, 2024).

In qualitative studies, library research must be applied consistently with established methodological principles. One reason for conducting qualitative analysis is the exploratory nature of this research (Safarudin et al. 2023).

RESULTS AND DISCUSSION

RESULTS

Based on the background, objectives, and methods, the results of this article are as follows:

Maritime Safety Assessment

A Maritime Safety Assessment (MSA) is a systematic approach used to assess the level of maritime safety by identifying potential hazards, analyzing risks, and evaluating the effectiveness of implemented safety controls. This reflects the need for structured, risk-based management of maritime safety to prevent maritime accidents. Typical indicators of a Maritime Safety Assessment include Hazard Identification, Risk Analysis, Risk Evaluation, Risk Control and Mitigation, Compliance with Regulations and Standards, Vessel Technical Condition, Human Factors, Operational Readiness and Emergency Procedures, Safety Supervision and Monitoring, and Continuous Evaluation and Improvement (Kholiq et al., 2025).

The indicators or dimensions contained in the Maritime Safety Assessment variable include: 1) Hazard Identification: The system's ability to identify potential shipping hazards, whether originating from the ship's technical condition, human factors, the environment, or operations.; 2) Risk Analysis: Assessment of the risk level based on the possibility of an

accident occurring and the magnitude of the impact on the safety of life, the ship, and the environment; 3) Risk Evaluation: The process of determining the level of risk acceptance (acceptable risk) and establishing risk priorities that require control measures; 4) Risk Control and Mitigation: Availability and effectiveness of control measures, such as safety procedures, safety equipment, crew training, and safety management systems; 5) Compliance with Regulations and Standards: The level of compliance with national regulations, international conventions (SOLAS, ISM Code, ISPS Code), and IMO safety guidelines; 6) Ship Technical Condition: The ship's seaworthiness, including structure, machinery, navigation equipment, safety systems, and pollution prevention systems; 7) Human Factors: Competence, fatigue, communication, safety culture, and crew compliance with safety procedures; 8) Operational Readiness and Emergency Procedures: Availability and effectiveness of emergency procedures, drill implementation, and crew readiness in dealing with incidents: Availability and effectiveness of emergency procedures, drill implementation, and crew readiness in dealing with incidents; 9) Safety Supervision and Monitoring: Effectiveness of ship supervision, safety audits, routine inspections, and safety performance monitoring; 10) Continuous Evaluation and Improvement: Incident reporting mechanisms, incident analysis, and implementation of corrective and preventive actions on an ongoing basis.

Maritime Safety Assessment has been studied by several researchers, including: (Fan et al., 2023), (Chuah et al., 2022), (Karsten et al., 2020), and (Zhu et al., 2019).

Safety Management System (SMS) Analysis

Safety Management System (SMS) analysis is a crucial step in identifying gaps between policy and implementation, evaluating safety performance, and formulating recommendations for continuous improvement. This demonstrates that SMS analysis serves not only as an evaluation tool but also as a basis for strategic decision-making in efforts to improve shipping safety, environmental protection, and the operational sustainability of shipping companies. Typical indicators of a safety management system analysis include management policies and commitments, hazard identification and risk assessment, standard operating procedures (SOPs), personnel competency, training, and awareness, safety communication and reporting, vessel and safety equipment maintenance, emergency preparedness and response, monitoring, auditing, and performance evaluation, and Change Management and continuous improvement (Wróbel et al., 2023).

Indicators or dimensions contained in the safety management system analysis variables include: 1) Management Policy and Commitment: Assessing the existence of a documented safety policy, clarity of responsibilities, and top management commitment in supporting the consistent implementation of SMS; 2) Covering the organization's ability to identify potential hazards, conduct risk analysis, and establish effective control measures for safety and environmental risks; 3) Standard Operating Procedures (SOP): Measuring the completeness, clarity, and suitability of work procedures to the operational conditions of the ship, including the level of compliance of the crew in implementing the SOP; 4) Personnel Competence, Training, and Awareness: Assessing the adequacy of safety training, crew certification, and the level of understanding and awareness of SMS policies and procedures; 5) Safety Communication and Reporting: Covering the effectiveness of internal communication systems, reporting of incidents and near misses, and the organization's openness in conveying safety information without a blame culture (just culture); 6) Ship Maintenance and Safety Equipment: Assessing the ship's maintenance system, the reliability of safety equipment, and compliance with inspection schedules and technical testing; 7) Measuring the organization's preparedness to face emergencies through contingency plans, emergency drills, and periodic evaluation of drill results; 8) Performance Monitoring, Auditing, and Evaluation: Includes the implementation of internal and external audits, monitoring safety performance, and follow-up on non-conformance findings; 9) Management of Change: Assesses the organization's ability

to manage operational, technical, or organizational changes to avoid creating new safety risks; 10) Continuous Improvement: Includes ongoing evaluation mechanisms, incident analysis, and the implementation of corrective and preventive actions to improve the effectiveness of the SMS. (Khomeiny et al., 2019).

Safety Management System analysis has been studied by several researchers, including: (Priyanto & Dinata, 2025), (Khotami et al., 2023), (Sembiring et al., 2025), and (Junaidi et al., 2024).

Ship Surveillance

Ship surveillance is a crucial tool for ensuring that every operating vessel meets shipping safety and marine environmental protection standards (Syafnil et al., 2021). This reflects that ship surveillance serves not only as an administrative inspection activity, but also as a preventive measure to identify potential accidents and pollution risks early on. Typical indicators of ship surveillance include administrative aspects, ship seaworthiness, safety equipment, Operational and Safety Procedures, crew competence and readiness, ship security, and environmental protection (Setiyantara et al., 2022).

Indicators or dimensions contained in the ship supervision variables include: 1) administrative aspects: This indicator assesses the completeness and validity of ship and crew documents, including ship seaworthiness certificates, nationality letters, cargo documents, pollution prevention documents, and crew competency and skill certificates according to their positions; 2) ship seaworthiness: the physical condition and technical functions of the ship, such as the hull, main engine and auxiliary engines, steering system, electrical system, and navigation equipment that must function properly and be maintained; 3) safety equipment: Assess the availability, condition, and readiness of safety equipment, including lifeboats, life rafts, life jackets, fire extinguishers, fire alarm systems, and emergency communication equipment; 4) Operational and Safety Procedures: Measure the implementation of standard operational procedures, including the Ship/Shore Safety Checklist, loading and unloading procedures, emergency procedures, and compliance with the Safety Management System (SMS) and ISM Code; 5) crew competence and readiness: Assess the crew's understanding and skills regarding their duties and responsibilities, implementation of safety drills, division of emergency tasks, and the level of discipline in implementing work safety procedures. 6) Ship security: This indicator includes the implementation of the ISPS Code, control of ship access, identification of personnel, and readiness to face security threats while the ship is operating or docked. 7) environmental protection aspects: Assess the ship's compliance with marine pollution prevention provisions, including waste management, ballast water, oil record books, and the readiness of oil spill response equipment (Readi Adana Matanari et al., 2023).

Ship surveillance has been studied by several researchers, including: (Suharto et al., 2018), (Rachman et al., 2025), (Ye et al., 2025) dan (Li & Wang, 2025).

Vessel Technical Condition

A vessel's technical condition is one of the main factors determining the safety, security, and operational reliability of a vessel during shipping activities (Weda, 2022). This reflects the need to meet seaworthiness standards and ensure proper technical maintenance of the vessel as a primary prerequisite for ensuring shipping safety. Typical indicators of a vessel's technical condition include the Automatic Identification System (AIS), Global Positioning System (GPS), Electronic Chart Display and Information System (ECDIS), and Voyage Data Recorder (VDR) (Simau et al., 2023).

Indicators or dimensions contained in the ship's technical condition variables include: 1) Automatic Identification System (AIS): AIS is installed according to regulations and is in active condition, Ship data (name, MMSI, call sign, ship size) is appropriate and accurate, AIS signal transmission and reception are running normally, and AIS operation is understood by

the officer on duty; 2) Global Positioning System (GPS): GPS is functioning properly and provides accurate position, time and position synchronization is running normally, data display is easy to read and has no interference, and backup power sources are available; 3) Electronic Chart Display and Information System (ECDIS): ECDIS is operating normally and has been calibrated, the latest and most updated electronic map (ENC), appropriate safety alarm settings (safety depth, safety contour), and the navigation officer has an ECDIS certificate and competency; 4) Voyage Data Recorder (VDR): VDR is functioning and recording voyage data continuously, (microphone, sensor, and input interface are working normally, VDR alarm system is active and does not show any faults, periodic testing (annual performance test) (Shishkin et al., 2025).

The technical condition of the ship has been studied by several researchers, including: (Sandler & Budashko, 2022), (Kushner & Mamontov, 2021), (Zakharchenko et al., 2020), and (Burkov, 2023)

Table 1. Relevant Research Results

No	Author (Tahun)	Previous Research Results	Similarities With This Article	Differences With This Article
1	(Fan et al., 2023)	The research results show a conceptual framework used to evaluate psychological aspects in maritime operations with accident scenarios or pre-accident conditions through situations or activities that occur on board the ship.	Maritime Safety Assessment	Incorporation of seafarer psychological factors into maritime safety assessment
2	(Priyanto & Dinata, 2025)	The results of the study show that the implementation of the Safety Management System (SMS) has a very important impact on the workforce on ships in reducing work accident statistics in the commercial ship engine area.	Analysis of the Effectiveness of the Safety Management System (SMS) on Maritime Safety	Reducing the Number of Work Accidents in the Engine Room
3	(Suharto et al., 2018)	The results of this study explain the supervision of illegal fishing activities in the waters of the Sangihe Islands Regency, which is supported by law enforcement, the role of the Regional Government, and the awareness of fisheries business actors in complying with fisheries regulations.	Ship Surveillance Analysis	Analysis of Fishing Vessel Supervision to Combat Illegal Fishing in the Waters of the Sangihe Islands Regency
4	(Sandler & Budashko, 2022)	The results of the study show that the sensor has a linear response, high resolution, an effective detection range below 300 Hz, and very little temperature influence, making it reliable for use in ship engine-boiler room conditions.	Diagnosing Ship Engineering Conditions	Improving Tools for Diagnosing the Technical Condition of Ship Electrical Power Installations

Sumber: Processed by the Author

DISCUSSION

Based on theoretical analysis, this literature review article reviews relevant articles, evaluates the influence of variables, and develops a conceptual research design.

Based on the research findings, this article reviews relevant articles:

Pengaruh Analisis Safety Management System (SMS) Terhadap Assessment Keselamatan Maritim

Safety Management System (SMS) analysis is a systematic process to assess the effectiveness of the implementation of a safety management system in an organization or shipping operation through the evaluation of safety policies, hazard identification, risk assessment, operational procedures, human resource competencies, and monitoring and continuous improvement mechanisms, to ensure operational safety and prevention of maritime accidents.

Safety Management System (SMS) analysis influences Maritime Safety Assessment; if SMS analysis is carried out appropriately and comprehensively, the maritime safety assessment will also be more accurate and reliable. This can be explained as follows: 1) Safety policies and compliance: SMS analysis assesses the level of compliance with applicable safety policies and procedures. Consistently implementing safety policies indicates a better level of operational safety in maritime assessments; 2) Hazard identification and risk assessment: The SMS's ability to identify potential hazards and control risks is the main basis for determining the level of shipping safety. The more systematic this process, the more accurate the safety assessment results will be; 3) Human resource competency and behavior: SMS analysis evaluates the competency, training, and awareness of crew members and related personnel. Competent and disciplined human resources directly contribute to increasing the value of maritime safety assessments; 4) Supervision, audits, and incident reporting: The existence of safety audits, incident reporting, and follow-up of findings in the SMS affects the reliability of safety assessments because they reflect the actual safety conditions in the field.

Factors that influence Safety Management System (SMS) Analysis include: management commitment and policies, hazard identification and risk assessment, compliance with operational procedures and safety regulations, (human resource competence, training, and awareness), safety communication and reporting systems, supervision, audit, and evaluation of safety performance, ship maintenance and safety equipment reliability, emergency preparedness and response, change management, continuous improvement.

Based on a review of the literature and previous relevant studies, it was found that Safety Management System (SMS) Analysis has an impact on Maritime Safety Assessment, which is in line with research conducted by (Todingan et al., 2025), (Zhang et al., 2023), and (Chuah et al., 2022)**.**

The Impact of Ship Surveillance on Maritime Safety Assessments

Ship surveillance is a series of control and monitoring activities for ship operations to ensure that the ship, crew, cargo, and shipping activities comply with safety, security, and environmental protection requirements in accordance with applicable laws and regulations, in order to prevent violations and accidents in the shipping sector.

Ship Surveillance influences Maritime Safety Assessment; if ship surveillance is carried out effectively and consistently, the maritime safety assessment will be more accurate and reliable. This can be explained as follows: 1) Compliance with safety regulations and standards: Ship surveillance ensures that ships meet safety, security, and seaworthiness requirements; 2) Technical condition and seaworthiness of ships: Through routine inspections and checks, ship surveillance assesses the technical condition of ships, including engines, navigational equipment, and safety equipment; 3) Operational and crew supervision: Ship surveillance also includes control over operational procedures and crew competency; 4) Law enforcement and follow-up of findings: Ship surveillance supported by law enforcement and

follow-up of safety violations or non-compliances strengthens the reliability of maritime safety assessments because it reflects the real conditions of safety in the field.

Factors that influence Ship Supervision include the availability and competence of human resources for supervisors, the adequacy of supervisory facilities and infrastructure, supervisory budget support, clarity of regulations and standards for ship supervision, coordination and synergy between related agencies, supervision and reporting systems, compliance and awareness of ship owners and crew.

Based on a review of the literature and relevant previous studies, it was found that Ship Surveillance has an impact on Maritime Safety Assessment, which is in line with research conducted by (Jiang et al., 2025), (Liu et al., 2020), (Roy et al., 2022), and (Liu et al., 2021).

The Influence of Ship Technical Condition on Maritime Safety Assessment

Ship Technical Condition is the physical and functional condition of a ship, including its structure, machinery, electrical systems, navigation equipment, and safety equipment. This is assessed based on technical standards and inspection results to ensure the ship can operate safely, reliably, and in accordance with applicable shipping regulations.

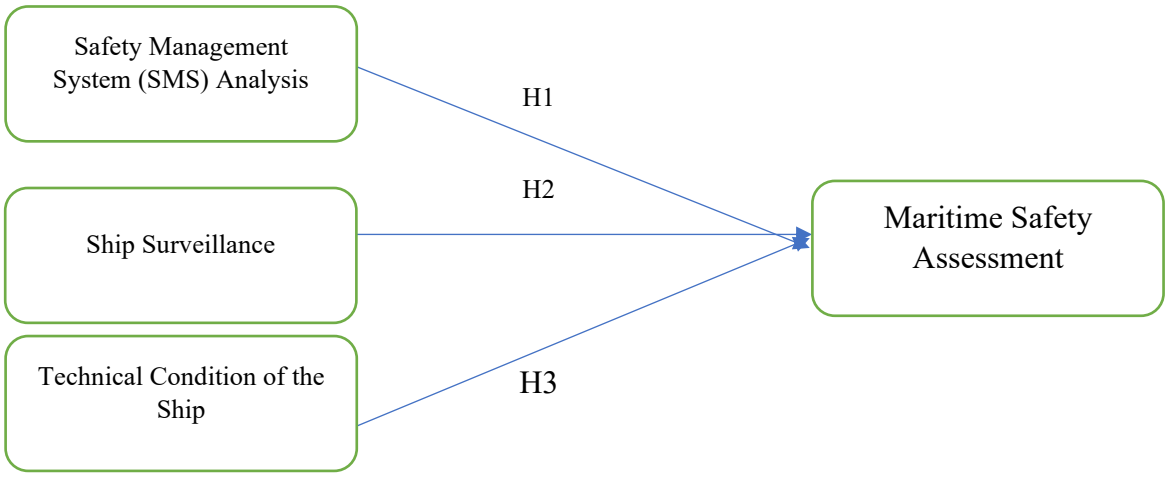
The technical condition of a ship affects the Maritime Safety Assessment; if the technical condition of the ship is well maintained and meets seaworthiness standards, the maritime safety assessment will be more accurate and reliable. This can be explained as follows: 1) Seaworthiness of the ship and ship's machinery: checking the seaworthiness, structure, main engine, and supporting systems that are functioning properly is the main indicator of shipping safety and directly influences the results of the maritime safety assessment; 2) Reliability of navigation and safety equipment: Navigation equipment, communications, and safety equipment that are maintained and functioning optimally increase the level of operational safety of the ship as reflected in the assessment; 3) Ship maintenance and inspection: Implementation of routine maintenance and periodic technical inspections ensures that the condition of the ship remains up to standard, thereby strengthening the accuracy of the maritime safety assessment; 4) Prevention of failures and accidents: Good ship technical conditions reduce the potential for system failures and accidents, so that the maritime safety assessment better represents the actual safety conditions in the field.

Factors that influence the technical condition of a ship include the maintenance and care of the ship, the age and intensity of the ship's operations, the quality and reliability of the ship's engines and equipment, the competence and skills of the ship's crew, the availability of spare parts and repair facilities, compliance with ship seaworthiness standards and regulations, operational environmental conditions, the results of ship inspections and technical audits.

Based on a review of the literature and relevant previous studies, it was found that the technical condition of the ship has an impact on the Maritime Safety Assessment. This is in line with research conducted by (Sandler & Budashko, 2022), (Kushner & Mamontov, 2021), (Zakharchenko et al., 2020) & (Корягин et al., 2021).

Conceptual Research Framework

Based on the problem formulation, relevant research, and discussion, the conceptual framework for this article is shown in Figure 1.



Source: Processed by the Author
Figure 1: Conceptual Framework

Based on the conceptual framework above, the following analysis is needed: Analysis of the Safety Management System (SMS), Ship Supervision, and Ship Technical Conditions on Maritime Safety Assessment. In addition to the three exogenous variables that influence y1, there are many other variables, including:

1) Crew Competence and Performance**: (Rachman et al., 2024), (Anggoro, 2022), (Hasyanti & Farahna, 2024), (Putri et al., 2023) dan (Abbas & Irman, 2022).**
2) Safety Culture**: (Turgo, 2024)**, (Altinpinar & Başar, 2022), (Rosnani, 2023), (Della et al., 2024), dan (Santoso et al., 2020).
3) Crew Experienced **: (Wood et al., 2021), (Oliveira et al., 2020), (Purba & Siska, 2025), (Yanto & Supartini, 2023), and (Zhang et al., 2024).**

CONCLUSION

Based on the objectives, results, and discussion, the conclusion of this article is to formulate hypotheses for further research, namely:

1) Safety Management System (SMS) analysis influences Maritime Safety Assessment;
2) Ship Supervision influences Maritime Safety Assessment; and
3) Ship Technical Condition influences Maritime Safety Assessment.

REFERENCES

Abbas, & Irman. (2022). Komitmen Organisasi Sebagai Variabel Intervenning Dari Efek Kompetensi Terhadap Kinerja Awak Kapal PT. Multi Jaya Samudera. *Economics and Digital Business Review*, *2*(2).

Abdul Nasir Rachman, Baharuddin, B., & Johannes Baptista Halik. (2024). Pengaruh Kompetensi Dan Kesesuaian Peran Terhadap Kinerja Awak Kapal MV.Mutawa.103 Di Abu Dhabi. *EKOMA : Jurnal Ekonomi, Manajemen, Akuntansi*, *4*(1). https://doi.org/10.56799/ekoma.v4i1.6435

Akhiarullah, Wais, & Afrijal. (2023). Efektivitas Penyediaan Layanan Publik Otoritas Dalam Menjalankan Fungsi di Pelabuhan Ulee-Lheue. *Jurnal Ilmiah Mahasiswa FISIP Unsyiah*, *8*.

Altinpinar, İ., & Başar, E. (2022). Investigation of the effect of vessel type on seafarers' safety culture. *International Journal of Occupational Safety and Ergonomics*, *28*(3). https://doi.org/10.1080/10803548.2021.1916209

Anggoro, R. (2022). The Pengaruh Kompetensi Dan Kepemimpinan Transaksional Terhadap

Kepuasan dan Kinerja Awak Kapal Di Miclyn Express Offshore Pte.Ltd. *Saintara : Jurnal Ilmiah Ilmu-Ilmu Maritim*, *6*(1). https://doi.org/10.52475/saintara.v6i1.134

Arrafi, M. A., Syifa Fajar Maulani, Fikodias Gilang Prabowo, Lamanda Putri, Nurul Haqi Abdurroqib, & Zharfany Putri Mila Julianto. (2023). Penerapan International Safety Management (ISM CODE) Pada PT AKR Sea Transport. *Jurnal Sains Teknologi Transportasi Maritim*, *5*(2). https://doi.org/10.51578/j.sitektransmar.v5i2.69

Burkov, D. E. (2023). Application of ship's information system to control and monitor the technical condition of ship's equipment. *Vestnik Gosudarstvennogo Universiteta Morskogo i Rechnogo Flota Imeni Admirala S. O. Makarova*, *15*(5). https://doi.org/10.21821/2309-5180-2023-15-5-893-902

Candra Oktyasari Putri, Niken Devi Rosita, Dhesi Wulan Sari, Masriah, & Fajar Sari Kurniawan. (2023). HUBUNGAN DISIPLIN DAN KOMPETENSI PELAUT TERHADAP PRODUKTIVITAS KERJA AWAK KAPAL PT. SHIP MANAGEMENT INDONESIA. *EKONOMIKA45 : Jurnal Ilmiah Manajemen, Ekonomi Bisnis, Kewirausahaan*, *10*(1). https://doi.org/10.30640/ekonomika45.v10i1.674

Chuah, L. F., Mokhtar, K., Bakar, A. A., Othman, M. R., Osman, N. H., Bokhari, A., Mubashir, M., Abdullah, M. A., & Hasan, M. (2022). Marine environment and maritime safety assessment using Port State Control database. *Chemosphere*, *304*. https://doi.org/10.1016/j.chemosphere.2022.135245

Darusalam, A., Lubis, L., & Marsudi, S. (2023). Analisis Kebijakan Pengawakan Kapal Niaga. *Jurnal Ilmiah Manajemen Publik Dan Kebijakan Sosial*, *7*(2). https://doi.org/10.25139/jmnegara.v7i2.6909

Della, R. H., Permata, D. Y., Syakurah, R. A., Agustien, M., & Ramadhani, A. P. (2024). Analisis Budaya Keselamatan Terhadap Tingkat Pelayanan Jasa Transportasi Penyeberangan Ferry Pelabuhan Bakauheni. *Jurnal Penelitian Transportasi Laut*, *25*(2). https://doi.org/10.25104/transla.v25i2.2299

Esad Demirci, S. M., & Cicek, K. (2022). Innovative Strategy Development Approach for Enhancing the Effective Implementation of the International Safety Management (ISM) Code. *Transportation Research Record*, 03611981221098394. https://doi.org/https://doi.org/10.1177/03611981221098394

Fan, S., Blanco-Davis, E., Fairclough, S., Zhang, J., Yan, X., Wang, J., & Yang, Z. (2023). Incorporation of seafarer psychological factors into maritime safety assessment. *Ocean and Coastal Management*, *237*. https://doi.org/10.1016/j.ocecoaman.2023.106515

Hasyanti, A., & Farahna, S. (2024). Analisis Pengaruh Manajemen Perawatan Kapal dan Kompetensi Awak Kapal Terhadap Kinerja Operasional Perusahaan Pelayaran pada PT Gurita Lintas Samudera Tahun 2024. In *Repository Polimarin*.

Jiang, Y., Xu, W., & Yang, D. (2025). Assessing the Credibility of AIS-Calculated Risks in Busy Waterways: A Case Study of Hong Kong Waters. *Mathematics*, *13*(18). https://doi.org/10.3390/math13182961

Junaidi, A., Yudo, H., & Ab-Samat, H. (2024). Identify the Trends on Maritime Safety Management System Studies: A Review. *TransNav*, *18*(4). https://doi.org/10.12716/1001.18.04.03

Kadarisman, M. (2017). KEBIJAKAN KESELAMATAN DAN KEAMANAN MARITIM DALAM MENUNJANG SISTEM TRANSPORTASI LAUT. *Jurnal Manajemen Transportasi & Logistik (JMTRANSLOG)*, *4*(2). https://doi.org/10.54324/j.mtl.v4i2.121

Karsten, M. M. V., Ruge, A. T., & Hulin, T. (2020). Closing the gap: Merging engineering and anthropology in holistic fire safety assessments in the maritime and offshore industries. *Safety Science*, *122*. https://doi.org/10.1016/j.ssci.2019.104512

Kholiq, I. N., Winarni, E., Putri, C. O., & Anggoro, R. (2025). Strategi Mitigasi Risiko dalam

Operasi Transfer Batubara Ship to Ship: Analisis Keselamatan Operasional MV. Lumoso Jaya di Bojonegara. *Saintara: Jurnal Ilmiah Ilmu-Ilmu Maritim*, *9*(1). https://doi.org/10.52475/saintara.v9i1.366

Khomeiny, A. S. El, Nasution, S., & Primanta, F. (2019). Peran Safety Management System Dalam Keselamatan Pelayaran. *Jurnal Manajemen Bisnis Transportasi Dan Logistik*, *5*(3).

Khotami, W., Suharto, I., Herliani, E., Salim, Y., & Courtney, G. (2023). Safety Management System Implementation on Ship in Shipping Companies in Banjarmasin. *Journal Markcount Finance*, *2*(1). https://doi.org/10.70177/jmf.v2i1.89

Kushner, G. A., & Mamontov, V. A. (2021). Estimating efficiency of forecasting technical conditions of ship propulsion systems. *Vestnik of Astrakhan State Technical University. Series: Marine Engineering and Technologies*, *2021*(4). https://doi.org/10.24143/2073-1574-2021-4-27-33

Li, Y., & Wang, S. (2025). Efficient and lightweight deep learning model for enhanced ship detection in maritime surveillance. *Ocean Engineering*, *328*. https://doi.org/10.1016/j.oceaneng.2025.121085

Liu, R. W., Yuan, W., Chen, X., & Lu, Y. (2021). An enhanced CNN-enabled learning method for promoting ship detection in maritime surveillance system. *Ocean Engineering*, *235*. https://doi.org/10.1016/j.oceaneng.2021.109435

Liu, Z., Wu, Z., & Zheng, Z. (2020). An improved danger sector model for identifying the collision risk of encountering ships. *Journal of Marine Science and Engineering*, *8*(8). https://doi.org/10.3390/JMSE8080609

Ofel Yericho Todingan, K.P. Suharyono S. Hadiningrat, & Verry Albert Jekson Mardame Silalahi. (2025). Implementation of Safety Management System in Improving Ship Crew Work Safety. *JIPOWER : Journal of Intellectual Power*, *2*(1). https://doi.org/10.63786/jipower.v2i1.31

Oliveira, L., Birrell, S., & Cain, R. (2020). How technology can impact customer-facing train crew experiences. *Ergonomics*, *63*(9). https://doi.org/10.1080/00140139.2020.1772377

Priyanto, & Ikhsan Rizki Dinata, M. (2025). Analisis Efektivitas Safety Management System (SMS) dalam Menurunkan Angka Kecelakan Kerja di Engine Room. *Jurnal TRANSMA*, *1*(2).

Purba, J., & Siska, S. Y. (2025). Influence of Human Resource Quality on Crew Ship Performance at Bourbon Offshore Asia Pte., Ltd. *Jurnal Bisnis Mahasiswa*, *5*(3). https://doi.org/10.60036/jbm.622

Putri, C. O., Parengu, M., Negeri, M., Pawiyatan, S. J., Duwur, B., & Gajahmungkur, S. (2023). Analisis Faktor-Faktor yang Mempengaruhi Keselamatan Pelayaran di PT. Pelni Cabang Waingapu (Studi pada Kapal Penumpang KM Awu). *Majalah Ilmiah Gema Maritim, e-Issn*, *25*(2).

Rachman, S., Asri, H., Kendek, M., Rahmah, A., & Sulistiana, O. (2025). The effectiveness of automatic identification system use on ship surveillance in navigation district type a class 1 Makassar. *Edelweiss Applied Science and Technology*, *9*(5). https://doi.org/10.55214/25768484.v9i5.7292

Readi Adana Matanari, Ika Yuliana Susilawati, & Jauhari Dwi Kusuma. (2023). Aspek Hukum Kapal Patroli Terkait Pengawasan Keselamatan Pelayaran. *Unizar Recht Journal (URJ)*, *2*(4). https://doi.org/10.36679/urj.v2i4.147

Rosnani, R. (2023). Analysis Of The Application Of Safety Culture On Motor Sailing Vessels In Supporting Shipping Safety. *International Journal of Marine Engineering Innovation and Research*, *8*(3). https://doi.org/10.12962/j25481479.v8i3.18442

Roy, K., Chaudhuri, S. S., Pramanik, S., & Banerjee, S. (2022). Deep Neural Network Based Detection and Segmentation of Ships for Maritime Surveillance. *Computer Systems Science and Engineering*, *44*(1). https://doi.org/10.32604/csse.2023.024997

Sandler, A., & Budashko, V. (2022). IMPROVING TOOLS FOR DIAGNOSING TECHNICAL CONDITION OF SHIP ELECTRIC POWER INSTALLATIONS. *Eastern-European Journal of Enterprise Technologies*, *5*(5–119). https://doi.org/10.15587/1729-4061.2022.266267

Santoso, H. B., Dillyanto, P., Maritim, P., Indonesia, N., Pawiyatan Luhur, J., Bendan Dhuwur, / I, Semarang, K., & Tengah, J. (2020). Budaya Keselamatan dan Model Kepemimpinan Keselamatan Dalam Menjamin Terwujudnya Motivasi Keselamatan Pelayaran Kapal-Kapal Niaga dengan Moderasi Sistem Manajemen Keselamatan (ISM Code). *Jurnal Maritim Polimarin*, *6*(1).

Sembiring, H. F. A., Arafah, W., Ricardianto, P., & Endri, E. (2025). The Modeling Implementation Of A Safety Management System On Container Ships To Improve Indonesian Maritime Affairs. *Journal of Maritime Research*, *22*(1).

Shishkin, O., Pashenko, O., & Kuprovskyi, V. (2025). Development of maritime VHF radiocommunications for efficient and safe navigation. *Shipping & Navigation*, *37*. https://doi.org/10.31653/2306-5761.37.2025.47-62

Simau, S., Prakoso, I., Manengkey, J. I., Manohas, J., Pontoh, P., & da Gomez, G. K. (2023). Kajian Pemanfaatan Ais (Automatic Identification System) Dalam Melacak Aktifitas Illegal Fishing Pada Kapal Dan Ais Hybrid Sebagai Alat Bantu Penangkapan Ikan. *Jurnal Bluefin Fisheries*, *4*(2).

Suharto, B. Y., Budiman, J., & Karwur, D. B. (2018). ANALISIS PENGAWASAN KAPAL PERIKANAN TERHADAP PENANGGULANGAN ILLEGAL FISHING DI PERAIRAN KABUPATEN KEPULAUAN SANGIHE, INDONESIA. *Jurnal Kebijakan Sosial Ekonomi Kelautan Dan Perikanan*, *7*(2). https://doi.org/10.15578/jksekp.v7i2.6099

Syafnil, H. R., Putera, R. E., & Azre, I. A. (2021). PENGAWASAN KAPAL WISATA BAHARI DI KOTA PARIAMAN. *Jurnal Administrasi Publik Dan Pembangunan*, *2*(2). https://doi.org/10.20527/jpp.v2i2.3140

Turgo, N. (2024). Tales of the sea: Seafarers' sense of place in the management of socialities and safety culture at sea. *Asian and Pacific Migration Journal*, *33*(1). https://doi.org/10.1177/01171968241245626

Weda, I. (2022). ANALISIS FAKTOR YANG MEMPENGARUHI KESELAMATAN PELAYARAN (STUDI PADA KSOP TANJUNG WANGI). *Jurnal Ekonomi, Bisnis Dan Manajemen*, *1*(1). https://doi.org/10.58192/ebismen.v1i1.52

Wood, P. I. L., Bonaccorso, C.-I. E., Ferrari, K., Oddi, C., & Tran, C. (2021). Changing the Culture: Introducing Fledgling Nurses into an Exclusively Experienced Crew. *Journal of PeriAnesthesia Nursing*, *36*(4). https://doi.org/10.1016/j.jopan.2021.06.097

Wróbel, K., Gil, M., Krata, P., Olszewski, K., & Montewka, J. (2023). On the use of leading safety indicators in maritime and their feasibility for Maritime Autonomous Surface Ships. *Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability*, *237*(2). https://doi.org/10.1177/1748006X211027689

Yanto, R., & . S. (2023). PENGARUH PENGALAMAN KERJA KETERAMPILAN KESADARAN CREW KAPAL TERHADAP KESELAMATAN KERJA DI PT. SURF MARINE INDONESIA. *JURNAL MATEMAR: MANAJEMEN DAN TEKNOLOGI MARITIM*, *4*(1). https://doi.org/10.59225/matemar.v4i1.134

Ye, T., Guan, G., & Liang, G. (2025). Effect of multiple appendages on maritime surveillance ship resistance at various ship speeds. *Ocean Engineering*, *315*. https://doi.org/10.1016/j.oceaneng.2024.119852

Yudhi Setiyantara, Yudhanita Pertiwi, Ningrum Astriawati, Ade Chandra Kusuma, & Ilham Pratama Putra. (2022). ANALISIS PEMERIKSAAN KAPAL OLEH MARINE INSPECTOR PADA KSOP KELAS IV PROBOLINGGO. *Majalah Ilmiah Gema Maritim*, *24*(2). https://doi.org/10.37612/gema-maritim.v24i2.303

Zakharchenko, O. V., Bedrii, D. I., Bileha, O. V., Savina, O. Y., & Haidaienko, O. V. (2020). Crewing of Sea Vessels Taking into Account Project Risks and Technical Condition of Ship Equipment. *Journal of Reviews on Global Economics*, *9*. https://doi.org/10.6000/1929-7092.2020.09.13

Zhang, Q., Zhu, Y., Zhang, X., & Terwilliger, M. G. (2024). Predicting popularity: Machine learning insights into movie team patterns and online ratings. *Issues in Information Systems*, *25*(3). https://doi.org/10.48009/3_iis_2024_129

Zhang, Y., Wang, S. X., Yao, J. T., & Tong, R. P. (2023). The impact of behavior safety management system on coal mine work safety: A system dynamics model of quadripartite evolutionary game. *Resources Policy*, *82*. https://doi.org/10.1016/j.resourpol.2023.103497

Zhu, L., Zhang, L., Li, X., & Zhou, R. (2019). Maritime safety assessment in the 21st-century maritime silk road under risk factors coupling. *ICTIS 2019 - 5th International Conference on Transportation Information and Safety*. https://doi.org/10.1109/ICTIS.2019.8883809

Корягин, С. И., Великанов, Н. Л., & Шарков, О. В. (2021). Assessment of the technical condition of ship hulls using mobile magnetic devices. *MORSKIE INTELLEKTUAL`NYE TEHNOLOGII)</Msg>*, *4(54)*. https://doi.org/10.37220/mit.2021.54.4.031