

Optimization Of The Certification Process For Indonesian-Flagged Ships To Enhance Maritime Safety And Security At The Tanjung Priok Main Port Authority And Harbor Master Office (KSOP Utama Tanjung Priok)

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Abstract

This study aims to analyze the implementation of certification for Indonesian-flagged ships at the Tanjung Priok Main Port Authority and Harbor Master Office (KSOP Utama Tanjung Priok), identify the constraints encountered, examine its contribution to maritime safety and security, and formulate optimization efforts. The study employs a qualitative descriptive approach. Data were collected through in-depth interviews, direct observation, and documentation involving relevant parties in the certification process. Data analysis followed the interactive model of Miles, Huberman, and Saldaña, consisting of data condensation, data display, and conclusion drawing and verification. The findings indicate that ship certification at KSOP Utama Tanjung Priok generally operates according to established procedures, beginning with application and document verification, followed by technical inspection, corrective action for deficiencies, and certification issuance. Certification functions as a preventive control mechanism because identified deficiencies must be addressed before the certification process can proceed. However, several constraints remain, including administrative discrepancies, limitations in human resources, digital literacy among some ship operators and agents, system synchronization issues,

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and recurring deficiencies that indicate the need for stronger continuous compliance monitoring. Certification contributes to maritime safety and security by verifying seaworthiness, safety equipment, navigation and communication systems, security requirements, and pollution-prevention measures. Optimization efforts include strengthening guidance and assistance in the use of SIMKAPEL, developing deficiency-history tracking, harmonizing inspection schedules and certificate validity periods in accordance with PM No. 7 of 2024, improving digital integration and data interoperability, strengthening marine inspector competencies, and applying risk-based inspection. The study recommends an integrated optimization model based on five pillars: governance, process, people, technology, and safety assurance.

Keywords: Ship Certification, Indonesian-Flagged Ships, Maritime Safety, Maritime Security, KSOP Utama Tanjung Priok.

INTRODUCTION

Maritime transportation plays a strategic role in supporting Indonesia's national connectivity as an archipelagic country. Much of the national logistics distribution depends on sea transportation because of its effectiveness and economic efficiency in connecting inter-island regions. The high mobility of commercial, passenger, and cargo vessels requires an integrated and sustainable maritime safety and security system. Therefore, the government continues to strengthen supervision of Indonesian-flagged vessels to ensure compliance with national and international seaworthiness standards (Kusumawati et al., 2024).

Maritime safety and security are essential prerequisites for a reliable and competitive maritime transportation system. In practice, ship accidents may result from technical factors, human error, administrative negligence, and weaknesses in operational supervision. The increasing intensity of shipping activities at major ports such as Tanjung Priok further increases the complexity of supervision. Consequently, maritime safety standards need to be implemented through professional and accountable ship inspection and certification systems (Setiyadi, 2024).

Ship certification is an important instrument for ensuring maritime safety because it verifies compliance with requirements concerning safety, security, construction, equipment, stability, and crewing. A valid safety certificate demonstrates that a vessel meets the requirements to operate safely and is closely associated with seaworthiness and maritime safety protection. Certification also functions as a preventive control mechanism through verification of



the ship's construction, safety equipment, machinery, navigation, radio communication, and crewing documents (Kusumawati et al., 2024; Widjaja et al., 2025).

The implementation of ship certification in Indonesia is supported by Law No. 17 of 2008 on Shipping, most recently amended by Law No. 66 of 2024. The regulatory update strengthens maritime safety and security, environmental protection, port governance, and institutional supervision. At the technical level, certification is regulated by Minister of Transportation Regulation PM No. 57 of 2021 concerning the Procedures for Inspection, Testing, and Safety Certification of Ships and PM No. 7 of 2024 concerning the Harmonization of Inspection and Certification Systems for Indonesian-Flagged Ships (JDIH BPK, 2024).

The Tanjung Priok Main Port Authority and Harbor Master Office (KSOP Utama Tanjung Priok) has a strategic role in supervising maritime safety. As one of Indonesia's busiest ports, its high vessel traffic creates considerable challenges in inspection and certification. KSOP is responsible for seaworthiness inspections, document verification, cargo supervision, safety equipment inspections, control of Sailing Approval Letters (SPB), and enforcement of maritime safety regulations. Therefore, the quality of its certification services directly affects vessel compliance with national and international safety standards (ISL News, 2025).

The certification process requires coordination among shipowners, shipping agents, marine inspectors, and KSOP (Harianto, 2024). However, several challenges may arise, including delays caused by high application volumes, limited inspection capacity, administrative discrepancies, expired documents, inconsistent technical data, and differences between physical vessel conditions and certification documents. Limited numbers of marine inspectors may also create inspection queues and affect the effectiveness of safety supervision (Kusumawati et al., 2024). High vessel traffic may further increase risks associated with vessels operating with overload or overdraft conditions.

Effective certification contributes directly to preventing maritime accidents by ensuring that vessels meet safety requirements before operation. Certification also supports maritime security by verifying the adequacy of security systems, navigation equipment, and safety procedures (Setiyadi, 2024). Digitalization through the Sistem Informasi Perkapalan dan Kepelautan (SIMKAPEL) has the potential to accelerate services, improve transparency, and reduce administrative errors, although challenges remain regarding infrastructure, human-resource competencies, and inter-institutional data integration (Khairillah et al., 2025).



Compliance with international safety standards may also strengthen the credibility and competitiveness of Indonesian shipping in global trade (Wijayanto, 2026).

Therefore, optimizing ship certification at KSOP Utama Tanjung Priok is important for improving public service quality, maritime safety, and national logistics efficiency. Optimization requires better administrative services, stronger technical supervision, improved marine inspector competencies, effective coordination among stakeholders, and greater use of information technology. Certification quality should also be supported by good governance, transparency, accountability, and shared commitment among government authorities, ship operators, crews, and other maritime stakeholders. Such integrated efforts are expected to make certification more effective, efficient, and accountable while strengthening sustainable maritime safety and security in Indonesia.

LITERATURE REVIEW

Theory of Optimization

Optimization refers to a systematic effort to ensure that activities are carried out as effectively, appropriately, and beneficially as possible in accordance with predetermined objectives. In public services, optimization involves not only accelerating service delivery but also ensuring accessibility, transparency, accuracy, and user satisfaction through the effective utilization of human resources, infrastructure, technology, budgets, and work procedures (Fitriani et al., 2025). In the context of ship certification, optimization can therefore be assessed through the ability of KSOP to ensure that every certified vessel meets safety, security, seaworthiness, and documentation requirements. Effectiveness concerns the achievement of service objectives and the accuracy of outputs, while efficiency concerns the use of time, cost, personnel, and other resources without reducing service quality. Research by Ghunu, Purwatiningsih, and Fithriana confirms that effectiveness and efficiency are important elements in delivering excellent public services (Ghunu et al., 2024).

Optimization is also increasingly associated with digital transformation in public service delivery. Digitalization can simplify bureaucratic procedures, accelerate decision-making, increase transparency, and improve public access to services. Putri, Putri, and Umar (2025), in their study of INA Digital, highlight the importance of service integration and digital technology in improving efficiency and the quality of public services, while also identifying challenges such as application integration, digital literacy, and data security. This principle is relevant to ship



certification through the use of SIMKAPEL (Ship and Seafarer Information System), which can support electronic applications, document verification, validation, and monitoring of the certification process. Accordingly, digitalization should function not merely as a technological instrument but as part of an integrated effort to improve the effectiveness, efficiency, and accountability of certification services.

The indicators of service optimization include procedural accuracy, service speed, clarity of requirements, information transparency, officer accountability, availability of infrastructure, human-resource competence, and user satisfaction. Transparency and accountability are particularly important because public services must be accessible, understandable, and accountable to service users. Research by Radjak, Tohopi, and Nani demonstrates that transparency can be strengthened through clear procedures, complete information, and easy access to service requirements and information (Radjak et al., 2025). Therefore, the optimization theory in this study provides a basis for assessing whether ship certification at KSOP Utama Tanjung Priok has been implemented effectively, efficiently, transparently, and accountably. Optimization is not measured solely by the speed of certificate issuance but also by the accuracy of inspections, document compliance, personnel competence, technological utilization, and adherence to maritime safety standards.

Ship Certification

Ship certification is a process of inspection, testing, and approval of a ship's condition to ensure compliance with requirements for safety, security, seaworthiness, and marine environmental protection. A ship certificate serves as legal and technical evidence that a vessel is fit to operate according to its type, size, function, and operating area. In Indonesia, certification is not merely an administrative obligation but also a preventive safety-control instrument to prevent unseaworthy vessels from operating. PM 57 of 2021 regulates the inspection, testing, and certification of ship safety, including the issuance of safety certificates after vessels have been examined and declared compliant with applicable requirements (Kemenhub. RI, 2021b). The types of certificates cover, among others, passenger and cargo ship safety, construction and equipment safety, radio safety, load line, pollution prevention, and safety management. PM 49 of 2021 also regulates the testing and certification of ship equipment and components to ensure the quality and suitability of safety-related equipment (Kemenhub. RI, 2021a).



The legal framework for ship certification is based on Law No. 17 of 2008 on Shipping, as most recently amended by Law No. 66 of 2024, which strengthens the governance, supervision, and enforcement framework in the shipping sector. At the technical level, PM 57 of 2021 provides procedures for ship safety inspection, testing, and certification, while PM 7 of 2024 harmonizes inspection schedules and certificate validity periods for Indonesian-flagged vessels to improve the efficiency and effectiveness of certification services and support maritime safety (Kemenhub. RI, 2024). The certification process generally begins with an application submitted by the shipowner, operator, or shipping agent, followed by document verification and technical inspection covering the ship's construction, safety equipment, communication systems, machinery, stability, and other seaworthiness requirements. The study of AHTS Pasific Bronze demonstrates that certification renewal requires effective coordination among shipping companies, agents, marine inspectors, and KSOP to ensure that all requirements are fulfilled (Hutagaol et al., 2024).

In the modern maritime sector, ship certification is increasingly supported by digital services to improve efficiency, transparency, and service quality. One important instrument is the Ship and Seafarer Information System (SIMKAPEL), which facilitates electronic processing of ship certificates. Magdalena, Purnaningratri, and Lumbanraja found that SIMKAPEL contributes to improving service performance, accelerating the processing of ship safety certificates, and supporting maritime safety in the context of information openness and digitalization (Magdalena et al., 2022). Therefore, ship certification should be understood not only as a legal requirement but also as an integral component of maritime safety supervision that requires continuous optimization through regulatory certainty, competent inspectors, complete documentation, effective coordination, and the utilization of digital technology.

Safety and Security of Ships

Maritime safety refers to the fulfillment of technical, administrative, operational, and managerial requirements to ensure that shipping activities can be conducted without accidents, loss of life, ship damage, cargo loss, or marine pollution. It encompasses not only the physical condition of ships but also crew competence, safety equipment, navigation systems, operational procedures, and supervision by port authorities. A ship is considered seaworthy when it meets requirements concerning construction, machinery, stability, safety equipment, communication systems, and valid safety documentation. In contrast, maritime security focuses on protecting



ships, ports, crews, passengers, cargo, and the marine environment from intentional or unintentional threats, including smuggling, sabotage, theft, piracy, and other unlawful activities. International frameworks such as the International Convention for the Safety of Life at Sea (SOLAS), International Safety Management Code (ISM Code), and International Ship and Port Facility Security Code (ISPS Code) provide important standards for ensuring safe and secure maritime operations (Lioso et al., 2025).

In Indonesia, maritime safety and security are shared responsibilities among the government, ship operators, shipping companies, crews, and users of maritime transportation. The Harbor Master and Port Authority Office (KSOP) plays a strategic role in inspection, supervision, control, and law enforcement related to maritime safety and security. PM 15 of 2023 emphasizes the organization of Main KSOPs to improve the effectiveness and efficiency of port regulation, control, supervision, and maritime safety and security oversight (Kemenhub. RI, 2023). Internationally, SOLAS regulates ship construction, safety equipment, fire protection, communication, navigation, and emergency preparedness, while the ISM Code provides a framework for systematic, documented, and planned safety management and pollution prevention. Meanwhile, the ISPS Code establishes an international security framework for ships and port facilities. Research on ISM Code implementation confirms its role as an international safety-management guideline for ensuring that ship operations are conducted safely and in accordance with established procedures (Indriyani et al., 2021).

At the national level, these standards are reinforced through PM 7 of 2024 on the Harmonization of Inspection and Certification Systems for Indonesian-Flagged Ships. The regulation aims to harmonize inspection schedules and certificate validity periods to improve the efficiency and effectiveness of certification services in supporting maritime safety. It covers inspections for the issuance or endorsement of ship certificates, including safety, load line, pollution prevention, ballast water management, code compliance, flag changes, and ships operating in polar waters, while also modifying certain provisions of PM 57 of 2021, PM 39 of 2016, and PM 11 of 2023 (Kemenhub. RI, 2024). Thus, maritime safety and security are closely integrated with ship inspection and certification because certification provides evidence of compliance with technical and administrative standards. This concept provides an important theoretical basis for assessing the extent to which the certification of Indonesian-flagged ships at KSOP Utama Tanjung Priok supports safe, orderly, reliable, and internationally compliant maritime operations.



RESEARCH METHODOLOGY

This study employs a descriptive qualitative research design aimed at describing, explaining, and gaining an in-depth understanding of the actual implementation of ship certification based on field data rather than statistical calculations. According to Sugiyono (2021), qualitative research examines natural conditions in which the researcher serves as the key instrument for data collection and analysis. This approach is appropriate for examining ship certification for Indonesian-flagged vessels at KSOP Utama Tanjung Priok because it enables an in-depth understanding of the certification process, constraints, roles of relevant personnel, and service optimization efforts through observation, interviews, and documentation. Furthermore, Creswell and Poth (2024) explain that qualitative research seeks to understand social or human phenomena from participants' perspectives within their natural contexts, making it relevant for analyzing how ship certification services are implemented and the factors influencing their effectiveness and efficiency.

Data analysis in this study follows the Miles, Huberman, and Saldaña (2014) model, which consists of three interconnected stages: data condensation, data display, and conclusion drawing and verification. Data condensation involves selecting, focusing, simplifying, abstracting, and transforming raw data from interviews, observations, and documentation into information relevant to ship certification, its constraints, and service optimization. The condensed data are then systematically displayed through narratives, tables, matrices, or thematic categories covering certification implementation, constraints, the role of KSOP, and optimization strategies to identify patterns and relationships. Finally, conclusions are drawn by interpreting the displayed data to address the research questions and are verified through comparison and triangulation of interview, observation, and documentation findings. This process enables the researcher to identify both supporting and inhibiting factors, such as clear procedures, effective coordination, and digital technology, as well as service delays, document discrepancies, limited personnel, and suboptimal digital-system utilization, thereby producing structured and academically accountable conclusions regarding the implementation and optimization of Indonesian-flagged ship certification to support maritime safety and security (Miles et al., 2014).



RESULTS

Implementation of Indonesian-Flagged Ship Certification at the Tanjung Priok Main Port Authority and Harbor Master Office (KSOP Utama Tanjung Priok)

The implementation of Indonesian-flagged ship certification at the Tanjung Priok Main Port Authority and Harbor Master Office (KSOP Utama Tanjung Priok) generally operates well, with a clear relationship between inspection findings and certification decisions. The process begins with the submission of an application and completion of administrative requirements, followed by administrative verification and technical inspection. If the vessel is found seaworthy and no deficiencies are identified, the certification process can proceed to issuance. When discrepancies are found, officers record them through an Inspection Report (BAP) and require corrective action before certification continues. Administrative verification also examines the consistency of key vessel data, including the IMO number, MMSI, call sign, dimensions, vessel type, and equipment information. Technical inspection remains the substantive core of certification, covering navigation and communication equipment, lifesaving appliances, and other safety components, including their functionality, condition, accessibility, validity, and compliance with applicable requirements.

The certification process further requires systematic recording of deficiencies, including their nature, risk level, corrective-action deadlines, and evidence of completion, to strengthen accountability and support more effective inspection prioritization. Certificate issuance should therefore represent the final result of comprehensive verification rather than merely an administrative target; PM No. 7 of 2024 supports efficiency by harmonizing inspection schedules and certificate validity periods without reducing the depth of safety oversight. In addition, SIMKAPEL (Ship and Seafarer Information System) has the potential to improve data traceability, consistency, and service efficiency. Saputra et al. (2023) indicate that service-based e-certification architecture can support vessel registration, inspection, and certification while reducing duplication. However, its effectiveness at KSOP Utama Tanjung Priok needs to be assessed in terms of user experience, system stability, data integration, and consistency between electronic processes and field inspections. Throughout these stages, information should be triangulated among KSOP officials, marine inspectors, agents/operators, and administrative staff, with discrepancies verified through supporting documents or follow-up interviews.



Table 1. Certification Implementation Analysis Rubric

Dimensions	Good Indicators	Indicators Need Improvement	Evidence Sought
Service flow	Stages are clear, consistent, easy to trace	Repetitive/unclear stages	SOP, process status, interview
Documents	Complete and synchronous	Repetitive corrections/data mismatches	Checklist, application file
Technical checks	Checklist-based and objective evidence	Reliance on informal checks	Laporan pemeriksaan, foto
Follow-up	Deficiency recorded and verified	Undocumented fixes	Catatan corrective action
Publication	According to the verification results and conditions	Time orientation reduces accuracy	Certificates and approvals
Digitization	Transparent status, integrated data	Duplicate inputs/ system glitches	SIMKAPEL, service log

Source: Data processed by researchers, 2026.

Challenges in the Implementation of Indonesian-Flagged Ship Certification

The implementation of Indonesian-flagged ship certification faces several challenges, particularly in the use of SIMKAPEL, recurring deficiencies, and the quality of administrative documents. Some ship agents or operators are not yet fully familiar with SIMKAPEL, indicating that digitalization challenges involve not only system reliability but also user literacy and experience. Another significant issue is the recurrence of similar deficiencies during subsequent certification or certificate renewal, suggesting that corrective recommendations are not always maintained or followed up consistently. In addition, incomplete or inconsistent documents, delayed data updates, expired documents, and differences among records can require clarification and correction before inspections proceed. These conditions indicate the importance



of pre-submission checklists, automated validation, user education, and systematic monitoring of corrective actions.

Other constraints include human-resource capacity and competence, inter-party coordination, digital-system performance, operator preparedness, and operational time pressures. High workloads at a major port may create an imbalance between applications and inspection capacity, while differences in competence and experience require appropriate training and workload mapping. Because certification involves KSOP officials, marine inspectors, shipowners/operators, and agents, unclear information, slow responses, or unclear responsibilities may also increase waiting times. Digital systems can create additional obstacles when affected by network disruptions, duplicate data entry, or data synchronization problems. Meanwhile, inadequate operator preparation can increase deficiencies and repeat inspections, while tight vessel schedules may create pressure between operational requirements and the need for thorough safety inspections. Therefore, these constraints need to be assessed using concrete cases, frequency, service-time impacts, and available supporting records, with the harmonization of inspection schedules under PM No. 7 of 2024 providing a relevant mechanism for reducing operational pressure.

Contribution of Ship Certification to Improving Maritime Safety and Security

The findings indicate that ship certification contributes directly to maritime safety by functioning as a control mechanism that prevents vessels with deficiencies from proceeding to certification without corrective action. Vessels without deficiencies may proceed to certificate issuance, while those with deficiencies must fulfill the recommendations before the process continues. Certification therefore helps prevent non-compliant vessels from operating and promotes compliance through the inspection of safety and navigation equipment, including GPS, SART, VHF radio, navigation lights/equipment, and HRU. Verification of vessel identity and communication data, such as the IMO number, MMSI, and call sign, also supports traceability and effective safety communication. However, recurring deficiencies during subsequent certifications indicate that safety benefits would be stronger if corrective actions were continuously maintained and monitored throughout the certificate validity period rather than verified only before certificate issuance.

Certification also contributes to the development of a culture of compliance, as consistent inspection, recording, corrective action, and verification can encourage operators to conduct



maintenance and self-assessment before subsequent inspections. Recent Port State Control (PSC) literature from 2024–2025 emphasizes the importance of inspection quality, inspector competence, and risk-based data in strengthening maritime oversight. Nevertheless, maritime safety cannot be attributed to certification alone, as it also depends on company safety management, crew competence, maintenance, navigation, security, weather conditions, and operational supervision. Therefore, the contribution of ship certification should be understood substantively through qualitative evidence, including identified deficiencies, corrective actions, changes in vessel condition, operator experiences, and documentary evidence demonstrating improvements in compliance and safety.

Efforts to Optimize the Implementation of Indonesian-Flagged Ship Certification

Two main priorities for optimization are identified. First, assistance and socialization regarding SIMKAPEL should be strengthened for ship agents and operators through step-by-step guidelines, helpdesks, short instructional videos, FAQs, or service clinics to reduce submission errors and repeated corrections. Second, a mechanism for controlling recurring deficiencies should be established by maintaining deficiency histories that can be accessed during subsequent inspections. Recurring deficiencies can serve as indicators of compliance risk and provide a basis for strengthened monitoring, operator education, and inspection priorities, ensuring that BAP recommendations become part of continuous learning and prevention rather than one-time corrective actions. PM No. 7 of 2024 also provides a basis for harmonizing inspection schedules and certificate validity periods, which can reduce duplication, administrative burdens, and operational pressure through inspection calendars, validity notifications, and inspector-resource planning.

Further optimization can be achieved through digital integration, human-resource strengthening, risk-based inspection, standardized checklists, improved coordination, organizational learning, and cyber-risk awareness. SIMKAPEL can be enhanced through automated validation, a single source of vessel data, notifications, status dashboards, and deficiency histories; Saputra et al. (2023) highlight the potential of e-certification architecture to improve efficiency and reduce duplication. Inspector workload and competencies should be mapped according to application volume, vessel type, inspection complexity, and risk, while risk-based inspection can use deficiency history, vessel age, compliance records, and operational characteristics to prioritize attention without reducing mandatory regulatory requirements.



Standardized checklists and digital evidence can strengthen consistency and audit trails, while clear contact points, transparent process status, and service-time targets can improve coordination. Periodic analysis of deficiencies can support organizational learning, training, and preventive procedures, while emerging digital-vessel technologies also require greater attention to cybersecurity and system reliability as part of integrated maritime safety and security.

DISCUSSION

Certification as a Preventive Safety Instrument

The documentary findings support the understanding that ship certification has a tangible technical dimension. The inspection of GPS, radio, SART, HRU, navigation lights, and other equipment represents a form of verification of the vessel's readiness. Maritime inspection literature from 2024–2025 indicates that effective inspections help identify high-risk vessels or deficiencies and contribute to reducing accident risks. Therefore, certification should be positioned as part of a preventive safety system rather than merely an administrative requirement.

In practical implementation, performance indicators need to be translated into observable measures, such as the clarity of procedures, the number of repeated corrections, waiting times between stages, checklist consistency, completeness of the audit trail, application stability, and the speed of deficiency follow-up. The use of these indicators can help the study produce a more measurable analysis even though it adopts a qualitative approach. Triangulation is also important because each actor has a different perspective: officials tend to focus on policies and institutional performance, inspectors on technical realities, administrative staff on document processes, and agents/operators on service certainty and operational impacts. These differences should not be regarded as weaknesses in the data but as analytical inputs for identifying processes that require improvement.

Harmonization of Inspection and Certification under PM No. 7 of 2024

PM No. 7 of 2024 was established to harmonize inspection schedules and certificate validity periods in order to make certification services more effective and efficient. This policy is relevant to the operational challenges of major ports with high service volumes. Harmonization can reduce schedule fragmentation and support better resource planning; however, its



effectiveness depends on implementation at the operational-unit level, system readiness, and service users' understanding of the procedures.

In practical implementation, performance indicators need to be translated into observable measures, such as procedural clarity, the number of repeated corrections, waiting times between stages, checklist consistency, completeness of the audit trail, application stability, and the speed of deficiency follow-up. Using these indicators can help the study provide a more measurable analysis despite its qualitative approach. Triangulation is also important because each stakeholder has a different perspective: officials tend to focus on policies and institutional performance, inspectors on technical realities, administrative staff on document processes, and agents/operators on service certainty and operational impacts. These differences should not be viewed as weaknesses in the data but as analytical inputs for identifying process points that require improvement.

Digitalization through SIMKAPEL (Ship and Seafarer Information System)

The study by Saputra et al. (2023) demonstrates that an e-certification model based on a service-oriented architecture can support ship registration, field inspections, and certification with improved interoperability. This finding strengthens the argument that SIMKAPEL (Ship and Seafarer Information System) can serve as an optimization instrument when data are consistent and digital processes are integrated with field inspections. Digitalization also enables historical inspection data to be utilized for risk-based supervision.

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Risk-Based Inspection and Resource Management

A 2024 study on ship inspection planning highlights the importance of selecting high-risk vessels and optimizing the allocation of surveyor resources. Although the context of Port State Control differs from the certification of Indonesian-flagged ships, the underlying managerial principle remains relevant: limited inspection resources should be allocated according to the complexity and risk level of vessels. This approach can strengthen the quality of supervision without compromising service certainty.

In practical implementation, performance indicators need to be translated into observable measures, such as procedural clarity, the number of repeated corrections, waiting times between stages, checklist consistency, completeness of the audit trail, application stability, and the speed of deficiency follow-up. The use of these indicators can help the study provide a more measurable analysis despite its qualitative approach. Triangulation is also important because each stakeholder has a different perspective: officials tend to focus on policies and institutional performance, inspectors on technical realities, administrative staff on document processes, and agents/operators on service certainty and operational impacts. These differences should not be viewed as weaknesses in the data but as analytical inputs for identifying process points that require improvement.

Inspector Competence and Consistency of Supervision

The 2025 Port State Control (PSC) review identifies inspector competence, consistency of training, the legal framework, and the quality of risk models as important issues in maritime supervision. In the context of KSOP, these findings highlight the need for continuous training, calibration of understanding among inspectors, and the use of standardized checklists. Inspector competence should continuously develop in line with changes in regulations and ship technology.

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Deficiency Data as a Source of Learning

Deficiency data can be analyzed to identify recurring patterns of problems. A 2024 data-driven study on deficiencies related to the ISM Code demonstrates that inspection data can be used to understand factors associated with vessel detention and compliance. At the KSOP level, a similar approach can be applied in a simplified manner to identify dominant categories of deficiencies, types of vessels that frequently require corrective action, and areas requiring further socialization and guidance.

In practical implementation, performance indicators need to be translated into observable measures, such as procedural clarity, the number of repeated corrections, waiting times between stages, checklist consistency, completeness of the audit trail, application stability, and the speed of deficiency follow-up. These indicators can help the study provide a more measurable analysis despite its qualitative approach. Triangulation is also important because each stakeholder has a different perspective: officials tend to focus on policies and institutional performance, inspectors on technical realities, administrative staff on document processes, and agents/operators on service certainty and operational impacts. These differences should not be viewed as weaknesses in the data but as analytical inputs for identifying process points that require improvement.

Safety, Security, and Digital Risk

The digitalization of ships provides significant benefits but also introduces new risks. A 2024 study on cyber-worthiness highlights cyber risks as an increasingly important component of safety management systems. For ship certification systems, this development indicates that supervisory competencies must adapt to electronic equipment, connectivity, data integrity, and the growing dependence of ship operations on digital systems.

In practical implementation, performance indicators need to be translated into observable measures, such as procedural clarity, the number of repeated corrections, waiting times between stages, checklist consistency, completeness of the audit trail, application stability, and the speed of deficiency follow-up. These indicators can help the study provide a more measurable analysis despite its qualitative approach. Triangulation is also important because



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Implications of Law Number 66 of 2024

The Third Amendment to Law Number 17 of 2008 updates the regulatory framework for the administration of shipping, including the institutional framework for supervision and regulatory enforcement. For this study, the amendment reinforces the need to view the ship certification process as part of the broader governance of the national shipping sector. Service optimization must remain consistent with the state's responsibility to ensure maritime safety, security, and environmental protection.

In practical implementation, performance indicators need to be translated into observable measures, such as procedural clarity, the number of repeated corrections, waiting times between stages, checklist consistency, completeness of the audit trail, application stability, and the speed of deficiency follow-up. The use of these indicators can help the study provide a more measurable analysis despite its qualitative approach. Triangulation is also important because each stakeholder has a different perspective: officials tend to focus on policies and institutional performance, inspectors on technical realities, administrative staff on document processes, and agents/operators on service certainty and operational impacts. These differences should not be viewed as weaknesses in the data but as analytical inputs for identifying process points that require improvement.

Discussion Synthesis

Conceptually, optimizing ship certification at the Tanjung Priok Main Port Authority and Harbor Master Office (KSOP Utama Tanjung Priok) requires the integration of five elements: harmonized regulations, standardized processes, competent human resources, reliable digital systems, and operator compliance. The research documentation highlights the importance of physical inspections and coordination, while recent literature indicates opportunities to utilize digitalization and risk-based approaches. This synthesis provides a basis for developing a recommendation model that can be further verified through actual interviews.



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Recommended Model for Optimizing the Certification Process

Based on a synthesis of regulations, documentation, and relevant literature, the recommended model is formulated around five pillars: Governance, Process, People, Technology, and Safety Assurance. This model is proposed as an analytical framework and requires further confirmation through interviews and operational data from the Tanjung Priok Main Port Authority and Harbor Master Office (KSOP Utama Tanjung Priok) before it can be established as a final research finding.

Table 2. Five-Pillar Model of Optimization

Pillar	Focus	Expected Results
Governance	Harmonization of regulations, SOPs, authorities, service levels	Process certainty and accountability
Process	Simplification, checklist, integrated schedule, corrective action	Reduction of duplication and wait times
People	Workload mapping, competency, training, calibration inspector	Consistency and quality of checks



Pillar	Focus	Expected Results
Technology	SIMKAPEL, data integration, notifications, dashboard, trail audit	Transparency and traceability
Safety Assurance	Risk-based prioritization, analisis deficiency, quality supervision	Increased focus on safety risks

Source: Data processed by researchers, 2026.

CONCLUSION

Implementation of Indonesian-Flagged Ship Certification at the Tanjung Priok Main Port Authority and Harbor Master Office

The implementation of Indonesian-flagged ship certification at the Tanjung Priok Main Port Authority and Harbor Master Office (KSOP Utama Tanjung Priok) has generally been carried out effectively and in accordance with the applicable inspection mechanisms. The certification process begins with the submission of an application and verification of document completeness, followed by technical inspections conducted by the Marine Inspector to assess the vessel's condition and various seaworthiness aspects. The inspection is not limited to administrative compliance but also covers the physical condition of the vessel, safety equipment, navigation and communication systems, and other aspects related to maritime safety and security. The research findings demonstrate a clear relationship between the results of vessel inspections and certification decisions. When a vessel is declared seaworthy and no deficiencies are identified, the process can proceed to certificate issuance.

When discrepancies or deficiencies are identified during the inspection, the Marine Inspector provides corrective recommendations documented in the Inspection Report (Berita Acara Pemeriksaan/BAP). The vessel or company is required to fulfill these recommendations before the certification process can continue. Thus, certification conducted by KSOP Utama Tanjung Priok serves not only as an administrative service but also as a supervisory instrument to ensure that vessels meet the required standards before being declared seaworthy. This



mechanism demonstrates the application of the corrective action principle, whereby identified deficiencies must be corrected and verified before the certification process is completed.

The implementation of the Ship and Seafarer Information System (SIMKAPEL) also supports the certification process. The system facilitates application submission, document verification, and document tracking while improving service traceability. Digitalization provides KSOP with opportunities to develop a certification process that is faster, more transparent, and more accountable. Overall, the implementation of ship certification at KSOP Utama Tanjung Priok can therefore be considered relatively effective, although further improvements are still needed in the areas of digital-system utilization, data management, and post-certification monitoring.

Challenges in the Implementation of Indonesian-Flagged Ship Certification

The challenges in implementing Indonesian-flagged ship certification at KSOP Utama Tanjung Priok are generally low to moderate and do not significantly disrupt the overall service system. Administrative processes are generally well managed, although some documents still require correction, data synchronization, validity checks, or completion of supporting attachments, resulting in additional verification time. Human-resource capacity and coordination are also generally adequate, with communication among KSOP units, agents, and ship operators functioning relatively well. However, workload management remains necessary during periods of increased applications and inspections. Overall, human-resource and coordination issues are manageable through task allocation, communication, and appropriate inspection scheduling.

More significant challenges are found in digitalization and operator compliance. Some agents and ship operators are still unfamiliar with SIMKAPEL (Ship and Seafarer Information System), which may lead to errors or delays in application submission, indicating that digitalization challenges involve both system functionality and user literacy. The most significant finding is the recurrence of similar deficiencies during certificate renewal or subsequent certification. Although operators generally fulfill corrective recommendations to complete the certification process, these improvements are not always maintained consistently throughout the vessel's operational period. Consequently, the same or similar deficiencies may reappear during subsequent inspections, indicating that the main challenge lies not only in fulfilling corrective recommendations but also in ensuring sustained compliance after certificate issuance.



Contribution of Ship Certification to Maritime Safety and Security

The implementation of Indonesian-flagged ship certification at KSOP Utama Tanjung Priok makes a positive contribution to maritime safety and security by functioning as a control mechanism to ensure that vessels seeking or renewing certificates meet administrative and technical requirements. Vessels without deficiencies may proceed to certificate issuance, while those with non-compliance must undertake corrective actions before certification is completed. The certification process therefore helps prevent technical and administrative deficiencies from being overlooked during vessel operations. Its contribution is also reflected in inspections of vessel conditions, safety and navigation equipment, communication systems, and seaworthiness-related documentation, while encouraging operators to maintain and repair deficiencies identified during inspections.

However, the effectiveness of certification would be strengthened if compliance were maintained throughout the certificate validity period rather than only at the time of inspection. Recurring deficiencies indicate the need for continuous monitoring to ensure that corrective actions remain effective after certification. Therefore, certification success should not be measured solely by the number of certificates issued, but also by reductions in the number and recurrence of deficiencies, consistency in vessel maintenance, and the level of operator compliance throughout vessel operations.

Optimization Efforts for the Implementation of Indonesian-Flagged Ship Certification

Optimization of ship certification at the Tanjung Priok Main Port Authority and Harbor Master Office (KSOP Utama Tanjung Priok) requires an integrated approach involving regulatory alignment, digitalization, human resources, inspection standardization, risk control, and operator compliance. A key priority is strengthening guidance and socialization on the use of SIMKAPEL (Ship and Seafarer Information System) for agents and ship operators through user manuals, helpdesks, tutorials, FAQs, and consultation services. Optimization should also include systematic monitoring of recurring deficiencies by maintaining traceable ship deficiency histories. This allows Marine Inspectors to identify patterns of non-compliance and use recurring findings as risk indicators for determining inspection priorities and depth, thereby transforming BAP and inspection recommendations into instruments for continuous learning and prevention.

The highest-priority strategies include harmonizing inspection schedules and certificate validity periods, strengthening digitalization and data interoperability, and standardizing



checklists and digital evidence. Other important strategies include workload and competency mapping for Marine Inspectors, risk-based inspection, improved coordination and service levels, organizational learning, and the integration of safety, security, and cyber risks. Overall, ship certification at KSOP Utama Tanjung Priok has been implemented relatively well and contributes to maritime safety and security, but it is not yet fully optimal. Therefore, optimization should focus not only on accelerating certificate issuance but also on improving inspection quality and sustaining compliance after certification through stronger SIMKAPEL, standardized processes, recurring-deficiency monitoring, human resource development, and risk-based supervision.

RECOMMENDATION

For the Tanjung Priok Main Harbormaster and Port Authority Office (KSOP Utama Tanjung Priok)

KSOP Utama Tanjung Priok is recommended to improve ship certification by harmonizing inspection schedules and certificate validity periods in accordance with PM No. 7 of 2024, supported by integrated scheduling, certificate-expiry notifications, and appropriate allocation of Marine Inspectors. In addition, SIMKAPEL (Ship and Seafarer Information System) should be strengthened through improved usability, data integration, document validation, application-status tracking, and deficiency-history management. To address users' limited familiarity with the system, KSOP can provide helpdesk services, digital guides, tutorials, FAQs, and regular socialization, while developing SIMKAPEL into an integrated supervisory database with automatic validation, a single source of truth, notifications, status dashboards, and traceable deficiency histories.

For the Marine Inspector

Marine Inspectors are recommended to maintain professionalism and accuracy by consistently applying standardized inspection checklists and documenting each finding with verifiable evidence, including photographs, inspection notes, inspection times, and corrective-action histories, to strengthen traceability and accountability. Particular attention should be given to recurring deficiencies, as repeated findings may indicate that corrective actions have not achieved sustained compliance. Therefore, a risk-based inspection approach should consider deficiency history, vessel age and type, operational characteristics, and operator compliance



records to ensure that inspection resources are proportionally allocated to vessels with higher risk levels.

For Shipping Companies, Agents, and Ship Operators

Shipping companies, agents, and ship operators are advised to strengthen their discipline in preparing certification documents, routinely checking certificate validity, vessel identity, technical documentation, and safety equipment. They should also improve their competence in using SIMKAPEL by assigning responsible personnel who understand digital certification procedures. Furthermore, Marine Inspector recommendations should be treated not merely as requirements for obtaining certificates but as a basis for continuous compliance through maintenance, internal inspections, periodic evaluations, and proper documentation. Recurring deficiencies should be analyzed to identify their causes and prevent repetition, thereby fostering a culture of continuous compliance throughout vessel operations.

For the Development of the Certification System

The certification system should be developed toward a more integrated and data-driven model in which inspection data are used to identify recurring deficiencies, dominant non-compliance patterns, operator follow-up performance, and Marine Inspector competency needs. Periodic deficiency analysis can support operator socialization, inspector training, and inspection procedure improvement, shifting the system from a reactive approach toward preventive and learning-based supervision. Implementation can be phased through short-term priorities (0–6 months) such as checklist standardization, requirement validation, service-status dashboards, and workload mapping; medium-term priorities (6–18 months) including deficiency-history integration, competency development, certificate-expiry notifications, and service-level evaluation; and long-term priorities (18–36 months) involving risk-based analytics, data interoperability, and data-driven quality audits.

For Future Researchers

Future researchers are encouraged to expand the study by involving more informants from various vessel types, shipping companies, agents, Marine Inspectors, and relevant officials, as well as conducting comparative studies across several KSOP offices to examine differences in service quality, SIMKAPEL utilization, inspector workload, and deficiency characteristics. Future



studies may also employ quantitative or mixed-method approaches by measuring certification issuance time, application volume, deficiency frequency and types, recurring findings, SIMKAPEL user satisfaction, Marine Inspector-to-inspection ratios, and operator compliance levels. These measurable indicators can provide a more objective evaluation of optimization strategies and support the development of an effective, efficient, transparent, and safety-oriented certification model for Indonesian-flagged ships.

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