JRSSEM 2025, Vol. 05, No. 2,
E-ISSN: 2807 - 6311, P-ISSN: 2807 - 6494

Effectiveness of the Implementation of the Ship Inspection Report Programme (SIRE) in Improving Ship Safety at PT Pertamina International Shipping

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Abstract.
The adoption of the Ship Inspection Report Programme (SIRE) by PT Pertamina International Shipping demonstrates the company's commitment to enhancing maritime safety and adhering to international standards set by the OCIMF. In practice, however, its implementation encounters several obstacles, including limited assimilation of program objectives, insufficient resources, and less-than-optimal internal communication and safety culture. This research evaluates the effectiveness of SIRE implementation across five dimensions of organizational effectiveness: clarity of goals, efficiency in resource utilization, organizational characteristics, internal communication, and adaptability to change. A descriptive qualitative method was applied, using purposive sampling to select five key informants directly involved in the program, with data gathered through in-depth interviews and analyzed thematically. The results indicate that although SIRE has been implemented effectively overall, significant challenges remain, particularly the lack of comprehensive understanding of its core purpose, as it is often viewed only as a vetting preparation tool. Other issues include the limited number of internal inspectors, weak inter-unit coordination and communication, and the absence of an adaptive roadmap to anticipate regulatory developments and external risks. To ensure sustained effectiveness, this study suggests enhancing case-based training, digitizing the inspection system, forming cross-functional teams, and formulating risk-based adaptive strategies.

Keywords: Organizational Effectiveness, Policy Implementation, Ship Safety, SIRE

INTRODUCTION

Safety in the shipping industry, particularly in the transportation of oil and gas, is a critical priority due to the sector's inherently high risk of maritime accidents and serious environmental consequences. Oil and gas carriers operate across international waters and are frequently exposed to challenges such as extreme weather conditions, cargo leakage risks, and potential incidents resulting from human error or technical failure (Rawson et al., 2021). The implementation of stringent safety standards is therefore essential to reduce the likelihood of accidents and to protect the marine environment (Xue & Lai, 2023). High safety standards also play a pivotal role in ensuring the long-term sustainability of the shipping industry and in supporting the operational continuity of energy companies that depend heavily on maritime transportation (Melnyk et al., 2022).

PT Pertamina, as one of Indonesia's largest energy companies, bears a significant responsibility to ensure that vessels used in the distribution of oil and gas comply with strict international safety standards (Wahid et al., 2024). One of the primary strategies adopted is the Ship Inspection Report Programme (SIRE), a vessel inspection system developed by the Oil Companies International Marine Forum (OCIMF) to enhance the operational safety of oil tankers. OCIMF, established in 1970 in response to growing concerns over tanker safety and marine environmental protection, is a non-profit organization comprising major global oil companies (Yin, 2021). The forum has developed a range of safety guidelines, with SIRE being among its flagship initiatives aimed at ensuring optimal safety standards for vessels in the oil and gas sector.

First introduced in 1993, SIRE operates as a database-driven inspection system designed to raise

the safety standards of oil tankers (OCIMF, 2025). Although non-regulatory in nature, compliance with SIRE has become a *de facto* requirement for tanker operators, as adherence is often a prerequisite for securing contracts and permission to operate in the oil and gas shipping industry (Siali & Bertnsson, 2023). The program provides oil companies and ship owners with access to inspection reports covering technical, operational, and safety compliance aspects. This enables early identification of potential risks and implementation of corrective actions before incidents occur, thereby reducing the likelihood of accidents that could endanger both the vessel and the marine environment (Kartsimadakis, 2023).

As a major player in the oil and gas sector, *PT Pertamina* has integrated SIRE into its tanker inspection framework to assess the seaworthiness of vessels transporting its petroleum products. The program's implementation is intended not only to enhance operational safety and prevent accidents but also to ensure compliance with global regulations while optimizing operational efficiency (Chaal et al., 2023; Crestelo Moreno et al., 2022; Kretschmann, 2020). Furthermore, SIRE contributes to strengthening the safety culture among vessel operators, ensuring that ships meet OCIMF standards. By enabling early detection of weaknesses in safety management, the program facilitates proactive corrective measures. It also supports *Pertamina's* environmental sustainability commitments by preventing oil spills and other incidents with the potential to harm marine ecosystems (Sadler-Smith et al., 2022).

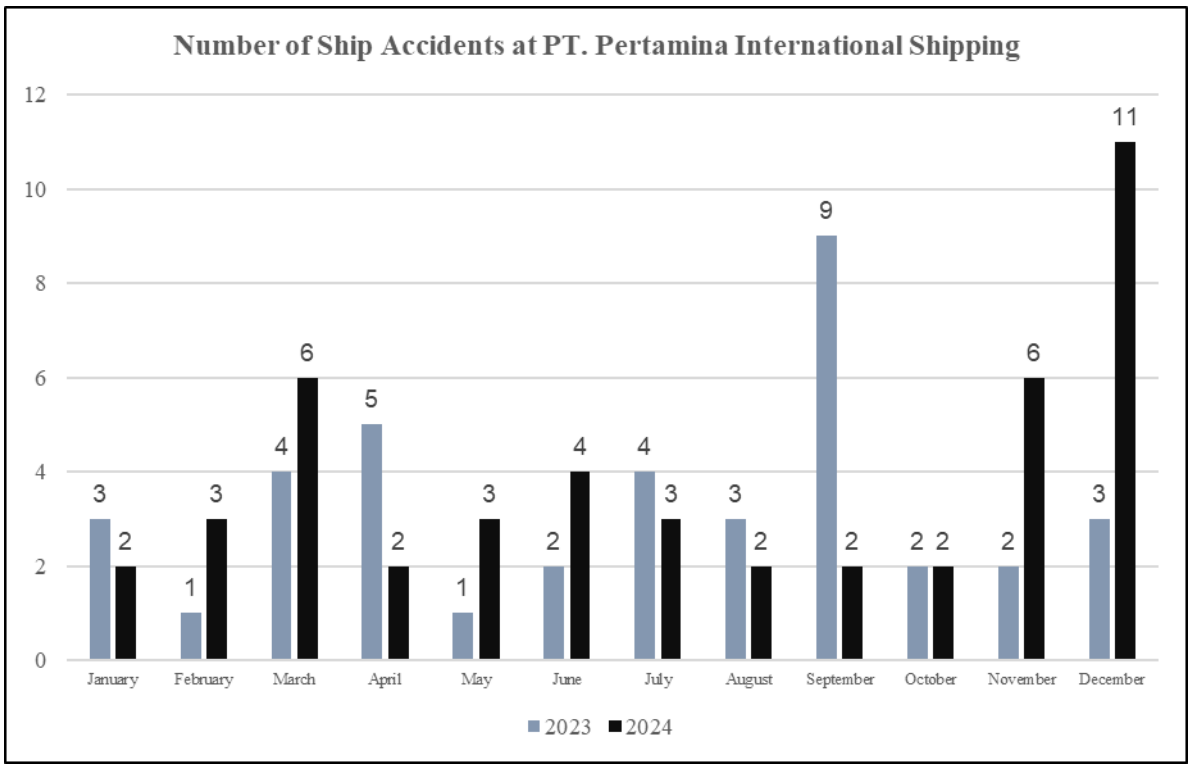

Figure 1. Number of Ship Accidents

Source: Internal Data of PT Pertamina International Shipping (2024)

However, despite the intended safety benefits, internal company data reveal that the number of tanker incidents increased in 2024 compared to 2023. As illustrated in Figure 1, the total number of vessel accidents rose from 39 in 2023 to 46 in 2024, with a sharp spike in December, and notable increases in February and November. These incidents include allision (collision with stationary objects), oil spills, vessel collisions, fires, groundings, crew injuries, illness-related fatalities, and breakaways from mooring due to weather, currents, or procedural failures. This trend raises concerns about the extent to which SIRE has effectively mitigated operational risks in *Pertamina's* tanker fleet.

The increase in accidents contrasts with previous research, such as that by Kurnyyanto and Kanto (2025), who argue that SIRE improves tanker reliability through enhanced crew performance and more effective management practices (Kurnyyanto & Kanto, 2025). Additionally, risk-based inspections and digitalization in SIRE 2.0 have been credited with strengthening safety standards, though they require crews to be better trained and to fully understand operational procedures. Conversely, Demirci *dan* Cicek (2023) caution that excessive inspections by oil companies may increase crew fatigue, thereby elevating accident risks. This highlights the need for further investigation to ensure that SIRE does not inadvertently reduce crew performance or overall operational effectiveness. Against this backdrop, the present study examines the effectiveness of SIRE implementation at *PT Pertamina International Shipping* in improving tanker safety, employing a qualitative research approach.

Previously, various studies have been conducted related to ship inspections and maritime safety. Navas de Maya et al. (2020) in *Ships and Offshore Structures* applied data mining techniques to tanker accident inspection reports to predict and sequence common operational non-conformities. Meanwhile, Poggi et al. (2020) in the *International Journal of Naval Architecture and Ocean Engineering* explored the development of remote inspection technology using robots and autonomous systems to improve the efficiency and safety of ship structure inspections. On the other hand, Demirci and Cicek (2022) in *Ocean Engineering* developed an intelligent analytics model (Intelligent Ship Inspection Analytics) by utilizing the ship deficiency database from the *Paris MoU* to identify deficiency patterns based on ship attributes. Another study by Widodo et al. (2023) focuses on the implementation of lifeboat maintenance and its operational challenges in supporting ship safety. Pavić et al. (2024) examined the integration of human factors in the SIRE 2.0 inspection program, while Pabian et al. (2024) examined ship certification and its bureaucratic constraints at the Banten *KSOP*. Finally, Prieto et al. (2025) analyzed risk patterns based on vessel type using Port State Control data correspondence analysis.

Methodologically, previous studies such as Navas de Maya et al. (2020), Poggi et al. (2020), and Demirci and Cicek (2022) have used a quantitative approach by utilizing large databases such as accident reports, THETIS databases, or experimental trials. Meanwhile, this study uses a descriptive qualitative approach through interviews, documentation studies, and literature review with primary data from informants involved in the implementation of SIRE at *PT Pertamina International Shipping*. In terms of focus, previous research emphasized more on aspects of technology, data analytics, or predictive modeling, while this study focuses on evaluating the organizational effectiveness of SIRE programs in improving tanker safety in a corporate context. Thus, there is a research gap in terms of methodological approaches, data sources, and analytical viewpoints that makes this study relevant and different from previous studies.

The primary objective of this study is to analyze the effectiveness of the Ship Inspection Report Programme (SIRE) in enhancing the operational safety of vessels at *PT Pertamina International Shipping*. Specifically, the research seeks to evaluate the barriers and constraints that hinder the program's ability to effectively reduce the incidence of maritime accidents within the company's tanker fleet. In doing so, the study aims to provide evidence-based recommendations to improve the implementation of SIRE, thereby strengthening its role as a proactive safety management tool. These recommendations are intended to support *PT Pertamina International Shipping* in achieving higher safety performance standards, ensuring compliance with international maritime regulations, and fostering a sustainable safety culture across its operations.

The benefits of this research can be seen from two aspects, namely practical and theoretical. Practically, the findings of this research are expected to be evaluation and reference material for *PT Pertamina International Shipping* in increasing the effectiveness of the implementation of the SIRE program, especially in overcoming operational constraints, improving coordination between functions, and optimizing resources to support a sustainable safety culture. The resulting recommendations can also be adopted by other shipping companies that implement similar inspection systems. Theoretically,

this research contributes to the development of the literature on organizational effectiveness and implementation of maritime safety policies, especially in the context of evaluating ship inspection programs. The evaluative approach used can also serve as a methodological reference for similar research in the future.

MATERIALS AND METHODS

This study employs a qualitative descriptive-evaluative approach to examine the effectiveness of the Ship Inspection Report Programme (SIRE) at *PT Pertamina International Shipping*, focusing on five organizational effectiveness dimensions: goal clarity, resource efficiency, organizational characteristics, internal communication, and adaptability (Dhoopar et al., 2023). Data were collected through in-depth interviews, documentation review, and literature study, with five purposively selected key informants meeting criteria of direct SIRE involvement, at least three years of maritime safety experience, and familiarity with OCIMF standards, while secondary data were drawn from company reports, inspection records, and international safety regulations. Data analysis followed Gioia (2021) through data reduction, display, and conclusion drawing, using semi-structured interviews comprising 12 questions on effectiveness, barriers, and recommendations. Recurring patterns in informants' responses were used to identify priority indicators for improvement, validated through source triangulation (Agustianti et al., 2022). Each barrier was further analyzed using Root Cause Analysis (RCA) and the 5 Whys technique (Al-Rifai, 2025), ensuring solutions address fundamental causes (Roh et al., 2021). Conducted at the company's Jakarta headquarters and selected operational units between March and May 2025, the research allowed direct observation of inspection processes and timely access to documentation, ensuring findings reflect current practices and challenges in SIRE implementation.

RESULTS AND DISCUSSION

Overview SIRE at PT. Pertamina International Shipping

PT Pertamina International Shipping (PIS), a subsidiary of PT Pertamina (Persero), plays a strategic role in national and international energy distribution through maritime shipping and logistics. Operating more than 300 vessels and serving over 65 countries with offices in Singapore, Dubai, and London, PIS has diversified its services beyond energy to dry bulk and non-captive cargo while pursuing fleet modernization and energy transition initiatives, including low-carbon technologies and fuels, to reduce emissions by 32% by 2034. Prioritizing safety, PIS implements the Ship Inspection Report Programme (SIRE) developed by the Oil Companies International Marine Forum (OCIMF), ensuring vessel seaworthiness, safety compliance, and pollution prevention through rigorous inspections, audits, and crew training aligned with ISM and ISPS Codes. The inspection system, coordinated among service users, the PMSOL team, PIS's internal units, and certified inspectors, follows a transparent workflow from inspection requests to the issuance of the Pertamina Safety Approval (PSA). Each stage emphasizes accountability, corrective actions where needed, and continuous monitoring, thereby reinforcing operational integrity, protecting the marine environment, and supporting PIS's vision of becoming Asia's leading integrated maritime logistics company.

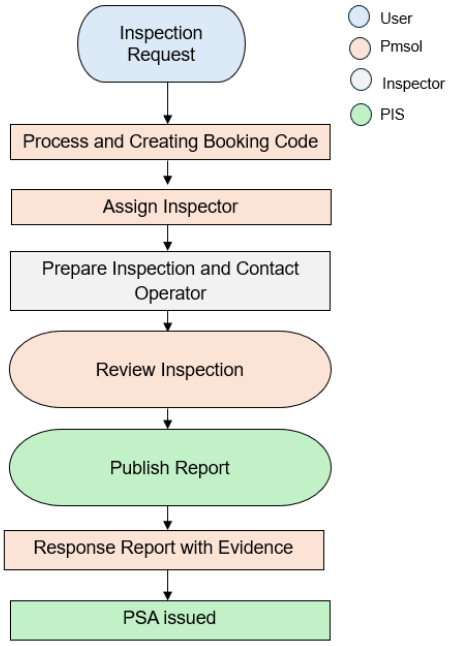

Figure 2. Inspection System Flow of PT. Pertamina International Shipping
Source: Internal Documents of PT Pertamina International Shipping (2025)

The implementation of the Ship Inspection Report Programme (SIRE) at PT Pertamina International Shipping (PIS) is a core element of its safety management system, ensuring all vessels, whether owned or chartered, comply with international operational safety standards set by the Oil Companies International Marine Forum (OCIMF). Administered by the HSSE Shipping unit as part of the vetting process, inspections are initiated through requests processed by the Pertamina Marine Services Operational Logistics (PMSOL) team, which assigns inspectors to assess vessel condition, safety equipment, navigation systems, and crew competence using a strict checklist. Results are reviewed and published as official reports, forming the basis for issuing the Pertamina Safety Approval (PSA) if criteria are met, while vessels failing standards have 30 days to implement corrective actions or face disqualification. Critical failures—such as malfunctioning steering systems, fire pumps, pump room ventilation, and inert gas systems—along with safety scores below 65.01% or more than 10 high-risk observations, automatically disqualify a vessel. To uphold integrity, the programme also enforces strict feedback mechanisms, allows for PSA revocation in cases of repeated negative feedback, and includes random re-inspections. Through this structured approach, PIS positions SIRE not only as a procedural requirement but as a sustainable and comprehensive quality assurance system to enhance maritime operational safety.

Effectiveness of SIRE Implementation

The effectiveness of the Ship Inspection Report Programme (SIRE) at PT Pertamina International Shipping (PIS) was assessed through in-depth interviews with five informants directly involved in its operational execution, aimed at capturing perceptions of SIRE's role in enhancing vessel safety and exploring its practical implementation. Participants were asked the key question: *"What is your view on the effectiveness of the Ship Inspection Report Programme (SIRE) implementation at PT Pertamina International Shipping so far?"* and, in addition to qualitative insights, were requested to provide a quantitative rating from 1 to 100 to measure perceived effectiveness.

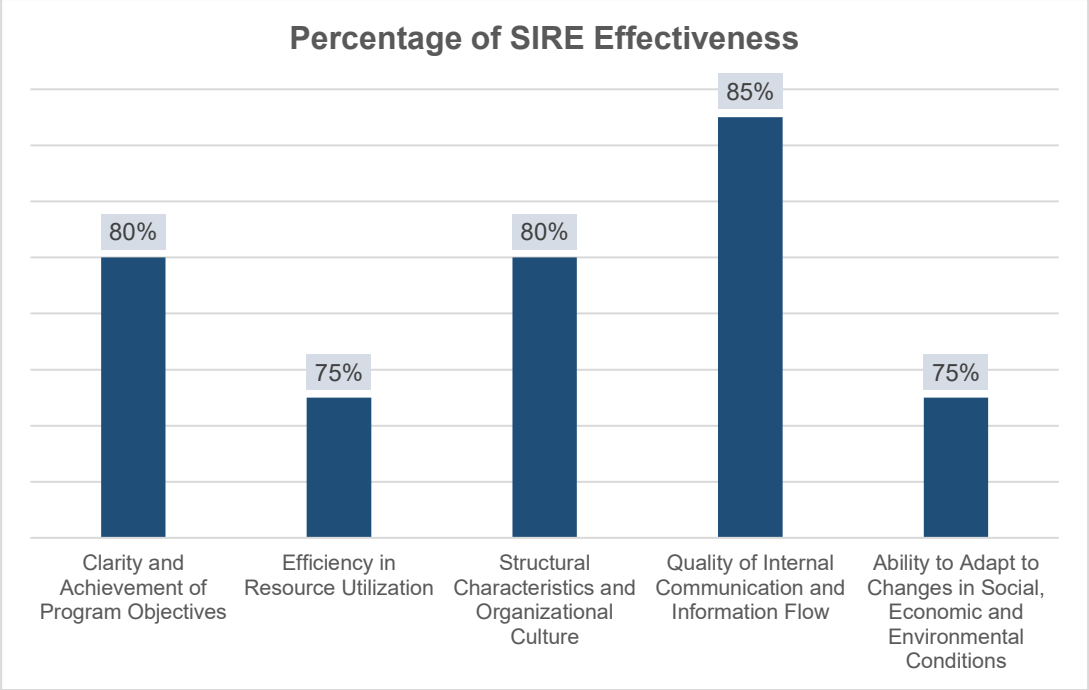

Figure 3. Percentage of The Effectiveness of SIRE Implementation
Source: Results of Researcher Analysis based on Interview Data (2025)

Figure 3 illustrates that the effectiveness of the Ship Inspection Report Programme (SIRE) implementation at PT Pertamina International Shipping (PIS) is assessed across five key indicators, namely clarity and achievement of program objectives (80%), efficiency in resource utilization (75%), structural characteristics and organizational culture (80%), quality of internal communication and information flow (85%), and adaptability to changes in social, economic, and environmental conditions (75%), all of which exceed the minimum effectiveness thresholds established by Dhoopar et al. (2023)—75% for clarity of objectives, 60% for resource efficiency, 85% for structural characteristics, 75% for internal communication, and 70% for adaptability—suggesting that SIRE implementation can generally be categorized as effective, even though empirical data show a gap between expected outcomes and actual practice, with vessel accidents increasing from 39 incidents in 2023 to 46 in 2024 according to internal reports from PIS, thereby indicating that SIRE has not yet fully achieved its goal of reducing accidents and requires comprehensive evaluation in approach, execution, and follow-up; further qualitative findings reveal that the clarity and achievement of program objectives remain problematic as many crew members perceive SIRE merely as a pre-vetting requirement rather than a safety culture instrument, reflecting a policy implementation gap exacerbated by the lack of measurable performance indicators, sporadic training limited to pre-inspection periods, and weak socialization of differences between conventional SIRE and SIRE 2.0; in terms of resource utilization efficiency, concerns arise from a shortage of certified local inspectors, reliance on costly third-party services, rushed preparations due to manpower constraints, the absence of a digital monitoring dashboard for findings and corrective actions, and insufficient training investments that prioritize inspection readiness over a sustainable safety mindset; structurally and culturally, hierarchical decision-making delays the resolution of critical findings, a reactive mindset persists, safety checklists are performed mechanically with a compliance orientation rather than continuous improvement, and inconsistent safety standards across vetting periods alongside limited middle management ownership and lack of a just culture hinder organizational learning; additionally, internal communication gaps and poor adaptability undermine effectiveness as information often fails to circulate between central offices and vessels, responsibility for closing findings remains unclear, and adaptation to SIRE 2.0, ESG requirements, and emerging

maritime risks is constrained by the absence of a structured adaptation roadmap; accordingly, participants emphasized that SIRE must evolve beyond a technical audit tool into a predictive risk management framework through measures such as regular risk-based training, the development of a digital safety dashboard, dedicated personnel for corrective action follow-up, and cross-departmental task forces, which collectively would enable more strategic utilization of SIRE outcomes and stronger long-term maritime safety performance.

Barriers and Challenges in SIRE Implementation

The barriers and challenges in the implementation of the Ship Inspection Report Programme (SIRE) at PT Pertamina International Shipping are categorized according to the five dimensions of effectiveness outlined by Dhoopar et al. (2023), which provide a comprehensive analytical framework for assessing both procedural and systemic constraints, where operational, managerial, and strategic factors collectively influence overall programme effectiveness and its potential to enhance maritime safety performance; however, clarity of objectives remains inconsistent as many crew members perceive SIRE merely as a pre-vetting formality rather than a continuous safety management framework, a situation exacerbated by the absence of defined performance indicators, sporadic training, and limited involvement of operational personnel in policy and training design, resulting in diminished ownership and disconnection from behavioral or systemic safety improvements; constraints in resource utilization are also evident through a shortage of certified local inspectors, dependence on costly third-party services, rushed preparation due to manual reporting systems, inadequate budget prioritization for high-risk findings, and the absence of real-time monitoring platforms that delay follow-up and obscure recurring safety issues; structural and cultural barriers further undermine effectiveness, as hierarchical decision-making slows critical responses, safety remains reactive and compliance-driven, middle management engagement is weak, and the lack of a just culture discourages transparent reporting, while inefficiencies in communication—such as manual reporting, limited dissemination of findings to vessel crews, and the absence of dedicated coordinators or cross-departmental forums—result in fragmented corrective actions and archived rather than actionable insights; adaptability is equally constrained, with the transition to SIRE 2.0 and rising ESG expectations unsupported by structured roadmaps or targeted training, contingency planning for crises underdeveloped, and preparation for green shipping, digital safety, and cyber security minimal, thereby reflecting persistent traditional work practices in a dynamic maritime environment; consequently, the evidence suggests that SIRE at PIS remains heavily compliance-oriented, lacking integration into a predictive risk management approach and an embedded safety culture, and addressing these gaps will require the establishment of clear performance metrics, digital transformation of inspection processes, stronger leadership engagement, systematic feedback mechanisms, and proactive adaptation strategies aligned with global maritime safety standards.

Recommendations for Improving the SIRE Implementation System

The recommendations for addressing the identified barriers and challenges in the implementation of the Ship Inspection Report Programme (SIRE) at PT Pertamina International Shipping are categorized according to the five effectiveness dimensions proposed by Dhoopar et al. (2023). These dimensions serve as the analytical framework for formulating improvement strategies. Insights from in-depth interviews with key stakeholders were synthesized to develop targeted recommendations that address both operational and strategic aspects of SIRE implementation.

Improving clarity and achievement of SIRE's objectives requires comprehensive training and socialization that reach all organizational levels, particularly vessel crews. Such training should be held regularly and be case-based to embed SIRE as part of a continuous safety culture rather than a pre-vetting administrative requirement. Establishing clear key performance indicators (KPIs) linked to SIRE compliance at all levels would provide measurable benchmarks and reinforce accountability.

Practical operational guidelines would further aid understanding and operational consistency. Greater crew involvement in training strategy formulation is essential to build a sense of ownership and align daily work practices with safety objectives.

Enhancing efficiency in resource utilization can be achieved by increasing the number and competency of certified local inspectors, thereby reducing dependency on high-cost external parties. Digitalizing inspection processes through e-inspection tools and integrated dashboards would alleviate crew workloads, accelerate data processing, and improve monitoring of corrective actions. Allocating budgets based on risk profiles would ensure resources are directed where they yield the greatest safety impact. Such measures would make SIRE implementation more systematic, cost-effective, and responsive to field realities. Strengthening organizational structure and culture involves forming cross-functional teams dedicated to SIRE oversight, enabling faster coordination and follow-up on inspection findings. Establishing a just culture and implementing recognition systems for proactive safety reporting would encourage transparency and continuous improvement. Active middle-management engagement, supported by targeted leadership training, is critical to embedding safety leadership throughout the organization. These structural and cultural shifts would position SIRE not merely as an inspection protocol but as a driver for sustained behavioral and managerial change.

Improving internal communication and information flow calls for a centralized digital dashboard accessible to all stakeholders, including vessel crews, displaying inspection results, trends, and follow-up status in real time. Regular cross-departmental forums would facilitate open discussions, share lessons learned, and strengthen collective problem-solving. Assigning a dedicated person-in-charge (PIC) for SIRE communications at both vessel and office levels would ensure accountability in information dissemination and follow-up tracking. Such mechanisms would create a two-way feedback loop, accelerate decision-making, and increase engagement in the safety improvement process. Building adaptability to changing social, economic, and environmental conditions requires the development of a strategic adaptation roadmap covering SIRE 2.0 transition, ESG compliance, and crisis preparedness. Regular training based on updated regulations and emergency scenarios would enhance crew readiness in uncertain conditions. Implementing risk-based early warning systems and contingency plans would enable proactive responses to disruptions such as pandemics, geopolitical tensions, or supply chain breakdowns. By embedding adaptability into safety governance, the organization would not only strengthen operational resilience but also maintain high safety performance in the face of evolving external demands

CONCLUSIONS

This study evaluated the effectiveness of the Ship Inspection Report Programme (SIRE) at *PT Pertamina International Shipping* (PIS) using the five dimensions of effectiveness by Dhoopar *et al.* and found that although the program can be quantitatively categorized as effective—since all indicators met the minimum standards—its implementation remains largely administrative and reactive rather than embedded in daily safety culture. Interviews with five key informants revealed gaps across all dimensions, including limited understanding of strategic objectives, inefficient resource utilization, a compliance-driven culture, weak internal communication, and low adaptability to external dynamics such as the transition to SIRE 2.0 and ESG demands, which correlate with an increase in vessel incidents from 39 in 2023 to 46 in 2024. SIRE is often perceived as an audit formality rather than a strategic safety instrument due to weak dissemination, limited structural support, and the absence of an adaptive roadmap, reinforcing public policy arguments that successful implementation depends not only on policy design but also on organizational capacity to respond and adapt. To address these issues, the study recommends strengthening training and socialization, developing safety-based KPIs, accelerating digitalization of inspection and monitoring processes, establishing a cross-functional oversight team, and designing an adaptive roadmap to anticipate regulatory and industry shifts, thereby transforming

SIRE into a proactive, risk-based, and sustainable safety management system. However, the findings are limited by the small, experience-based respondent pool, reliance on qualitative interviews that may carry interpretative bias, and the absence of comparative or longitudinal analysis, suggesting that future research should adopt a broader respondent base, mixed methods, and cross-industry perspectives to better evaluate SIRE's effectiveness in diverse operational contexts.

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