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Effectiveness of Risk Management through Risk Maturity Measurement: A Study at PT Pelabuhan Indonesia

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ABSTRAK

Penelitian ini bertujuan untuk mengevaluasi efektivitas manajemen risiko di Pelindo pasca-penggabungan dan mengukur tingkat kedewasaan manajemen risikonya. Selain itu, penelitian ini bermaksud menawarkan rekomendasi yang relevan bagi perusahaan dalam mengembangkan strategi dan implementasi manajemen risiko. Penelitian ini mengadopsi pendekatan deskriptif kualitatif dengan strategi studi kasus, di mana peneliti menganalisis sebuah organisasi sebagai unit analisis dalam setting yang tidak buatan, mencerminkan lingkungan alami tanpa manipulasi. Teknik pengumpulan data meliputi wawancara dilakukan terhadap representatif di Group Manajemen Risiko, Tata Kelola dan Kepatuhan selaku pengelola risiko di level korporat. Selanjutnya analisis dokumen yang meliputi buku teks, jurnal akademik dan profesional, tesis, artikel, dan laporan departemen perusahaan. Kemudian analisis data mengikuti model Miles dan Huberman. Penelitian menunjukkan bahwa tingkat kedewasaan manajemen risiko di Pelindo pasca-penggabungan mencapai fase praktik baik dengan skor 2,94. Ini menunjukkan penerapan Manajemen Risiko yang konsisten sesuai standar industri, meski efektivitasnya bervariasi. Struktur organisasi, kerangka kerja, proses, dan budaya risiko sudah mulai diterapkan. Rekomendasi peningkatan mencakup penguatan budaya risiko, peningkatan fungsi manajemen risiko, dan penyelarasan strategi risiko dengan rencana transformasi ERM untuk efektivitas dan kepatuhan lebih baik.

ABSTRACT

This research aims to evaluate the effectiveness of risk management at Pelindo post-merger and assess its risk management maturity level. Additionally, the study intends to offer relevant recommendations for the company in developing its risk management strategy and implementation. The research adopts a qualitative descriptive approach with a case study strategy, where the researcher analyzes an organization as a unit of analysis in a natural setting without manipulation. Data collection techniques include interviews with representatives from the Group Risk Management, Governance, and Compliance as the corporate-level risk managers. Document analysis includes textbooks, academic and professional journals, theses, articles, and company department reports. Data analysis follows the Miles and Huberman model. The research indicates that the maturity level of risk management at Pelindo post-merger has reached the good practice phase with a score of 2.94. This reflects a consistent application of risk management in accordance with industry standards, although its effectiveness varies. The organizational structure, framework, processes, and risk culture have begun to be implemented. Recommendations for improvement include strengthening the risk culture, enhancing the effectiveness of risk management functions, and aligning risk strategies with the ERM transformation plan for better effectiveness and compliance.

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INTRODUCTION

Risk management is an essential component in organizations and businesses, serving to identify, evaluate, and manage various risks that could affect the achievement of organizational goals. These risks can arise from various sources, including market uncertainties, policy changes, or operational disruptions (Etemad, 2020; Gurtu & Johny, 2021). A good risk management approach is crucial for reducing negative impacts and leveraging emerging opportunities. With effective risk management, organizations can better prepare for uncertainties. This helps in making more informed decisions and minimizing potential losses (Baz and Ruel 2021; Catanzaro and Teyssier 2021; Wong et al. 2022). ISO 31000, the international standard for risk management, defines risk as the effect of uncertainty on objectives or goals (Björnsdóttir et al., 2022; Tirayoh & Pangeran, 2023). ISO 31000 provides clear principles and guidelines on how risk management is applied within an organization. Based on ISO 31000:2018 Risk Management – Guidelines, the application of risk management consists of three elements: principles, framework, and process (IPC, 2019). To anticipate and minimize the impact and likelihood of events should the identified risks occur, the company has developed an application system called PRiMA (Pelindo Risk Management). This application was built to enhance the effectiveness and efficiency of the Risk Management process in managing risks across the entire Pelindo Group (Pelindo, 2024).

Successful implementation of risk management requires the involvement of all parts of the organization, including strategic and operational planning, emphasizing transparency, accountability, and effective communication (Ebirim et al., 2024). Enterprise Risk Management (ERM) is an integrated approach to risk management that allows organizations to coordinate and manage different types of risks within a consistent framework (González, Durán Santomil, et al., 2020; Jules & Vicente, 2021). ERM emphasizes inclusivity, structure, and dynamism, enabling companies to tailor risk management to the ever-changing business context. PT Pelabuhan Indonesia (Pelindo) is a State-Owned Enterprise (SOE) with a long history in Indonesia's maritime network (Ilmar et al., 2022; Saleh, 2019). After Indonesia's independence, Pelindo operated as an integrated port company, connecting domestic and international ports (Kusumaningrum & Heikal, 2023; Tungkup, 2020; Wahyuni et al., 2020). With the merger of the four Pelindos (I, II, III, and IV) into a single entity according to Government Regulation Number 101 of 2021, the company now has better coordination and control (Robyanto & Waileruny, 2024). Pelindo has the vision to be a leading integrated and world-class maritime ecosystem, aiming to create a strong national maritime ecosystem network (Nuralamsyah et al., 2022). Pelindo offers various services to achieve these goals, including container terminals, non-container terminals, logistics, hinterland, and marine and equipment services. Pelindo is now one of the largest container operators in the world, with ambitions to rank among the top five global container operators.

Pelindo has adopted ISO 31000:2018 as its risk management framework in pursuit of these goals. As an SOE with a Systemic A Conglomerate risk classification, Pelindo faces various types of risks, such as operational, financial, technological, and legal risks (Priyarsono et al., 2023; Triggs et al., 2019). To improve the effectiveness of risk management, Pelindo has developed the Pelindo Risk Management (PRiMA) application to efficiently identify, measure, and manage risks across all Pelindo entities (Kusumo et al., 2022). Although it has adopted leading risk management standards, Pelindo needs help enhancing risk culture and consistency in risk management. Differences in employee understanding and perception of risk handling and a need for more awareness about the importance of risk management are major obstacles. After the merger,

Pelindo faces a major challenge in improving its risk culture, which is a crucial element in the implementation of ISO 31000-based risk management. According to Usman Saroni, Group Head of Risk Management, Governance, and Compliance, awareness and development of a risk culture remain significant obstacles, particularly due to differences in employee understanding of risk management in the workplace and inconsistencies in its implementation. Employees are not yet fully aware of the importance of risk management in supporting the achievement of the company's objectives, largely due to a lack of awareness and belief that risk management is a critical aspect. Moreover, these challenges are compounded by the complexity of the company post-merger, operating in a competitive business environment with high expectations from stakeholders and customers. As a state-owned enterprise (SOE) classified under the Systemic A Conglomerate risk category by the Ministry of SOEs, Pelindo faces high risks due to its large size and operational complexity, necessitating the standardization and integration of risk management systems across the group. Although the company has adhered to regulations set forth in PER-02/MBU/03/2023 for strategic decision-making, the effectiveness of post-merger risk management has yet to be fully evaluated. Therefore, risk management maturity assessments are required to identify gaps and provide continuous improvement recommendations, so that Pelindo can enhance the effectiveness of its risk management in the future.

Several previous studies, such as the one by González et al. (2020), discuss enterprise risk management (ERM) in Spanish public companies and assess risk management implementation and its impact on company performance. Similarly, the study by Blundo et al. (2021) emphasizes the importance of risk management in global uncertainty and sustainability, highlighting the need for effective risk management in large companies, especially those with a systemic impact on the national economy. Like the study by Lee, (2020), which reviews the cybersecurity risk management framework in the Internet of Things (IoT) context, this study also examines the risk management framework and how it can be measured and analyzed. The main difference between these studies and this research lies in the context and focus of the companies studied. The study by González et al. (2020) focuses on public companies in Spain, while this research examines an SOE in Indonesia, providing a different context. Additionally, the study by (Blundo et al. (2021) emphasizes flexibility and resilience in corporate decision-making in the face of global uncertainty, while this research focuses more on assessing the level of risk maturity in the context of a company merger and its implications for risk management. Finally, the study by Lee, (2020) relates to cybersecurity and IoT risk management, which is a specific area.

In contrast, this research associates with general risk management in the port industry without emphasizing information technology or cybersecurity aspects. Thus, the main objective of this research is to evaluate the effectiveness of risk management in Pelindo after the merger and to measure the level of risk maturity. Additionally, this study aims to provide relevant recommendations for the company in developing risk management strategies and implementation. The uniqueness of this research lies in the comprehensive analysis of risk management effectiveness at PT Pelabuhan Indonesia after the merger, using a risk maturity measurement method aligned with the Ministry of SOE's regulations. Furthermore, this study provides recommendations for improvement based on the gap analysis found in risk

management implementation. This approach offers relevant insights for other SOEs facing similar challenges in managing risk amid organizational changes and a dynamic business environment.

Literature Review

Management is a series of processes encompassing planning, organizing, executing, monitoring, evaluating, and controlling. This process aims to empower all organizational resources, including human resources, capital, materials, and technology, to achieve organizational objectives (Alfawaire & Atan, 2021; Tanjung, 2020). Businesses and organizations always have goals and objectives that need to be completed. Organizational activities are often faced with uncertainties that can hinder achieving goals, known as risks (Mosii et al., 2021; Yusuf et al., 2023). Risks are factors or phenomena that arise in organizational activities and can affect the effectiveness and efficiency of core organizational processes (Mahmood et al., 2020; Olan et al., 2022). The impact of uncertainty can be observed in many aspects, such as finance, occupational safety, environment, and varying levels within the organization. Risk management helps companies adjust their strategies to achieve their vision and mission. As a planned activity by top management, the strategy aims for the long term and must align with existing risks. According to ISO 31000, the Risk Management Process identifies potential events that affect the company, manages risks, and assures achieving the company's objectives (Putri & Wijaya, 2022). This process involves various elements such as principles, frameworks, and processes. Risk management principles include integration, structure, alignment, inclusiveness, dynamic, best available information, human and cultural factors, and continuous improvement (Moreira et al., 2021; Senkus & Górna, 2021). The framework involves leadership and commitment, integration, design, implementation, evaluation, and improvement. Risk management consists of identification, assessment and measurement, and risk management (Munir et al., 2020). The Integrated Corporate Risk Management approach became known in the late 1990s and was adopted by many companies due to increased business complexity (López, 2021).

ERM was developed based on the corporate governance principles from the Committee of Sponsoring Organizations (COSO), which defines a model for identifying, assessing, and disclosing risks that large companies may face (Khodier et al., 2021). The main goal of this model is to guide the evolution and improvement of risk management, serving as a foundation for organizations to determine whether risk management is effective. ERM focuses on enhancing "silos" to coordinate and control enterprise risk consistently (Jankensgård, 2019; Linke & Florio, 2019). In practice, ERM improves company performance reduces various risk pressures, and provides growth opportunities for companies.

Risk Maturity measures the level of maturity in risk management implementation. Its purpose is to increase the impact of risk management on the organization's business value. The Risk Maturity Index is used to measure the quality of the design and effectiveness of the implementation of risk management in protecting and creating value for the company (Crispim et al., 2019; Hartono et al., 2019). The risk management maturity model refers to the concept of Corporate Risk Management and is related to general business assumptions applied at the enterprise management level. The risk maturity index can help organizations identify areas that need improvement and provide an overview of the company's position among the same business sectors. However, this model also has drawbacks, such as varying optimal maturity levels depending on the organization's context and the potential to be labor-intensive in

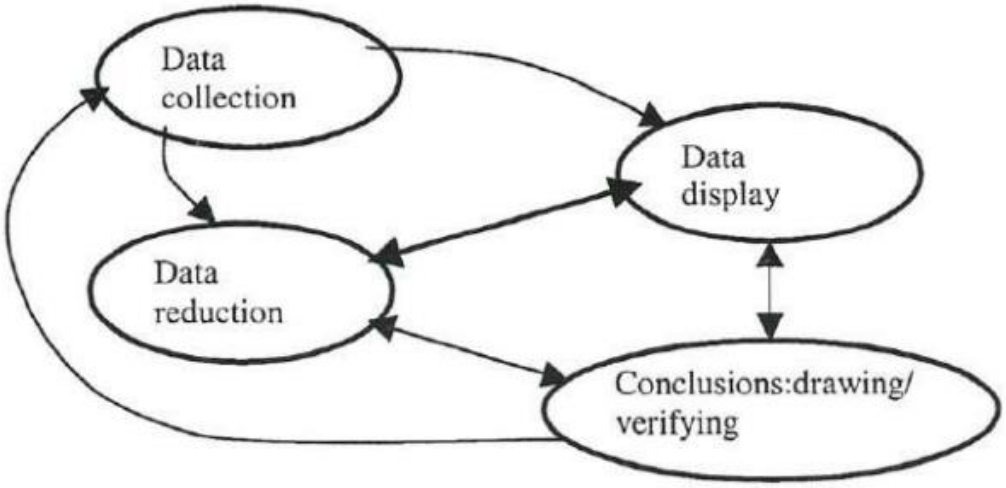
identifying all company risks (Wang et al., 2021). The risk maturity model (RMM) issued by the Risk Management Society (RIMS) is the most frequently used method to measure the level of risk maturity (Alijoyo et al., 2021).

RESEARCH METHODS

This research is descriptive with a qualitative approach. The research strategy used is a case study, focusing on an in-depth analysis of an organization as the unit of analysis. The research setting is non-contrived, meaning it is conducted in a natural environment without manipulation (Men et al., 2023). The research timeframe is cross-sectional, indicating that data is collected at a specific time to provide an overview of the situation or phenomenon at that moment (Ali et al., 2022). Using this approach, the research aims to give a rich and detailed description of the phenomenon within an organizational context. The operationalization of variables in this research serves as the basis for conducting interviews and data collection to evaluate and assess the level of risk management in the organization. The question guide listed in the table provides clear parameters to measure various dimensions of risk management, including risk culture, risk governance, and the effectiveness of risk management, ensuring that interviews and data analysis are conducted consistently and comprehensively. In this context, the sample could consist of respondents, informants, or other individuals as needed for the research. The list of respondents for this study includes 21 people involved in risk management and governance at Pelindo, a company in the logistics and transportation sector. Their positions range from chief financial officer to various roles on the risk and governance committees and positions in other departments focusing on risk management and internal oversight. The list also includes representatives from various Pelindo subsidiaries, indicating a wide scope for data collection in this research.

The data collected comprises primary and secondary data. Primary data is obtained through interviews with individuals or related work units. The interview was conducted with representatives from the Risk Management, Governance, and Compliance Group, who serve as risk managers at the corporate level. In contrast, secondary data comes from literature reviews, books, journals, theses, articles, internal documents, and the Internet. Several validity tests are conducted to ensure data validity, such as credibility, transferability, dependability, and confirmability tests. The credibility test uses a member-check technique, where analyzed data is cross-checked with respondents. The transferability test provides a detailed and systematic description so the research results can be applied to the same population. The dependability test involves an audit of the entire research process by a supervising professor and examiners. The confirmability test measures the objectivity of the research through discussions with peers and references. The research results should reflect the research process. The sharpness of text analysis and interview understanding is also used to support reliability in qualitative research. The data analysis technique uses the Miles and Huberman model, as referenced in Sugiyono, (2018), a general qualitative data analysis framework. This model consists of four components: data collection, data reduction, data display, and conclusion drawing. Data collection involves interview methods and document studies. Data reduction consists of selecting and filtering information. Data display can be in the form of narrative text, graphs, or diagrams to facilitate interpretation. Finally, conclusion drawing is the process of finding meaning from the presented data and may require further interpretation if the conclusions are still tentative.

Figure 1.
Miles & Huberman, Components in data analysis



Source: Miles et al., (2014)

Subsequently, in Risk Management Reporting, the evaluation score for the quality of Risk Management implementation will be converted, with the following score conversion criteria:

Table 1.
Conversion of Assessment Scores on the Quality of Risk Management Implementation

Quality of Risk Management Implementation	Assessment Score
Strong	>90
Satisfactory	85-90
Fair	80-84
Marginal	75-79
Unsatisfactory	<75

Source: SK-7 Risk Management Reporting Technical Guidelines by KBUMN, (2023)

A scoring system for evaluating performance achievement will also include a score conversion, with the following score conversion criteria:

Table 2.
Conversion of Assessment Scores into performance achievements

Performance	Score
Very Good	>95
Good	90-94
Fair	80-89
Poor	70-79
Bad	<70

Source: SK-7 Risk Management Reporting Technical Guidelines by KBUMN, (2023)

Based on the Technical Guidelines for Assessing the Risk Maturity Index (RMI) within State-Owned Enterprises No. SK-8/DKU.MBU/12/2023, for each level of RMI assessment results (BUMN, 2023), namely:

Table 3.
The Technical Guidelines for Assessing the Risk Maturity Index (RMI)

Maturity Level				
Initial Phase (1.0 to 1.4)	**Developing Phase (1.9 to 2.4)**	**Good Practice Phase (2.9 to 3.4)**	**Better Practice Phase (3.9 to 4.4)**	**Best Practice Phase (4.9 to 5.0)**
1) State-Owned Enterprises (SOEs) have implemented several dimensions of Risk Management practices;	1) State-Owned Enterprises (SOEs) generally implement all dimensions of Risk Management practices to meet minimum regulatory requirements;	1) SOEs have implemented all dimensions of Risk Management practices, which on average are close to or aligned with industry standard practices;	1) State-Owned Enterprises (SOEs) implement all dimensions of strong Risk Management practices, which, on average, are close to or in line with the global industry standards.	1) State-Owned Enterprises (SOEs) implement best risk management practices in line with global industry standards;
2) Risk culture and awareness among employees are still low;	2) Certain employees are sufficiently aware of risks, particularly in top management, and a Risk culture is beginning to be introduced within the company;	2) The average employee is sufficiently aware of risks, and a risk culture is beginning to be implemented within the company;	2) All employees are aware of risks, and the implementation of the company's Risk culture has entered a more extensive, complex, and increasingly integrated stage within the company, both for leaders and every individual.	2) A Risk Culture is fully embedded within the organization and has been entirely embraced by all personnel in the SOEs, supported by knowledge management and the development of risk management capabilities;
3) Governance and organizational structure related to Risk Management are still in the planning stage;	3) There is an organizational structure, framework, compliance, processes, systems, and tools related to Risk Management, though gaps still exist in practice;	3) Organizational structure, framework, compliance, processes, systems, and tools related to Risk Management have been	3) The organizational structure, framework, compliance, processes, systems, and tools related to Risk Management are implemented quite effectively.	3) The organizational structure, framework, compliance, processes, systems, and tools related to Risk Management are implemented effectively and

Maturity Level				
Initial Phase (1.0 to 1.4)	**Developing Phase (1.9 to 2.4)**	**Good Practice Phase (2.9 to 3.4)**	**Better Practice Phase (3.9 to 4.4)**	**Best Practice Phase (4.9 to 5.0)**
		implemented, although their effectiveness or level of implementation still varies;		continuously improved;
4) Risk Management infrastructure, such as policies, guidelines, SOPs, and regulations, are not regularly updated; and	4) The effectiveness or level of implementation still varies across different dimensions;	4) SOEs have consistently applied Risk Management across all parts of the company in accordance with the established Risk Management framework and continuously apply Risk Management principles; and	4) SOEs have implemented Risk Management with continuous improvements as evidence of the company's proactive approach to Risk Management.	4) The Risk Management process employs advanced methods with an integrated Risk Management information system that is connected to other information systems. Continuous updates and improvements to the Risk Management process are carried out;
5) The framework, compliance, processes, systems, and tools related to Risk Management are not consistently applied throughout the organization. Risk Management is only carried out on an ad hoc basis, relying on the understanding of certain individuals.	5) SOEs have communicated the Risk Management infrastructure and it is well understood by all company personnel; and	5) The cascading of corporate performance targets has been carried out down to the individual level.	5) The implementation of Risk Management is supported by adequate and accountable information systems.	5) SOEs have positioned Risk Management as a driver to add value to the company and as the basis for every decision-making process by considering every opportunity available; and

Maturity Level				
Initial Phase (1.0 to 1.4)	**Developing Phase (1.9 to 2.4)**	**Good Practice Phase (2.9 to 3.4)**	**Better Practice Phase (3.9 to 4.4)**	**Best Practice Phase (4.9 to 5.0)**
	6) The company has aligned its Risk Management infrastructure with corporate performance targets.		6) Performance achievement evaluations are conducted periodically.	6) Performance trends have shown continuous improvement year after year.

Source: SK-8 Technical Guidelines for Assessing the Risk Maturity Index (RMI) within State-Owned Enterprises by KBUMN, (2023)

RESULTS AND DISCUSSIONS

Results

Risk culture and capabilities

Risk culture

Table 4.
Risk Culture Sub-Dimension Assessment

Parameters: Internalization of Risk culture in company culture			
Information Acquisition			
D	**W**	**Sources and Questions**	**Answer**
√	√	Risk Management Unit – R9 Are risk management procedures and risk culture understood and embedded throughout all levels of the organization?	Currently, participation in the implementation and management of ERM at Pelindo has been quite active. This is being achieved by internalizing the company's risk culture through various programs designed to foster risk culture development, such as Risk Awards, Risk Management Discussions, Training and Certification, Seminars, Benchmarking, and more.

Results
Score: 4
Explanation of the Score:

1. There is an ongoing risk culture program (such as risk awards, risk town halls, and so on), with a more frequent risk awareness program (more than once a year) conducted regularly.
2. Responsibility for developing the Risk Culture is held by the Second Line and documented in the job descriptions of the Second Line, under the supervision of the Board of Directors and the Board of Commissioners/ Supervisors.
3. The Board of Directors plays an active role in developing a Risk Management culture.
4. A regular evaluation is conducted at least once a year to assess the improvement of the Risk Culture (such as a Risk Culture survey), including gathering feedback from employees for further development of the Risk Culture program.
5. Risk Culture is an integral part of the company's culture. It is outlined in the workplace culture policy, which is disseminated throughout the company, and this culture is instilled across all levels,

starting from the top management's endorsement and reinforced by concrete actions (which can also be used as criteria for employee performance evaluation).
Analysis Results/Quotes/important evidence/data sources:
1. The documents for Socialization and Implementation of Risk Awarding, Seminar, Focus Group Discussion (FGD), Poster, Flyer, Comic, and Benchmarking to other companies have been prepared and executed since 2021. 2. It is stated in the Organizational Job Description document of the Head Office (Perdir) on page 743 that the Job Duties and Responsibilities of the Group Head of Risk Management include risk management tasks. Risk management responsibilities are inherently assigned to all Directors. 3. Documentation of risk awards and seminars where the Deputy Managing Director was the keynote speaker (risk award and seminar flyers). 4. Has already been conducted ted during the risk award seminar event. 5. In the Technical Risk Management Guidelines: Building a Risk Awareness Culture, all company employees are expected to participate and support enhancing a risk awareness culture in the Company, and risk management aspects have already become common KPIs for employees.

Source: Processed by the author (2024)

Based on Table 4, Pelindo has implemented a strong risk culture through various programs, such as Risk Awards, seminars, and training, which encourage active participation at all levels of the organization. Additionally, the responsibility for developing a risk culture is held by the second line and overseen by the Board of Directors, with risk culture being an integral part of the corporate culture and integrated into employee KPIs.

Risk capability

Table 5.
Risk Capability Sub-Dimension Assessment

Parameter: The role of RMI Assessment in efforts to improve Risk Management practices			
Information Acquisition			
D	**W**	**Sources and Questions**	**Answer**
√			
Results Score Explanation: 1. An Independent Assessment team has conducted an RMI (Risk Management Index) assessment within the last three years. 2. The RMI assessment is conducted regularly (annually), at least at the Holding level. 3. The RMI assessment covers all Risk Dimensions (Risk culture and capability, Risk organization and governance, Risk framework and compliance, Risk processes and controls, Risk models, data, and technology). 4. A plan for improvement based on the RMI assessment results has been established, with clear follow-up actions (including detailed initiatives with responsible parties and a detailed implementation timeline). 5. There has been a socialization of the RMI assessment results to the Board of Directors, the Board of Commissioners/Supervisory Board, and other relevant stakeholders (such as all Risk Management personnel and relevant First Line/Third Line personnel) to reinforce Risk maturity ownership among all stakeholders.			
Analysis Results/Quotes/important evidence/data sources: 1. RMI Assessment Documents 2. Pelindo Holding has conducted routine assessments using the self-assessment method and involving BPKP (Indonesian State Financial and Development Supervisory Agency) in the assessment process. 3. The working paper document contains all risk dimensions but not all parameters from the technical guidelines. 4. The AOI (Area of Improvement) document includes a person in charge (PIC), a one-year fulfillment timeline, and its progress. 5. The Deputy Managing Director, the Head of Risk Management, and the Risk Management unit team attended the RMI closing meeting. The minutes of the February KPMR meeting contain the table of contents for the RMI AOI.			

Parameters: Risk expertise improvement program			
Information Acquisition			
D	**W**	**Sources and Questions**	**Answer**
√	√	HR Strategy – R16 Are risk management competencies part of compensation and career development discussions throughout the organization?	Risk Management competence, a generic technical competence at Pelindo, is achieved through competence enhancement programs such as certifications, training, courses, or workshops. Competence and career are correlated, meaning that a person can advance to a higher career level if they have met the expected competence requirements, particularly for employees in risk management positions who need more specific knowledge in risk management. Changes in competence will be felt when an employee takes on a higher career position. These competence qualifications will eventually become the requirements for every member of the Risk Management Body.

Result

Current score: 4

Explanation of the Score:

1. A risk skill enhancement program has been established.
2. The program is accessible to all employees.
3. The program is tailored to skill levels/positions, specifically for risk personnel and members of the Board of Commissioners/Supervisory Board of Directors.
4. The program topics are comprehensive, covering all risk management dimensions, including risk culture and capability, risk organization and governance, risk framework and compliance, risk process and controls, risk model, data, and technology.
5. The training attendance rate is above 95% of the total registered participants.
6. The program is mandatory and held regularly (at least once a year).
7. The curriculum is reviewed routinely and formally based on employee training needs, with an annual update process to ensure its quality and align it with critical risks and best risk management practices (e.g., continuously updated with the latest international standards).
8. There is a documented "feedback loop" from employees who have received risk training to assess the training's impact on their job performance and to provide feedback.

Analysis Results/Quotes/important evidence/data sources:

1. Annual Risk Management Training Planning Document
2. The training is accessible to all employees using the PortaVerse application.
3. The planning includes the Board of Directors, Commissioners, and position leveling.
4. The training topics are planned to be different each year.
5. Training Attendance List
6. Training Order Document
7. Curriculum review is conducted during training planning and proposed to the Training Planning section within HR Management.
8. There has been a Level 1 training evaluation from all training participants.
9. Risk Management Training Certificate.

Source: Processed by the author (2024)

Pelindo Risk Management Implementation (RMI) evaluation reveals a comprehensive risk assessment practice, with independent reviews, clear improvement plans, and outreach to various stakeholders to ensure effective implementation. Additionally, the risk expertise enhancement program is diverse, covering different levels and positions, with a curriculum updated annually and a training participation rate above 95%, demonstrating the company's commitment to strengthening a risk management culture.

Table 6.
Dimension 1 Culture and Risk Capability scores

No	Parameters	Score
1	Internalization of Risk culture	4,00
2	The Role of RMI Assessment in Efforts to Improve Risk Management Practices	3,00
3	Risk Skills Enhancement Program	4,00
Dimension 1 Culture and Risk Capability scores		3,67

Source: Processed by the author (2024)

The average score for Dimension 1 of Risk Culture and Capabilities is 3.67, indicating a fairly strong level of risk awareness and knowledge within the organization. The highest-scoring parameters are the internalization of risk culture and the risk skills improvement program, with a score of 4. Meanwhile, the role of RMI assessment in efforts to enhance risk management practices received a score of 3.

Organization and Risk Governance

The score for Dimension 2 Organization and Risk Governance is obtained from the average score for each parameter with detailed calculations as follows:

Table 7.
Dimension 2 Organization and Risk Governance Score

No	Parameters	Score
1	Effectiveness of risk management function	4,00
2	Maturity level of risk management organization	3,00
3	Active involvement of the Board of Commissioners/Supervisors in risk management	4,00
4	Escalation of issues to the Board of Commissioners/Supervisors	4,00
5	Risk understanding level among the Board of Commissioners/Supervisors	3,00
6	Role of committees under the Board of Commissioners/Supervisors	4,00
7	Active involvement of the Board of Directors in risk management	3,00
8	Mandate, authority, and independence of the Risk Management function to monitor all risks	4,00
9	Effectiveness of the risk management function in carrying out its duties	4,00
10	Implementation of the Three Lines of Defense Risk Governance Model	3,00
11	Role and Function of the First Line of Defense	4,00
12	Role and Function of the Second Line of Defense	4,00
13	Role and Function of the Third Line of Defense	3,00
14	Interaction between Risk and Assurance functions (compliance, legal, audit)	3,00
15	Role and function of Integrated Risk Governance	4,00
16	Risk monitoring from the parent entity to subsidiaries.	4,00
Dimension 2 Organization and Risk Governance Score		3,63

Source: Processed by the author (2024)

The Dimension 2 Risk Management Assessment results indicate the effectiveness and role of various functions in risk management. With an average score of 3.63, the involvement of the Board of Commissioners/Supervisory Board, the roles of the First and Second Lines, and the interaction between the Risk and Assurance functions are at a relatively good level, with some areas needing improvement.

Risk and compliance framework

The score for Dimension 3 of the Risk and Compliance Framework is obtained from the average score for each Parameter with detailed calculations as follows:

Table 8.
Risk and Compliance Framework Dimension 3 Score

No	Parameter	Score
1.	Quality improvement of the framework	4,00
2.	Enterprise Risk Management transformation plan	2,00
3.	The role of Risk Management in the preparation of strategic plans	2,00
4.	Relationship between the role of Risk Management and the achievement of strategic targets in the RKAP	4,00

No	Parameter	Score
5.	Risk capacity	2,00
6.	Risk appetite	3,00
7.	Communicating Risk Appetite to external stakeholders	2,00
8.	Risk policy	1,00
9.	Risk procedures	2,00
10.	Contingency plan in worst-case scenarios	2,00
11.	Review and stress testing of procedures and SOPs	3,00
12.	Compliance function and its role	2,00
13.	Implementation of the Integrated Enterprise Risk Management (ERM) framework	3,00
14.	Effectiveness of Internal Controls	2,00
Dimension 3 Organization and Risk Governance Score		2,43

Source: Processed by the author (2024)

The 3D Score in the Risk and Compliance Framework shows a range of scores across various aspects, with risk framework quality reaching the highest score (4.00), while risk policy scored the lowest (1.00). Overall, the average score for the Organization and Risk Governance aspect is 2.43, indicating some areas for improvement in the implementation and management of risk and compliance.

Process and risk control

Table 9.
Dimension 4 Process and Risk Control Score

No	Parameters	Score
1	Identification of primary risks	4,00
2	Risk measurement	3,00
3	Framework for measuring risk for risk prioritization	3,00
4	Integration of all primary risks	2,00
5	Activities for addressing primary risks	3,00
6	Identification and management of risk exposure above risk appetite	3,00
7	Real-time risk reporting	3,00
Score of the Four Dimensions of Organization and Risk Governance		3,00

Source: Processed by the author (2024)

The 4th dimension of the Process and Risk Control table shows the highest score in Major Risk Identification, with a score of 4.00. However, other aspects, such as the Integration of all Major Risks, have lower scores, like 2.00, indicating a need for improvement in overall risk management.

Risk models, data, and technology

Table 10.
Dimension Score 5 Risk Models, Data and Technology

No	Parameters	Score
1	Risk Modeling and Technology	1,00
2	Risk Data	3,00
Dimension Score 5 Risk Models, Data and Technology		2,00

Source: Processed by the author (2024)

The score for Dimension 5, which involves Model, Data, and Risk Technology, shows an average value of 2.00. This reflects that there is a variation in the maturity levels between risk modeling

(score of 1.00) and risk data (score of 3.00), indicating a potential need to enhance risk modeling and technology to align with higher risk data standards.

Risk composite rating calculation

The ranking is determined through two assessment variables: the evaluation of Risk Management quality and the review of performance achievement. The calculation results from these two variables represent a depiction of the quality of Risk Management about performance. The assessment score for the first variable, which is the Quality of Risk Management Implementation, is described as follows:

Table 11.
Risk Management Implementation Quality Score

No	Indicator	Quality	Rating result	Assessment Score (Quality x Assessment Results)
1	Achievement of Risk Exposure value compared to the target for Residual Risk.	30%	60	18,0
2	Achievement of output from Risk Treatment implementation compared to the target for total Risk Treatment output.	20%	100	20,0
3	Actual cost of Risk Treatment implementation compared to the budget.	20%	80	16,0
4	Accuracy in Risk Assessment, which includes Risk Identification, Risk Quantification, Risk Treatment Planning, and Risk Prioritization.	30%	90	27,0
	a. Accuracy in Risk Identification	25%	90	
	b. Accuracy in Risk Quantification	25%	90	
	c. Accuracy in Risk Treatment Planning	25%	90	
	d. Accuracy in Risk Prioritization	25%	90	
	Risk Management Implementation Quality Score = 18.0+20.0+16.0+27.0			81,0

Source: Processed by the author (2024)

The Risk Management Implementation Quality Score is 81, meaning it has Fair risk management implementation quality.

Financial performance achievements

The financial performance achievements in 2023 are explained in the table below:

Table 12.
Calculation of financial performance achievements

No	Indicator	Quality	Rating result	Assessment Score (Quality x Assessment Results)
1	Income Based on Unaudited data for 2023, the business	25%	70	17,5

No	Indicator	Quality	Rating result	Assessment Score (Quality x Assessment Results)
	income achievement is 97% compared to the business income target, on a scale of 2 with an assessment result of 70			
2	Total cost Based on Unaudited data for 2023, operating expenses in Unaudited data for 2023 reached 95.15% compared to the target operating expenses, on a scale of 2 with an assessment result of 70	25%	70	17,5
3	Net profit Based on Unaudited data for 2023, net profit in Unaudited data for 2023 reached 104.7% compared to the operating expense target, on a scale of 3	25%	90	22,5

No	Indicator	Quality	Rating result	Assessment Score (Quality x Assessment Results)
	with an assessment result of 90			
4	Debt to EBITDA Based on Unaudited data for 2023, debt to EBITDA in Unaudited data for 2023 reached 116%, on a scale with an assessment result of 100	25%	100	25,0
	Financial Performance Achievements	30%	Score 1+ Score 2+Score 3+Score 4 (17.5+17.5+22.5+25.5= 83)	30%x83=25

Source: Company internal data, unaudited management report 2023," data has been processed"

The results of the 2023 financial performance assessment show that the company managed to achieve an average score of 83 from the four main indicators, with revenue and total costs reaching 70, and net profit reaching.

Main operation/production performance achievements

The financial performance achievements in 2023 are explained in the table below:

Table 13.
Calculation of operational performance achievements

No	Business Field	Achievement
1	Ship Traffic	103%
2	Container	100%
3	Non-Container	105%
4	Passenger	134%
	Average Achievement	111%

Source: Internal company data, 2023 unaudited management report, “data processed”

According to the 2023 unaudited data, the average achievement in the business sectors of Vessel Traffic, Container, Non-Container, and Passenger is 111%, meaning it is at a scale of 4 with a performance score of 100. The final score for the second variable, which evaluates performance achievement, is explained as follows:

Table 14.
Assessment of performance achievements

No	Indicator	Quality	Rating Result	Assessment Score
1	KPI Achievement in Collegiality	30%	100	30,00
2	Financial Performance Achievement	30%	83	24,75
	a. Revenue	25%	70	
	b. Total Costs	25%	70	
	c. Net Profit	25%	90	
	d. Debt to EBITDA	25%	100	
3	Main Operational/Production Performance Achievement	40%	100	40,00
	Performance Achievement Variable Score = 30.00 +24.75 + 40.00			94,75

Source: Processed by the author (2024)

Based on the evaluation results of performance achievements, the KPI Collegial Achievement and Main Operations/Production Performance Achievement received the highest scores, each with 30.00 and 40.00. Meanwhile, the Financial Performance Achievement scored 24.75, bringing the total score of overall performance achievement variables to 94.75. Thus, the Composite Risk Rank calculation is as follows:

Table 15.
Composite Risk Rank Calculation

Variable	Value	Description
Quality of Risk Management Implementation	81,00	Fair
Performance Achievements	94,75	Good

Source: Processed by the author (2024)

The company demonstrates a fairly good quality of risk management application with a score of 81.00, indicating a reasonable level of risk. Additionally, the company's performance achievement is assessed as excellent with a score of 94.75, reflecting optimal performance.

Determination of RMI score

After calculating the Dimensional Aspect and Performance Aspect scores, the RMI Score is then calculated as explained in the table below:

Table 16.
RMI Score on Dimensional Aspects

Dimensional Aspects				
Parameter	Dimensions	Description	Dimension Score	Score
1 s.d 3	1	Risk culture and capabilities	3,67	
4 s.d 19	2	Organization and Risk Governance	3,63	
20 s.d 33	3	Risk and Compliance Framework	2,43	
34 s.d 40	4	Risk Processes and Controls	3,00	
41 s.d 42	5	Risk Models, Data and Technology	2,00	
1 s.d 42		Dimensional Aspect Score		2,94

Source: Processed by the author (2024)

The assessment results on the Dimension Aspect show a range of scores across five different dimensions. The dimension with the highest score is "Risk Culture and Capability" (3.67), while

the lowest is "Risk Model, Data, and Technology" (2.00), with an overall average score of 2.94. The following are the scores for each performance dimension:

Table 17.
RMI Score on Performance Aspects

Performance Aspects					
No	**Performance Aspects**			**Quality**	**Conversion Value x Quality**
	Aspect	**Rating**	**Conversion Value**		
1	Health Level	AAA	100	50%	50
2	Risk Composite Rating	2	78	50%	39
Total					89,00
Dimension Aspect Score Adjustment					0
RMI Score					2,94

Source: Processed by the author (2024)

The final score for the Risk Management Maturity Index at Pelindo is 2.94. No score adjustment was made because the score for the RMI Assessment Dimension Aspect obtained was < 3.00, which is by Technical Guidelines SK-8 KBUMN on Technical Guidelines for Risk Maturity Index Assessment. A score of 2.94 means that the implementation of Risk Management at Pelindo is in the good practice phase.

Recommendations for Improving RMI Measurement Results

Recommendations for Improving RMI Measurement Results Recommendations for improving the implementation of risk management encompass several crucial aspects. Regarding risk culture and capabilities, risk culture can be enhanced by incorporating responsibility for risk culture development into job descriptions across all lines, not just within the Second Line of Defense. A supporting system is also required to consistently implement and instill a risk culture in the corporate culture. Risk capabilities should also be improved by including the Risk Maturity Index (RMI) assessment in the company's risk policy and conducting annual assessments at both the holding and subsidiary levels. In terms of risk organization and governance, the effectiveness of the risk management function should be enhanced through a clear risk governance structure for each business unit under the group umbrella. The active involvement of the Board of Commissioners/Supervisors in risk management should be improved by accelerating response times and providing sufficient time to address escalated risk issues. Furthermore, the roles of committees under the Board of Commissioners/Supervisors should be more proactive in interacting with management. Regarding the risk framework and compliance, the quality of the risk management framework and the ERM transformation plan should be clearly defined. The integration of risk and alignment of company strategy with risk strategy should be carried out regularly to ensure the achievement of the strategic targets outlined in the business plan. Risk capacity must also be formally established and used to determine risk appetite, tolerance, and limits. In risk processes and controls, key risks should be identified and regularly updated to maintain the relevance of the risk taxonomy. Risk measurement should involve a balanced combination of quantitative and qualitative methods, while risk assessments should be conducted at least quarterly to ensure consistency with the assessment framework. Risk treatment activities should have assigned responsibilities, and risk mitigation should be monitored to assess effectiveness. Finally, risk reporting should be conducted in real time, including regular reports covering all significant risks, post-event analysis, and actionable recommendations. Regarding risk models, data, and technology, companies should implement risk models for routine risk quantification and develop advanced analytics applications for risk

management. Risk data management should encompass various material risks, and automation of operational data collection should be implemented to support effective risk reporting.

Discussion

Risk Culture and Capability

In the dimension of Risk Culture and Capability, Pelindo has demonstrated strong awareness and understanding of risk management across the organization. With an average score of 3.67, it can be said that the adopted risk management approach is quite effective. Programs such as the Risk Award and risk management seminars have strengthened the risk culture within the organization, where the Second Line is responsible for developing this culture, closely supervised by the Board of Directors. These initiatives indicate serious efforts to create an environment that fosters risk awareness at every level of the organization. Previous research by Adeinat & Abdulfatah (2019) and Saglam et al. (2020) emphasized the importance of a strong organizational culture as a key element in successful risk management, aligning with the findings at Pelindo. However, to achieve a higher level of risk management maturity, Pelindo is advised to reinforce this practice by including the responsibility for developing a risk culture in the job descriptions at all levels of the organization, not just limited to the Second Line.

Based on the research conducted by Hoseini et al. (2021) regarding the Generic Risk Maturity Model (GRMM), which is frequently used in evaluating risk management in industries, Pelindo's performance in terms of risk management has shown a relatively good achievement, especially in the aspects of risk culture and awareness throughout the organization. With programs like the Risk Award and risk management seminars, Pelindo has successfully strengthened risk awareness across various organizational levels. However, compared to the industry standards set by the GRMM, there are still some areas that need to be reinforced, such as integrating responsibility for the development of a risk culture at all managerial levels, as well as enhancing support systems for more effective implementation. To achieve a higher level of risk maturity, Pelindo also needs to ensure the presence of a comprehensive documentation system and more consistently documented and sustainable risk benchmarking practices. Therefore, to improve risk culture and capability, it is recommended that the responsibility for developing a risk culture be clearly integrated into the job descriptions of all managerial levels, not just the Second Line, and be supported by a set of support systems for implementing the company's risk culture program. Additionally, it is essential to regularly organize and conduct well-documented Innovative Risk Management (IRM) assessments and monitor the progress of implementing recommendations with clear evidence of improved IRM scores from year to year. Risk skills enhancement programs should also be strengthened through success analysis and collaboration with industry-relevant training providers to ensure that employees are educated on global best practices in risk management. All these initiatives must be thoroughly documented to ensure that the implementation and follow-up of training and assessments are carried out in accordance with the established roadmap and timeline.

Risk Framework and Compliance

The aspect of the Risk Framework and Compliance indicates more significant challenges for Pelindo. With an average score of 2.43, there is an indication that risk implementation and management have not been consistently applied across the organization. This reflects the need for improvement in designing and managing a stronger risk framework and ensuring better compliance with existing risk policies. Previous research by Kusnadi & Kirana, (2023) and Priyarsono et al. (2023) supports these findings, showing that Pelindo still faces difficulties in implementing an effective risk framework. To address these challenges, Pelindo needs to plan a

more comprehensive Enterprise Risk Management (ERM) transformation, aiming to better align corporate strategy with risk strategy. The integration of advanced technology for risk analysis and the automation of operational data collection is also recommended to improve the quality of the risk management framework and ensure real-time risk monitoring.

Compared to industry benchmarks or standards, such as the banking sector in the study by Adam et al. (2023), which has fully implemented Enterprise Risk Management (ERM), Pelindo's risk management performance still requires improvement. In the banking industry, the comprehensive implementation of ERM includes more stringent risk measurements through models like Capital Adequacy, Asset Quality, Management, Earnings, Liquidity, and Sensitivity to Market Risk (CAMELS). Meanwhile, Pelindo, with an average score of 2.43 in the risk framework and compliance aspects, indicates that the implementation of risk management is not yet consistent across the organization. Compared to other sectors that are more advanced in ERM implementation, Pelindo still faces challenges in integrating technology for real-time risk monitoring and applying stronger risk policies. To improve its performance, Pelindo can refer to international standards such as Committee of Sponsoring Organizations of the Treadway Commission (COSO) or Basel regulations, which have proven effective in enhancing risk management capabilities and compliance in other industries.

Recommendations to enhance the quality of the risk management framework and compliance within the organization include several strategic steps designed to ensure long-term effectiveness. First, the quality of the Risk Management (RM) framework needs to be improved by implementing quantitatively and qualitatively measured Enterprise Risk Management (ERM) initiatives, accompanied by periodic evaluations of related policies and procedures. The ERM transformation should be planned and executed by incorporating ESG/Climate risks into the taxonomy and analyzing their impact on the portfolio, as well as aligning risk strategy with the company's strategic plan. Additionally, it is essential to strengthen risk capacity, apply risk appetite decisively in strategic decision-making, and routinely communicate risk appetite and strategy to external stakeholders. The organization should also update risk policies that include clear ownership and responsibility, and refine risk procedures that integrate risk control with all elements of ERM. Contingency plans should be developed for worst-case scenarios, including crisis management documentation and contingency plans that exceed regulatory requirements. Annual reviews and stress tests of key SOPs should also be conducted with active involvement from senior management. The compliance function should focus on fulfilling corporate policies with a bottom-up approach to ensure compliance with regulatory requirements and industry best practices. Finally, the implementation of an Integrated ERM framework and internal controls should be optimally carried out with regular independent and objective reviews to ensure continuous operational compliance and effectiveness.

Risk Process and Control

In the dimension of Risk Process and Control, Pelindo achieved an average score of 3.00, indicating that a more comprehensive approach is still needed to measure and manage critical risks. Although there have been efforts to strengthen control processes, this study highlights the need for further improvement in the effectiveness of risk management processes. Real-time risk reporting has been identified as a key factor in optimizing the effectiveness of the risk management framework, as noted by Ershadi et al. (2020), Etemadi et al. (2021) and Parajuli et al. (2020). Therefore, Pelindo needs to enhance risk control processes by incorporating risk models that support periodic risk quantification. Additionally, the Board of Commissioners/Board of Supervisors is advised to be more actively involved in the risk management process to ensure that each control measure is carried out correctly and promptly.

Strengthening these processes and controls is expected to enhance the effectiveness of risk management at Pelindo and support achieving a higher level of risk management maturity.

Compared to global port industry organizations such as Maersk and DP World, Pelindo's risk management performance shows a need for improvement, particularly in terms of integrating technology for real-time risk reporting and more active oversight from the board. While Pelindo has started to strengthen its risk control processes, leading global port companies have already implemented more advanced Enterprise Risk Management (ERM) systems, utilizing automation and regularly updating risk taxonomies based on external benchmarking. In this context, Pelindo needs to adopt more sophisticated risk analysis technologies and enhance board engagement in risk governance to compete with companies that have successfully implemented best practices in risk management, as highlighted in the study by Blundo et al. (2021).

To strengthen the company's risk processes and controls, it is recommended to routinely update the risk taxonomy through external benchmarking and periodic reviews with the Board of Directors to ensure its relevance and comprehensiveness in response to changes in the external environment. Additionally, the application of risk measurement methods should combine standardized quantitative and qualitative approaches, with an evaluation of the suitability of methods conducted at least annually. Risk assessments need to be carried out automatically and consistently across all business units, with a bottom-up coordinated risk integration process. Risk mitigation plans should be developed with attention to the interconnection between work units and prioritizing effectiveness and efficiency of resources, with clear accountability for each major risk. Risk reporting should be conducted regularly, with real-time reporting covering all major risks, post-event analysis, and concrete follow-up recommendations.

This study identifies strengths and weaknesses in Pelindo's risk management, providing more specific recommendations to strengthen risk culture and control processes. Compared to research by González et al., (2020), which found that Enterprise Risk Management (ERM) does not always have a significant impact on performance or reduce the risk of bankruptcy, this study offers a practical approach to improve risk analysis technology and operational data management for real-time risk monitoring. Compared with Blundo et al.'s (2021) study that highlighted the role of risk management during times of uncertainty like the COVID-19 pandemic, this research provides concrete recommendations for enhancing oversight and board involvement in the risk management process. Unlike Lee's (2020) study, which focused on cybersecurity in the Internet of Things (IoT), Pelindo's approach integrates risk management across various lines, offering a broader and more comprehensive context. Thus, this study provides practical guidance for Pelindo to improve its risk framework and corporate governance, with concrete steps to achieve a higher risk management maturity level and recommendations that can be implemented immediately. This study underscores the importance of enhancing risk culture and transparent governance structures in Pelindo's risk management after the merger. The primary implication is that the organization must strengthen engagement and oversight at every level, not just the second line. By reinforcing the responsibility for risk culture in job descriptions throughout the organization, Pelindo can build a strong foundation for improving risk management effectiveness. Additionally, a more comprehensive approach to risk frameworks and compliance, including integrating technology for risk analysis and automation of data collection, can allow real-time risk monitoring and faster and more effective decision-making. If implemented correctly, these recommendations can increase the company's risk management capabilities, ensure alignment with company strategy, and improve overall performance.

CONCLUSIONS

This study demonstrates that Pelindo has implemented relatively good risk management practices following the merger, with a maturity level of 2.94. However, the research also identifies crucial areas for improvement, particularly related to the risk framework and compliance. The main recommendations put forward in this study include strengthening risk culture accountability at all levels of the organization. For example, to enhance risk culture accountability, Pelindo could incorporate the responsibility of risk culture development into the job descriptions across all organizational lines, including both managerial and operational levels. In this way, every employee, not just those in the second line of defense, will play an active role in strengthening the risk culture, which can be achieved through ongoing training, assessment, and monitoring programs. Furthermore, improving the risk management framework is also critical, particularly by adopting more advanced risk quantification models and integrating technology for automated risk analysis and data collection. This can help Pelindo monitor risks in real time, allowing for faster and more effective decision-making. For instance, by implementing advanced analytics models, Pelindo can more quickly identify and respond to potential risks and adjust risk strategies in line with changes in the external environment. In the context of future research, it is important to expand the scope of the study with a more in-depth approach, such as more detailed quantitative analysis. Specific aspects of risk management, such as the effectiveness of the compliance framework and the impact of more precise risk measurements, would benefit from this quantitative approach, as it would provide a more concrete statistical picture. Additionally, conducting comparative studies with other companies in the logistics and transportation industry would be relevant to gain a broader perspective, especially in understanding how risk management practices are applied in different contexts and what can be learned from them. Therefore, it is important to emphasize that continuous improvement in risk management practices at Pelindo is crucial to enhancing organizational resilience and achieving the company's strategic goals. This study makes a significant contribution in helping Pelindo strengthen its risk management capabilities, with recommendations that, if properly implemented, will help the company achieve a higher level of risk management maturity and, ultimately, ensure long-term sustainability and growth.

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