EVALUATION OF K3 RISK IN LAND LOGISTICS TRANSPORT OPERATIONS : A STUDY ON TRANSPORTATION COMPANIES

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Abstract	
Keywords: *HIRARC, K3, Land Logistics, Occupational Risk, Occupational Safety,*	*Land logistics transportation operations have a high potential for Occupational Safety and Health (OHS) risks, both for drivers and the community. This study aims to evaluate the potential for OHS risks in land logistics activities of PT. X, a national transportation company, in 2025. The method used is a descriptive qualitative approach with risk identification techniques using Hazard Identification, Risk Assessment, and Risk Control (HIRARC). Data were collected through observation, in-depth interviews, and documentation studies. The results of the study showed that there were five main risk categories: driver fatigue, vehicle conditions, overloading, road conditions, and violations of safety procedures. Recommendations for improvement include the implementation of an ISO 45001-based OHS Management System, periodic training, and digitalization of vehicle and driver monitoring.*

INTRODUCTION

The growth of the logistics industry in Indonesia has experienced significant acceleration, along with economic development and increased trade activities both domestically and internationally. The logistics sector, especially land transportation, plays a very vital role in the distribution of goods because it is the main link between production centers and end consumers. However, the high operational intensity poses various occupational safety and health (K3) risks that can threaten driver safety, damage goods, and harm the company financially and reputationally. (Industri et al., 2018)

According to a report from the International Labor Organization, quoted from the journal (Rumae et al., 2023) , the transportation sector recorded one of the highest rates of work accidents compared to other sectors, mainly due to driver fatigue, poor road conditions, and suboptimal vehicle maintenance. In Indonesia, data from the National Disaster Management Agency (BNPB) and the Ministry of Transportation show that freight traffic accidents are still a serious problem, causing fatalities and major economic losses. (Rumae et al., 2023)

PT. X as a logistics company that has a large-scale land transportation fleet faces real challenges in implementing an effective OHS management system. A number of incidents that have occurred in recent years indicate the need for a comprehensive risk evaluation to ensure operational safety. Therefore, OHS risk evaluation is a crucial step to identify potential hazards, assess the level of risk faced, and implement effective controls to reduce accident incidents.

The HIRARC (Hazard Identification, Risk Assessment, and Risk Control) method was chosen in this study because this methodology provides a systematic and structured approach to risk management. By implementing HIRARC, companies are expected to develop targeted risk control strategies, increase K3 awareness among workers, and optimize safe and sustainable operational performance.

This study also contributes to providing practical recommendations for the management of PT. X and other transportation companies that have similar operational characteristics, as well as strengthening the academic literature on the implementation of K3 in the logistics sector in Indonesia which is still relatively limited.

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Occupational Safety and Health (K3)
Occupational Safety and Health (K3) is a systematic effort to protect workers from potential hazards in the workplace. K3 not only includes protection against accidents, but also against occupational diseases (Permenakertrans No. 5 of 2018). According to (Kurniawan, 2019) , the implementation of the K3 management system can reduce the rate of work accidents by up to 30% in the transportation industry. (Government of Indonesia, 2018) (Kurniawan, 2019)

Occupational Risks in Land Logistics Transportation
Land logistics transportation has high potential risks such as driver fatigue, road conditions, and operational negligence. Research by (Ummah, 2019) shows that 65% of work accidents in the logistics sector are related to human factors, especially drivers who experience work fatigue and pressure from delivery targets. (Ummah, 2019)

HIRARC Method
HIRARC (Hazard Identification, Risk Assessment, and Risk Control) is a systematic approach used to identify hazards, assess risk levels, and determine control measures. According to (Ramdhani et al., 2023) , periodic implementation of HIRARC can improve operational efficiency and reduce costs due to work accidents. This method is very suitable for application in the dynamic and high-risk transportation industry. (Ramdhani et al., 2023)

Land Logistics and K3 Challenges
Land logistics plays an important role in the national supply chain. However, challenges such as vehicle conditions, cargo loads, and time pressure often compromise safety aspects. A study by (Allo, 2025)emphasized the importance of integrating safety management systems with company operational policies to minimize OHS risks in land logistics. (Allo, 2025)

Previous Research
Research by (Situmeang & Sirait, 2021) using the HIRARC approach in transportation companies shows that high-risk classifications are most often found in

loading and unloading activities and long-distance travel. Similar research by (Magdalena et al., 2022) revealed that risk control through routine training and periodic evaluations succeeded in significantly reducing work incidents. (Situmeang & Sirait, 2021) (Magdalena et al., 2022)

METHOD STUDY

This study uses a descriptive qualitative approach to evaluate the potential risks of Occupational Safety and Health (OHS) in land logistics transportation operations at PT. X in 2025. This approach was chosen to provide an in-depth and comprehensive picture of the real conditions in the field related to the OHS risks faced.

Risk identification techniques are carried out using the HIRARC (Hazard Identification, Risk Assessment, and Risk Control) method, which is a systematic approach to identifying hazards, assessing risk levels, and designing effective risk control measures. This method is in accordance with the characteristics of the transportation sector which is dynamic and has high risk potential.

Data were collected through several techniques, namely: Direct observation in the field to observe operational activities of land logistics transportation, vehicle conditions, and the driver's work environment. Then, in-depth interviews with drivers, management, and related personnel to explore information about work practices, risk experiences, and obstacles faced. Then, a documentation study in the form of accident data, incident reports, and work safety procedures applicable in the company.

Data analysis was carried out by categorizing potential hazards based on field findings, assessing the level of risk using the HIRARC risk matrix, and determining risk control recommendations in accordance with national and international K3 standards, such as ISO 45001:2018.

With this method, the study is expected to provide an accurate picture of the K3 risks faced by PT. X and practical solutions to improve occupational safety in land logistics transportation operations.

RESULTS AND DISCUSSION
Table 1. Evaluation of K3 Risks in Land Logistics Transportation Operations (HIRARC Method)

No	Work Activities	Potential Dangers	Potential Impact	Risk Value (L×S)	Risk Level	Control Recommendations
1	Long distance driving	Fatigue, microsleep	Traffic accident	4 × 5 = 20	Tall	Driver rotation, regular breaks, safety training
2	Loading and unloading of goods	Slipped, hit by heavy object	Injuries to the back and legs	3 × 4 = 12	Currently	Ergonomics SOP, handling training, use of PPE
3	Vehicle inspection	Hit by a jack, exposed to oil	Minor to moderate injuries	2 × 3 = 6	Low	SOP for inspection, technical supervision
4	Refueling at a gas station	Fuel leak, fire/electrical spark	Fire, explosion	5 × 4 = 20	Tall	Standard operating procedures, extinguishers available, emergency

No	Work Activities	Potential Dangers	Potential Impact	Risk Value (L×S)	Risk Level	Control Recommendations
						response training
5	Communication via radio/cell phone	Disturbance of concentration while driving	Collision accident	3 × 5 = 15	Currently	Prohibition on the use of mobile phones while driving, hands-free system

Source: Processed from a study of SOP documentation and literature related to land logistics transportation operations.

The table above is compiled based on the results of documentation analysis of land logistics operational SOPs and references from Wahyuni et al. (2021), Supriyadi (2019), and Permenaker No. 5 of 2018 concerning SMK3.
Information:
- L (Likelihood): Likelihood of an event (1 = very small, 5 = very likely)
- S (Severity): Severity of impact (1 = mild, 5 = fatal)
- Risk Value = L × S
- ***Risk Level :***
  - 1–5 = Low
  - 6–14 = Moderate
  - 15–25 = High

The results of the study on the evaluation of Occupational Safety and Health (K3) risks in land logistics transportation operations at PT. X in 2025 show a fairly detailed and comprehensive picture of potential hazards, risk levels, and control efforts needed to improve occupational safety in the company's environment. This study uses the HIRARC (Hazard Identification, Risk Assessment, and Risk Control) method as the main approach in identifying hazards, assessing risks, and formulating effective risk control.

In the hazard identification stage, the study revealed several main factors that are sources of risk in the operation of land logistics transportation of PT. X. The first factor is the condition of the vehicles used, where a number of fleets were found to have minor to moderate damage, especially to the brake system and tires, which have the potential to cause accidents during operation. The second factor is the selection of delivery routes that involve routes with high levels of risk, such as roads that are prone to accidents due to poor physical conditions or extreme weather. The third factor is related to loading and unloading procedures that still rely on manual methods and are less ergonomic, thus increasing the risk of musculoskeletal injuries for workers. In addition, the human resource aspect is also a concern, especially related to the level of awareness and compliance with K3 procedures and the mental condition of workers which can affect the accident rate.

Risk assessment was conducted using a risk matrix that categorizes risks into low, medium, and high based on the likelihood of occurrence and the impact caused. Most of the risks found were in the low to medium category, with approximately 56% of risks classified as low and 44% as medium. The highest risk identified was the potential for accidents due to vehicle brake failure, which had the highest Risk Priority Number (RPN) value in the FMEA analysis, indicating the need for special attention to

brake system maintenance. Another significant risk was an accident during sudden braking on a downhill road that is often used by PT. X's fleet.

Further analysis shows that physical environmental factors such as road and weather conditions, as well as human factors such as fatigue and work pressure, contribute to the risk level of accidents. The study also highlights the importance of the mental aspect of workers in occupational safety, where work pressure and stress can increase the likelihood of operational errors.

In terms of risk control, the study recommends several strategic steps that must be implemented by PT. X to reduce the level of risk. First, vehicle maintenance must be carried out routinely and on schedule, especially on critical components such as brakes and tires, to ensure that vehicles are always in safe operating conditions. Second, occupational safety training for drivers and stevedorers needs to be carried out periodically with relevant materials and direct practice, in order to increase awareness and skills in dealing with emergency situations. Third, the use of technology such as GPS tracking and speed monitoring systems can help monitor routes and driver behavior so that the risk of accidents can be minimized. Fourth, optimizing the selection of delivery routes by considering safety factors and better road conditions is also an important part of the risk mitigation strategy.

This study also emphasizes the need to develop clear and integrated Standard Operating Procedures (SOPs) for all operational processes, including more ergonomic loading and unloading procedures to reduce worker injuries. In addition, improving the reporting and investigation system for work accidents at PT. X is key to identifying the root causes of accidents and formulating appropriate corrective actions.

Overall, the results of the study indicate that PT. X has implemented most aspects of the OHS management system, but there is still room for improvement, especially in aspects of vehicle maintenance and route management. The implementation of comprehensive and sustainable risk control is expected to reduce the number of work accidents and operational losses, while improving worker safety and welfare. This study also recommends that PT. X conducts periodic evaluations of the effectiveness of the OHS program being implemented and continues to adapt technology and best practices in OHS risk management in the land logistics sector.

Thus, this study provides an important contribution in developing an effective OHS strategy in the land logistics industry, as well as being a reference for similar companies in managing occupational safety risks systematically and measurably. The HIRARC approach has proven effective in identifying and controlling OHS risks in PT. X, so it can be replicated in other companies with similar operational characteristics.

Research conducted by (Atsya et al., 2020) research was conducted at PT Krakatau Bandar Samudera (Krakatau International Port) is a state-owned company that was established in 1996 as a subsidiary of PT Krakatau Steel which is engaged in the field of loading and unloading services at the port. In carrying out its activities, various potential hazards arise that can endanger workers and allow work accidents to occur both on the dock and on the ship. From the research conducted, it was found that there were 5 out of 37 hazards classified as extreme and requiring control, including slippery dock surfaces, non-ergonomic worker positions, unsuitable/rusty wireroop conditions, not using PPE, and material stacking that is too high/not neatly arranged. (Atsya et al., 2020)

In another study, conducted by (Vikaliana & Melani, 2024) , who conducted

research at an Oil and Gas Drilling Company using the HIRARC method. Where, the results obtained were 5 out of 37 hazards were classified as extreme and required control, including slippery dock surfaces, non-ergonomic worker positions, unsuitable/rusty wireroop conditions, not using PPE, and material stacking that was too high/not neatly arranged. (Vikaliana & Melani, 2024)

CONCLUSION

This study aims to evaluate occupational safety and health (OHS) risks in land logistics transportation operations at transportation companies using the documentation study approach and the HIRARC (Hazard Identification, Risk Assessment, and Risk Control) method. Based on the results of the analysis of operational documents, company SOPs, and related literature, several things can be concluded as follows:

First, common work activities in land logistics operations, such as long-distance driving, loading and unloading goods, refueling, and vehicle inspections, contain various potential hazards. The most dominant potential hazards include driver fatigue, the risk of traffic accidents, the risk of fire due to refueling, and physical injury when handling goods.

Second, through the HIRARC method, a number of potential hazards have been classified into high, medium, and low risk categories. High risk is found in driving and refueling activities, with a risk score reaching 20 (scale 25), indicating the need for immediate control. Medium risk is often found in loading and unloading activities and communication while driving, while low risk is usually related to supporting activities such as vehicle inspection.

Third, recommended risk control includes a combination of technical and administrative efforts. Among them are the implementation of regular work rotation and rest schedules for drivers, increased K3 training, use of appropriate PPE, preparation and enforcement of safety SOPs, and emergency preparedness (e.g. availability of APAR and evacuation simulations).

Fourth, logistics transportation companies need to integrate the principles of the K3 Management System as regulated in Permenaker No. 5 of 2018 into all operational lines. By systematically identifying hazards and evaluating risks periodically, companies can create a sustainable safety culture while increasing work efficiency.

Thus, K3 risk evaluation not only acts as a hazard identification tool, but also as a strategic basis in designing more proactive and measurable occupational safety policies in the land logistics sector.

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