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# Analysis Of Operational Risk Management At Pt Xyz Using An Enterprise Risk Management Approach

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**Abstract**

*This study aims to analyse operational risk management at PT XYZ, a freight forwarding company, using the Enterprise Risk Management (ERM) approach based on the COSO ERM 2017 framework. While prior studies on ERM in logistics have generally focused on strategic or financial risks, research examining operational risk across the full receipt-to-distribution cycle using the five component COSO ERM 2017 model remains limited, particularly within Indonesian freight forwarding practice. A qualitative descriptive method with a case study approach was employed, with data collected through interviews, observations, and documentation. The analysis identified 12 operational risks originating from human, process, system, and external factors, including misrouting, damaged and lost goods, delivery delays, fleet limitations, warehouse inventory buildup, and system disruptions. Risk assessment classified these into 1 extreme, 2 high, 6 moderate, and 3 low risks, with fleet limitations scoring highest (20) as the principal driver of delivery delays and inventory backlogs. The study contributes a structured, stage-based risk mapping model integrating risk reduction and risk-sharing strategies through procedural refinement, fleet partnerships, and insurance offering a practical framework for strengthening ERM implementation in freight forwarding operations.*

**Keywords: Enterprise Risk Management, Risk Management, Operational Risk, Freight Forwarding Services**



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## INTRODUCTION

Indonesia's economy continues to grow alongside the expansion of e-commerce and goods distribution across various sectors. According to the Central Statistics Agency (BPS), the national economy grew by 5.03% in 2024, contributing to the development of logistics activities, including warehousing and courier services. Delivery activities involve several stages, from receiving and sorting goods to storage, transportation, and delivery to customers. Each stage has the potential to create operational risks that may disrupt the delivery process if not properly managed.

Operational risks in shipping activities may arise from human factors, processes, systems or technology, and external factors (Cornwell et al., 2023). These risks include sorting and routing errors, delivery delays, damaged or incomplete goods, system disruptions, and administrative errors. Because risks can occur at different stages and may be interconnected, their management requires systematic identification and control rather than only responding to problems after they occur.

Previous studies emphasize the importance of preventive risk management in logistics and freight forwarding activities. Preventive measures can reduce the impact of operational risks, while the use of technology and contingency planning can strengthen risk management practices. (Zhu et al., 2022) However, effective risk management also requires adequate information on risk incidents, as limited reporting may hinder the identification of recurring risk patterns (Siriwatana & Pongpanich, 2024).

These conditions are also found at PT XYZ, a company operating in the freight forwarding sector. Based on B2B customer complaint documentation throughout 2025, 25 cases were recorded, consisting of 10 incomplete shipments, 9 undelivered goods, 4 damaged goods, and 2 incorrect invoices. This data provides an initial overview of operational problems related to the shipping process, goods handling, and administration.

The complaint data does not fully represent the operational risks at PT XYZ because not all operational problems are recorded as formal complaints. Some issues are resolved directly by the operations department, while B2C complaints have not been documented as systematically as B2B complaints. Therefore, risk identification cannot rely solely on complaint data but needs to be supported by interviews, observations, operational experience, and company records.

In practice, operational risk management at PT XYZ tends to be reactive, with actions generally taken after problems occur. This condition reflects an ad hoc approach, in which risk management actions are carried out in response to risks or problems that


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have already occurred (Simanjuntak, D S, 2021). In addition, risks arising from one activity may be interconnected with risks in other activities, requiring an approach that considers risks from an integrated perspective.

Therefore, a structured approach is needed to identify, assess, and determine appropriate responses to operational risks at PT XYZ. Enterprise Risk Management (ERM) using the COSO ERM 2017 framework provides an integrated approach to managing risks across organizational activities. In this study, ERM is used to identify operational risks, assess their occurrence and severity, determine risk priorities, and establish appropriate risk responses.

## OBJECTIVES

This article intends

1. Identify potential operational risks in the operational activities of PT XYZ
2. Analyze the risk assessment of PT XYZ's operational activities
3. Analyze risk mitigation efforts that can be implemented to minimize their impact

This study contributes by integrating various sources of information including interviews, observations, operational experience, and corporate documentation into the risk identification process, thereby ensuring that risks not documented in customer complaints can still be identified, while also linking the results of the risk assessment to the determination of mitigation actions within the COSO ERM 2017 framework. The research findings are expected to enrich the study of operational risk management in freight forwarding companies and provide a foundation for PT XYZ to develop a more preventive and systematic approach to risk management.

## LITERATURE REVIEW

### Risk Management

Organizations use risk management to address potential risks through preestablished methods, so that risk can be understood as a reasonable consequence of every decision and activity (Tzanakakis, 2021). For this reason, risk management plays a crucial role in ensuring an organization's operational continuity.

According to ISO 31000:2018, risk management is a systematic and structured approach used to manage uncertainty in order to support the achievement of organizational objectives. Meanwhile, COSO (2017) defines risk management as an integrated process involving all elements of an organization from the board of directors


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to employees that is applied in strategy formulation to identify various potential events that could affect the achievement of organizational objectives.

**Risk**

Risk is the possibility of an undesirable event occurring that could result in loss or damage to an individual or organization due to uncertainty (Darmawi, 2022) According to (Amalia et al., 2024), risk is a situation characterized by uncertainty regarding the likelihood of an event occurring within a specific time frame, which has the potential to cause losses whether small or large that could affect a company's stability. (Mishra et al., 2019) categorize the risks faced by companies into four types: operational risk, financial risk, hazard risk, and strategic risk.

**Operational Risk**

Operational risk is the potential for a discrepancy between a company's expected results and its actual performance (Fiannisa & Arsyadona, 2024). According to (Azzahra et al., 2025), operational risk stems from failures in internal systems, business processes, human factors, and external events; thus, it relates not only to technical issues but also to the overall manner in which an organization conducts its operational activities.

(Fiannisa & Arsyadona, 2024) classify operational risk into four categories: human factors, process factors, system factors, and external factors. Additionally, (Ningsih et al., 2024) explain that operational risk not only impacts financial aspects but can also reduce operational efficiency and damage a company's reputation.

**Enterprise Risk Management**

According to COSO, Enterprise Risk Management (ERM) is a comprehensive approach to risk management, with top management serving as the primary steward to ensure its implementation at all levels of the organization. ERM not only serves as a risk control mechanism but is also an integral part of the strategy to enhance operational effectiveness and efficiency.

Based on COSO ERM (2017), risk management encompasses five interrelated components: governance and culture; strategy and objective setting; performance; review and revision; and information, communication, and reporting. The implementation of ERM provides various benefits, such as improving a company's efficiency and


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competitiveness, helping to anticipate uncertainty, and minimizing potential losses in a more planned manner (Ekuitas et al., 2025).

**Freight Forwarding**

Freight forwarding is a business activity that offers services for transporting goods to various regions for commercial purposes, with a process that begins with the receipt of goods, handling, temporary storage, and delivery to the intended recipient (Suharya et al., 2021). According to (Soimun & Navianti, 2022) freight forwarding services can be categorized based on the mode of transportation used, namely by land, sea, and air. As a service, freight forwarding has four main characteristics: intangibility, variability, inseparability, and perishability which make service quality highly dependent on the consistency of operational processes at every stage.

**RESEARCH METHODOLOGY**

This study uses a qualitative approach with a descriptive case study design to analyses operational risk management at PT XYZ based on the COSO ERM 2017 framework. Data consisted of primary and secondary data. Primary data were obtained through interviews and observations, while secondary data were obtained from company documents and relevant literature. Informants were selected purposively and consisted of the General Manager, Operational Supervisor, and Operational Staff. Data were collected through interviews conducted in June 2026, observations from August to December 2025 covering receiving, sorting, hub transit, loading, and warehousing, and documentation. The researcher served as the main instrument, supported by interview and observation guidelines and a risk assessment matrix.

The COSO ERM (2017) framework served as the theoretical basis for risk identification and management. Data analysis followed data reduction, data display, and conclusion drawing. Identified risks were evaluated based on occurrence and severity using a five-point scale. Risk scores were calculated by multiplying occurrence by severity and then mapped onto a 5 × 5 risk matrix to classify risks as low, moderate, high, or extreme and determine appropriate risk responses. Risk classification considered the combination of occurrence and severity and the position of each risk within the matrix, rather than relying solely on the numerical risk score. Data credibility was ensured through source triangulation across three informants and technique triangulation combining interviews, observations, and documentation (Sugiyono, 2022).


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## RESULT

### Identifies Risk

The initial stage of risk analysis involves an identification process to uncover all possible events that could hinder the achievement of PT XYZ's operational objectives. Based on interviews with the General Manager, Operations Supervisor, and Operations Staff, as well as direct observation of the company's operational activities, 12 operational risks were identified across all stages of goods distribution; these risks were grouped into four risk sources: human factors, process factors, system factors, and external factors, as shown in Table 1.

**Table 1 Operational Risk Identification**

| Risk Source | Code | Risk | Risk Causes |
|---|---|---|---|
| Human Factor | A1 | Misroute Risk | Worker inaccuracy during *sorting* and *loading*, as well as errors in reading addresses or destination codes. |
| | A2 | Goods Damage Risk | Improper *packing* according to goods characteristics, carelessness during *loading* and *unloading*, and improper arrangement of goods. |
| | A3 | Hub-Stranded Package Risk | Errors in determining distribution routes and insufficient staff knowledge of distribution processes. |
| | A4 | Loss of Goods Contents Risk | Negligence during loading and unloading, storage, and distribution; inadequate supervision; and insufficient security in storage areas. |
| | A5 | Shipping Document Loss Risk | Courier negligence in storing return delivery documents, misplaced documents during distribution, and inadequate supervision of shipping documents. |



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| | | | |
|---|---|---|---|
| Process Factor | B1 | Delivery Delay Risk | High shipment volume, delays in operational processes, and ineffective vehicle scheduling. |
| | B2 | Fleet Limitation Risk | Suboptimal fleet allocation, imbalance between fleet demand and availability, and delays in vehicles returning from previous routes. |
| | B3 | Warehouse Goods Accumulation Risk | Shipment volume exceeding capacity, delayed vehicle departures, and slow sorting and distribution processes. |
| | B4 | Goods Quality Deterioration Risk | Excessive delivery time, perishable goods characteristics, and distribution delays. |
| System Factor | C1 | Tariff Calculation Error Risk | The system does not automatically update tariffs, tariff configuration errors, and data integration issues between systems. |
| | C2 | System Disruption Risk | Server and internet network disruptions. |
| External Factor | D1 | Natural Disaster Risk | Floods, landslides, and extreme weather. |

Based on Table 1, the human factor accounts for the highest number of identified risks, with five risks (A1–A5), including misroute, goods damage, packages stranded at hubs, loss of goods contents, and loss of shipping documents. These risks are mainly associated with inaccuracy, negligence, and inadequate supervision in goods handling. The process factor comprises four risks (B1–B4) related to the management of operational resources, such as fleets and warehouses, while the system factor includes two risks (C1–C2), and the external factor includes one risk (D1), namely natural disasters. These findings indicate that the operational risks at PT XYZ are predominantly derived from internal factors, particularly human and work process factors, rather than external factors.


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**Assesses Severity of Risk**

After the risks were identified, each risk was assessed to determine its priority for treatment. The assessment was based on the occurrence (O) and severity (S) of each risk using a five-point scale (1–5). The scores were determined based on interview findings and the informants' experience in operational activities. The risk score (SR) was calculated by multiplying the occurrence and severity scores (SR = O × S). The occurrence and severity scores were then plotted on a 5 × 5 risk matrix to determine the risk category based on the intersection of the two dimensions, as presented in Table 3.

**Table 2 Risk Assessment**

| Types of Risk | Risk | Code | O | S | SR (OxS) |
|---|---|---|---|---|---|
| **Operational Risk** | Misroute Risk | A1 | 2 | 4 | 8 |
| | Goods Damage Risk | A2 | 3 | 4 | 12 |
| | Hub-Stranded Package Risk | A3 | 2 | 3 | 6 |
| | Loss of Goods Contents Risk | A4 | 3 | 5 | 15 |
| | Shipping Document Loss Risk | A5 | 2 | 3 | 6 |
| | Delivery Delay Risk | B1 | 4 | 3 | 12 |
| | Fleet Limitation Risk | B2 | 5 | 4 | 20 |
| | Warehouse Goods Accumulation Risk | B3 | 4 | 3 | 12 |
| | Goods Quality Deterioration Risk | B4 | 2 | 4 | 8 |
| | Tariff Calculation Error Risk | C1 | 2 | 3 | 6 |
| | System Disruption Risk | C2 | 2 | 4 | 8 |
| | Natural Disaster Risk | D1 | 1 | 5 | 5 |



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The assessment results in Table 2 show that the scores of the 12 identified risks range from 5 to 20. The fleet limitation risk (B2) has the highest score of 20, with an occurrence score of 5 and a severity score of 4, indicating that the risk occurs frequently and has a significant impact on operations. Meanwhile, natural disasters (D1) have the lowest score of 5, with an occurrence score of 1 and a severity score of 5, indicating that the risk is rare despite its high impact. These differences in risk scores serve as the basis for determining the priority of risk treatment.

**Prioritizes Risks**

Next, the identified risks were plotted on a 5 × 5 risk matrix based on their occurrence and severity levels, as presented in Table 3. The risk score was calculated by multiplying the occurrence and severity scores, while the risk category was determined based on the intersection of these two dimensions within the matrix.

**Table 3 Risk Matrix**

| | | | ***Severity*** | | | | |
|---|---|---|---|---|---|---|---|
| **Risk Matrix** | | | **1** | **2** | **3** | **4** | **5** |
| | | | **Insignificant** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| ***Occurance*** | **5** | **Almost Certain** | Low | Moderate | High | B2 | Extreme |
| | **4** | **Likely** | Low | Moderate | B1, B3 | High | Extreme |
| | **3** | **Possible** | Very Low | Low | Moderate | A2 | A4 |
| | **2** | **Unlikely** | Very Low | Very Low | A3, A5, C1 | A1, B4, C2 | High |
| | **1** | **Rare** | Very Low | Very Low | Low | Moderate | D1 |

The mapping results show four risk categories: one extreme risk (B2), two high risks (A2 and A4), six moderate risks, and three low risks. Risk B2, representing limited fleet availability, has an occurrence score of 5 and a severity score of 4. The intersection of these scores places B2 in the extreme category, while their multiplication produces a risk score of 20. This indicates that fleet limitations occur frequently and have a significant impact on operational activities. The risk categories obtained from the matrix provide the basis for prioritising subsequent risk treatment.


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**Implements Risk Responses**

Based on the risk assessment and mapping results, PT XYZ develops risk response strategies according to the category and characteristics of each risk, referring to the five response strategies in the COSO ERM 2017 framework: avoiding, reducing, sharing, accepting, and pursuing. The implementation of each strategy is summarized in Table 4.

**Table 4 Risk Response**

| No | Code | Risk | Strategi Respon | Bentuk Implementasi |
|---|---|---|---|---|
| **1** | B2 | Fleet Limitation Risk | Reducing & Sharing Risk | Cross-team fleet allocation coordination; cooperation with backup fleet vendors |
| **2** | A4 | Loss of Goods Contents Risk | Reducing | Vehicle seal checks, weighing, and documentation of goods between hubs |
| **3** | A2 | Goods Damage Risk | Reducing & Sharing Risk | Standardized packing and handling SOPs; insurance option for high-value goods |
| **4** | B1 | Delivery Delay Risk | Reducing | Fleet scheduling based on shipment volume, monitoring of sorting processes |
| **5** | B3 | Warehouse Goods Accumulation Risk | Reducing | Storage time limits, warehouse capacity monitoring, and accelerated sorting |
| **6** | A1 | Misroute Risk | Reducing | Rechecking labels/addresses, assistance for new employees |


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| | | | | |
|---|---|---|---|---|
| **7** | B4 | Goods Quality Deterioration Risk | Reducing | Prioritizing perishable goods shipments; monitoring goods conditions during distribution |
| **8** | C2 | System Disruption Risk | Reducing | Regular system maintenance, emergency manual recording procedures |
| **9** | D1 | Natural Disaster Risk | Sharing risk & Reducing | Cooperation with shipping insurance providers; force majeure clauses |
| **10** | A3 | Hub-Stranded Package Risk | Reducing | Assistance for new employees, hub distribution route guidelines |
| **11** | A5 | Shipping Document Loss Risk | Reducing | Checking delivery document completeness, archiving shipment numbers |
| **12** | C1 | Tariff Calculation Error Risk | Reducing | Tariff system maintenance, double-checking tariff details |

Based on Table 4, the most widely applied risk mitigation strategy at PT XYZ is reducing risk, which is implemented for all 12 identified risks. The measures include improving operational procedures, standardizing packing, fleet scheduling, system maintenance, and strengthening supervision. The sharing risk strategy is also applied to three risks: fleet limitation (B2) through cooperation with backup fleet vendors, goods damage (A2) through insurance for high-value goods, and natural disasters (D1) through shipping insurance and force majeure clauses. Meanwhile, the avoiding, accepting, and pursuing strategies have not been applied to the identified risks.

## DISCUSSION

Most operational risks at PT XYZ arise from human and process factors rather than system or external factors. This is consistent with (Cornwell et al., 2023) and (Fiannisa & Arsyadona, 2024) who found that operational risks in service companies are


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commonly associated with human activities and work routines. The dominance of these factors is also related to PT XYZ's reliance on employees in sorting, loading and unloading, and goods storage activities, while fleet and warehouse availability remain operational challenges. In contrast, system disruptions and natural disasters occur less frequently, although their impacts can be substantial.

Limited fleet availability (B2) obtained the highest risk score due to its relatively frequent occurrence and significant impact. This risk is also interconnected with delivery delays (B1) and warehouse accumulation (B3), indicating that operational risks are interrelated rather than isolated. This finding reflects the COSO ERM 2017 principle of considering risks as a portfolio (Ekuitas et al., 2025). Analyzing risks across the distribution process also provides a broader view than studies focusing on specific activities, such as port loading and unloading or a single process point using COSO ERM (Adha, 2026). While previous studies have identified human factors as dominant, this study found process factors to be more prominent, reflecting differences in risk characteristics across logistics operations.

PT XYZ primarily applies risk reduction and risk sharing strategies rather than avoiding risks entirely. This indicates an emerging preventive approach, although formal mechanisms such as a documented risk register and risk appetite have not yet been established. Risk sharing is applied to fleet and natural disaster risks through backup fleet vendors and insurance, particularly because these risks cannot be fully controlled internally.

Overall, the findings indicate that COSO ERM 2017 can support a more integrated view of operational risks in freight forwarding when risks are assessed across the distribution process. For PT XYZ, formalizing risk appetite and documenting a risk register could strengthen the transition from reactive risk management towards a more preventive and integrated approach.

## CONCLUSION

This study identified 12 operational risks at PT XYZ across human, process, system, and external factors throughout the goods distribution process. The risk assessment resulted in one extreme risk, two high risks, six moderate risks, and three low risks. Limited fleet availability was identified as the highest-priority risk, with a score of 20, and was found to be interconnected with delivery delays and warehouse accumulation. The mitigation strategies were predominantly risk reduction through improvements in operational procedures, packing standardisation, fleet scheduling,


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system maintenance, and supervision, supported by risk sharing through backup fleet vendors and insurance. Overall, the implementation of COSO ERM 2017 has supported PT XYZ's operational risk management; however, further improvements are required, particularly in formally establishing risk appetite and risk tolerance, documenting risk registers and portfolio views, and standardising risk information, communication, and reporting. These improvements can strengthen the company's transition towards a more preventive and integrated operational risk management approach

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