

## **Risk Management based on ISO 31000:2018 for Goods Delivery at PT Wahana Multi Logistik: Contribution to Green Supply Chain Management Sustainability**

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**Abstract:** With the change in lifestyle, the demand for delivery of goods is increasing, which has a negative impact on the environment, namely pollution and congestion. This change in the industrial era demands the role of industry in protecting the environment by reducing waste and pollution, thus causing the emergence of the concept of green supply chain management. This research aims to reduce risks at PT Wahana Multi Logistik so that it can ensure the delivery of goods runs efficiently, supporting the sustainability of green supply chain management. This research uses qualitative methodology and triangulation techniques. This research uses risk management analysis in accordance with the requirements of ISO 31000:2018 in addition to conducting interviews as a data collection tool. The risk analysis of PT Wahana Multi Logistik goods delivery process identified 20 potential risks, ranging from very high to low. These risks include environmental issues, damage to goods, delays, and accidents. This research provides recommendations to mitigate these risks.

**Keywords:** *Risk Management, ISO 31000:2018, Goods Delivery, Sustainability, Green Supply Chain Management*

### **1. Introduction**

Risk management is crucial for companies in achieving the goals of a company. Every activity carried out by the company has several potential risks that may occur. Risk according to the ISO 31000: 2018 standard is the effect of uncertainty on a goal where the effect can be positive and negative. The ISO 31000: 2018-based risk analysis method is an international standard that provides general guidelines on how to identify, analyze and evaluate risks in various contexts. ISO 31000:2018 is designed for use by organizations responsible for creating and protecting value in the organization (The British Standards Institution, 2018).

With the development of the times, there are several changes in people's lifestyles including shopping lifestyles. Nowadays, people are shifting from conventional shopping to online shopping through e-commerce, which has a huge impact on goods delivery services. The increase in e-commerce transactions increases the number of delivery of goods, which causes an increase in pollution. Negative impacts can be in the form of one of the supply chain management processes in goods delivery, namely pollution (sound, air, vibration), congestion, and visual intrusion, not only felt by logistics actors, but also by the wider community who are not directly involved in the process (Yanottama & Nahry, 2021).

Changes in the new industrial era that demand the role of industry in protecting the

environment by reducing waste and pollution have resulted in the emergence of the concept of green supply chain management in supply chain strategy. According to Dheeraj & Vishal (2012), Green Supply Chain Management (GSCM) is an innovation in the implementation of supply chain strategies that focus on the environmental context. GSCM involves various activities such as reduction, recycling, reuse, and material substitution. According to Toke et al. (2012) the concept of GSCM involves integrating environmental perspectives into the supply chain, including product design, selection and sourcing of raw materials, manufacturing processes, delivery of final products to consumers, and management of products after their end of life.

By developing these strategies, the researcher plans to make recommendations to reduce risks at PT Wahana Multi Logistik so as to ensure the delivery of goods runs smoothly in supporting the sustainability of green supply chain management. In addition, it is important to conduct continuous monitoring and risk control to ensure the successful implementation of the ISO 31000:2018-based risk management system.

## 2. Literature Review

### 2.1. Risk management

Every supply chain journey in an organization or company always faces challenges and it is difficult to avoid risks, including business risks such as bankruptcy, work accidents, theft and natural disasters. According to Djohanputro (2008), the systematic process of risk management consists of steps including identifying, evaluating, mapping, and developing solutions for risk resolution in addition to overseeing and controlling the risk management process itself. Meanwhile, according to Fahmi (2018), the scientific field of risk management examines how an organization uses structured and comprehensive managerial techniques to map out and comprehend the problems it encounters.

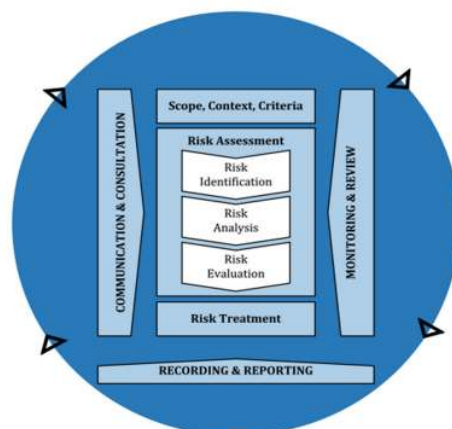
To face these risks, companies need to consider the worst-case scenario as a preventive step in managing risks. Risk management is an approach to identifying, assessing and managing risks based on their level of importance with the aim of reducing or eliminating their impact (Haryati et al., 2018). In short, risk management activities must identify, analyze and address both existing and potential risks. Without proper risk management, the company's business continuity will certainly be threatened, therefore managing risk is very crucial for the company (Albana et al., 2021).

### 2.2. ISO 31000:2018

The International Organization for Standardization (ISO) published ISO 31000:2018, a global standard with the goal of controlling risk management. This international standard can be applied in various activities by individuals, groups, and organizations. The use of this standard is universal, meaning that it can be used in various industrial sectors (Susilo & Kaho, 2018). According to ISO 31000:2018 (The British Standards Institution, 2018). Risk management is an organized process that involves the implementation of policies, methods and practical actions, along with communication and discussion activities

regarding risks. This includes determining risk contextual boundaries and criteria, evaluating risks involving identification, analysis and assessment, as well as executing risk treatment, monitoring and evaluation, as well as documentation and reporting, as depicted in the following illustration:

**Fig 1.** Risk management process



Source: Based on ISO 31000:2018 Risk Management Guideline

### 2.3. Goods Delivery

The need for delivery of goods is carried out by the community, including to meet personal needs and business needs so that the existence of goods delivery services is becoming increasingly important (Sungkar et al., 2021). It emphasizes how important logistics service providers are to the delivery of goods because they can support accurate and quick delivery (Syahnur et al., 2021). Delivery is defined as the process of transferring goods and services from the producer to the customer. The physical preparation of moving goods from the warehouse to the designated location in compliance with the order and transportation documents, while guaranteeing the condition of the goods satisfies the necessary handling standards, is referred to as delivery activities, according to the Indonesian Logistics Institute. Before delivery, the steps taken after preparing the goods include the packing and packing process. (Wijaya, 2018).

According to Dewi et al. (2020) the process of moving goods from one place to another to make them more accessible to customers is referred to as delivery. In daily life, we frequently witness situations where manufacturers struggle to manage the logistics of distribution without the assistance of many delivery service providers. In order to address this issue, manufacturers want capable business partners to efficiently oversee the

distribution process, enabling their target market—consumers and customers—to enjoy the sold goods and services right away. Overall, goods delivery involves the physical preparation of goods from the warehouse to the destination in accordance with ordering and delivery documents, as well as ensuring that the goods are in a condition that meets handling requirements.

#### *2.4. Sustainability*

Sustainability is essentially the state in which the amount of natural and artificial resources stays relatively constant for the foreseeable future in order to protect future generations' quality of life (Kuhlman & Farrington, 2010). When assessing the potential impact of a proposed policy, program, or project, the focus should be on improving welfare and positive or neutral impacts on overall resources in the future, known as sustainable development (Barbier, 2013).

Sustainability is the ability of social and biological systems to adapt to continuing change; it is a process rather than an outcome. This entails preserving natural systems' capacity to uphold and improve living conditions within social systems (Sakalasooriya, 2021). In Sakalasooriya (2021) research, the efficient, moral and equitable use of natural resources to meet the demands of present-day communities and future generations while enhancing their quality of life is referred to as sustainability.

#### *2.5. Green Supply Chain Management (GSCM)*

Reducing or minimizing waste (energy, emissions, hazardous chemicals, and solid waste) produced throughout the supply chain process is the primary concept of green supply chain management (GSCM) (Ninlawan et al., 2010). In Tseng et al. (2019) research, the definition of eco-friendly supply chain management is the incorporation of environmental management concepts into supply chain operations. In order to improve environmental efficiency, suppliers, customers, and logistics firms can work together to share information and insights.

In addition to the ever-changing and fast-moving competition and business environment, the industrialized world must also face environmental issues related to the depletion of natural resources, global warming, waste management, and increasingly stringent environmental regulations (Agusinta et al., 2022). According to Dubey et al. (2017) Businesses can get competitive benefits from sustainable supply chain management, such as premium goods and services, less waste and pollution, improved public perception, and profitable investment returns. Environmentally friendly supply chain management is focused on efforts to reduce environmental impacts covering all stages of production, use, handling, logistics and waste processing after production, including reuse and recycling practices (Dheeraj & Vishal, 2012). Green Distribution is an important activity that affects

green supply chain performance. Green Distribution, in this sense, can be defined as the delivery of goods processes to customers in Supply Chain activities that include environmental implications on three variables, namely: 1) The delivery of goods 2) Supplier selection criteria 3) The utilization of energy in the distribution process (Ricardianto et al., 2022).

### **3. Research method**

This research uses qualitative research methods so that the data collected is from statements containing issues, problems that are following the existing situation, conditions and reality. Qualitative research is research that produces findings that cannot be obtained through the use of statistical methods or other quantitative approaches (Murdiyanto, 2020). The result of research with this qualitative approach will be used as material which is then analyzed to obtain answers to issues, or problems that exist at PT Wahana Multi Logistics. The triangulation method is also used in this research. Through interview and observation activities, data were collected. Besides the approach of the interview method in data collection, another method that was also adopted was risk management analysis that refers to the ISO 31000:2018 guideline.

### **4. Results and discussion**

Wahana Multi Logistics (WML Cargo) is the best logistics company that has been committed since 2001 under the name PT Wahana Multi Indonesia. The services provided by PT Wahana Multi Logistics include land shipping, and expeditions. Another special service in the field of cargo owned by PT Wahana Multi Logistics is Wahana DG pack to handle all types of dangerous Goods class 1 – 9 for land, air and sea transportation.

This interview involved the president director and HRM departments. The interviewees were chosen because the researcher considered that the interviewees had competence in the field of risk management and the goods delivery process. Based on the result of interviews from the selected resource persons, the researcher obtained the following result (1) The process of delivery goods; (2) The documents essential for the goods delivery process include the delivery order (DO), purchase order (PO), SPK (work order), Routing slip (RS), document handover log book, and minutes of delivery; (3) The parties involved in the process of goods delivery at PT Wahana Multi Logistics are PIC Project, driver, operations staff and finance staff; (4) The company has not yet implemented green supply chain management; (5) Risk management policies already exist but still refer to quality; (6) There are many potential risks associated with delivery goods, including the possibility of delays, loss, damage, or delivery errors; incomplete documentation; non-availability of vehicles; accidents involving forwarders; inadequate workforce; errors in planning and specification; and the presence of incompetent workers. Additional obstacles include misidentifying the items, client cancellations, contract modifications at the customer's request, force majeure situations, the use of non-environmentally friendly vehicles, hazardous waste spills during transportation, and the ensuing pollution and environmental damage. Furthermore, limiting the spilling of hazardous material during the loading and unloading procedures and guaranteeing that environmental quality satisfies specified requirements are crucial components of reducing the hazards involved in

shipping commodities. The method used in this research is based on ISO 31000: 2018. There are four risk activities included in the risk management process, namely communication and consultation, determining the context, risk assessment consisting of risk identification, risk analysis and risk evaluation and risk treatment.

**Communication and Consultation.** This step is carried out to employees to discuss the license to carry out risk management so that there is strong evidence that can be used as a basis for accountability for what is done at PT Wahana Multi Logistik. The communication and consultation process is the first stage because it is the process of exchanging information and opinions regarding risk and its management by stakeholders. This process must be identified and considered in the decision-making process. The communication and consultation process should run throughout the risk management process.

**Scope, Context, and Criteria.** Risk analysis is carried out using the risk ranking method by paying attention to the priority of likelihood and impact. The next stage is risk treatment which consists of four types, namely risk acceptance, risk avoidance, risk sharing, and mitigation used to handle the risks that have been identified. The results of the interview then the author determines the likelihood and impact criteria which can be seen in the following table:

**Table 1.** Likelihood

| Estimated Likelihood of Occurrence | Estimated Time Scale of Likelihood to Occur |
|------------------------------------|---------------------------------------------|
| Rare                               | >10 years                                   |
| Unlikely                           | 5 years - 10 years                          |
| Possible                           | 6 months – 5 years                          |
| Likely                             | 1 month – 6 months                          |
| Almost certain                     | < 1 month                                   |

Source: Risk and Opportunity Identification Procedure System PT Wahana Multi Logistik

**Table 2.** Impact

| Type of Impact | Very Low                            | Low                                                                                           | Medium                                                                                                      | High                                                                                                          | Very High                                                                 |
|----------------|-------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Operational    | Small loss<br>(below Rp. 5,000,000) | Loss is acceptable and the project can still run normally<br>(Rp. 5,000,000 - Rp. 10,000,000) | Medium loss, project needs efficiency and supervision<br>(Rp. 10,000,001 - Rp. 50,000,000)                  | Large loss, the project must have a strong reason to continue<br>(Rp. 50,000,001 - Rp. 200,000,000)           | Very large losses, the project must be stopped<br>(above Rp. 200,000,000) |
| Environment    | No environmental pollution occurs   | Damage is limited to a minimal area with low significance                                     | Minor effects on the biological or physical environment (short-term) and does not affect ecosystem function | Moderate effects on the biological or physical environment (long-term) and does not affect ecosystem function | Very serious Long-term environmental damage to ecosystem function         |

Source: Risk and Opportunity Identification Procedure System PT Wahana Multi Logistik

**Table 3.** Risk Assessment Decision Matrix

| Likelihood            | Impact          |            |               |             |                  |
|-----------------------|-----------------|------------|---------------|-------------|------------------|
|                       | Very Low<br>(1) | Low<br>(2) | Medium<br>(3) | High<br>(4) | Very High<br>(5) |
| Almost certain<br>(5) | 5               | 10         | 15            | 20          | 25               |
| Likely (4)            | 4               | 8          | 12            | 16          | 20               |
| Possible (3)          | 3               | 6          | 9             | 12          | 15               |
| Unlikely (2)          | 2               | 4          | 6             | 8           | 10               |
| Rare (1)              | 1               | 2          | 3             | 4           | 5                |

Source: Risk and Opportunity Identification Procedure System PT Wahana Multi Logistik

**Table 4.** Risk-level score

|           |         |
|-----------|---------|
| Low       | 1 - 3   |
| Medium    | 4 - 6   |
| High      | 8- 15   |
| Very High | 16 - 25 |

Source: Risk and Opportunity Identification Procedure System PT Wahana Multi Logistik

**Risk Identification.** The risk identification stage related to the business process of goods delivery and the environment is carried out through a process of literature study, interviews, observation and documentation. The output obtained is a list of risks accompanied by risk events can be seen in the following table.

**Table 5.** Risk Identification

| Process Type | Process Name       | Risk ID | Risk Activity                                             |
|--------------|--------------------|---------|-----------------------------------------------------------|
| Operational  | Delivery Goods     | R01     | Delay in delivery of goods                                |
|              |                    | R02     | Loss of goods                                             |
|              |                    | R03     | Damage of goods                                           |
|              |                    | R04     | Delivery error                                            |
|              |                    | R05     | Incomplete document                                       |
|              |                    | R06     | Vehicle cannot be used                                    |
|              |                    | R07     | Accidents experienced by forwarder                        |
|              |                    | R08     | Limited number of workers                                 |
|              |                    | R09     | Errors in planning and specifications                     |
|              |                    | R10     | Incompetent workers                                       |
|              |                    | R11     | Misidentification of goods                                |
|              |                    | R12     | Cancellation by the customer                              |
|              |                    | R13     | Change of contract at customer's request                  |
|              |                    | R14     | Force majeure                                             |
| Environment  | Green Supply Chain | R15     | Vehicles are not yet using environmentally friendly fuels |

|  |  |     |                                                               |
|--|--|-----|---------------------------------------------------------------|
|  |  | R16 | Packaging materials are not environmentally friendly          |
|  |  | R17 | Hazardous waste spillage during shipment                      |
|  |  | R18 | Environmental damage and pollution                            |
|  |  | R19 | Environmental quality does not meet quality standards         |
|  |  | R20 | Hazardous waste spillage during loading and unloading process |

**Risk Analysis.** This step will involve assessing the hazards that were previously identified. The level of probability and effect will be the main emphasis of this assessment, as indicated by the table that follows.

**Table 6.** Risk Analysis with Likelihood and Impact

| Risk ID | Risk Event                         | Likelihood | Impact |
|---------|------------------------------------|------------|--------|
| R01     | Delay in delivery of goods         | 3          | 4      |
| R02     | Loss of goods                      | 3          | 5      |
| R03     | Damage of goods                    | 3          | 5      |
| R04     | Delivery error                     | 3          | 4      |
| R05     | Incomplete document                | 2          | 3      |
| R06     | Vehicle cannot be used             | 2          | 3      |
| R07     | Accidents experienced by forwarder | 2          | 4      |
| R08     | Limited number of workers          | 2          | 3      |

|     |                                                               |   |   |
|-----|---------------------------------------------------------------|---|---|
| R09 | Errors in planning and specifications                         | 1 | 3 |
| R10 | Incompetent workers                                           | 2 | 3 |
| R11 | Misidentification of goods                                    | 2 | 4 |
| R12 | Cancellation by the customer                                  | 1 | 3 |
| R13 | Change of contract at customer's request                      | 1 | 4 |
| R14 | Force majeure                                                 | 2 | 4 |
| R15 | Vehicles are not yet using environmentally friendly fuels     | 4 | 4 |
| R16 | Packaging materials are not environmentally friendly          | 4 | 3 |
| R17 | Hazardous waste spillage during shipment                      | 2 | 3 |
| R18 | Environmental damage and pollution                            | 3 | 3 |
| R19 | Environmental quality does not meet quality standards         | 1 | 2 |
| R20 | Hazardous waste spillage during loading and unloading process | 2 | 3 |

**Risk Evaluation.** Risk evaluation is the final step in the risk assessment process. At this stage, the researcher uses an evaluation tool in the form of a risk matrix that categorizes the risks into four levels, namely low, medium, high and very high. Possible risks that have been identified with the value of the level of occurrence and impact in the previous stage will be reclassified according to the available matrix framework.

**Table 7.** Risk Evaluation Matrix

| Likelihood            | Impact          |            |               |             |                  |
|-----------------------|-----------------|------------|---------------|-------------|------------------|
|                       | Very Low<br>(1) | Low<br>(2) | Medium<br>(3) | High<br>(4) | Very High<br>(5) |
| Almost certain<br>(5) |                 |            |               |             |                  |
| Likely (4)            |                 |            |               |             |                  |
| Possible (3)          |                 |            |               |             |                  |
| Unlikely (2)          |                 |            |               |             |                  |
| Rare (1)              |                 |            |               |             |                  |

Color description:

|           |                |
|-----------|----------------|
| Low       | Low Risk       |
| Medium    | Medium Risk    |
| High      | High Risk      |
| Very High | Very High Risk |

All possible risks will be categorized into four levels: low, medium, high, and very high, after they have been arranged in an assessment matrix according to their likelihood and impact.

**Table 8.** Risk Level

| Risk ID | Risk Event                                                    | Likelihood | Impact | Risk Score | Risk Level |
|---------|---------------------------------------------------------------|------------|--------|------------|------------|
| R15     | Vehicles are not yet using environmentally friendly fuels     | 3          | 4      | 16         | Very High  |
| R02     | Loss of goods                                                 | 3          | 5      | 15         | High       |
| R03     | Damage of goods                                               | 3          | 5      | 15         | High       |
| R01     | Delay in delivery of goods                                    | 3          | 4      | 12         | High       |
| R04     | Delivery error                                                | 2          | 3      | 12         | High       |
| R16     | Packaging materials are not environmentally friendly          | 2          | 3      | 12         | High       |
| R18     | Environmental damage and pollution                            | 2          | 4      | 9          | High       |
| R07     | Accidents experienced by forwarder                            | 2          | 3      | 8          | High       |
| R11     | Misidentification of goods                                    | 1          | 3      | 8          | High       |
| R14     | Force majeure                                                 | 2          | 3      | 8          | High       |
| R05     | Incomplete document                                           | 2          | 4      | 6          | Medium     |
| R06     | Vehicle cannot be used                                        | 1          | 3      | 6          | Medium     |
| R08     | Limited number of workers                                     | 1          | 4      | 6          | Medium     |
| R10     | Incompetent workers                                           | 2          | 4      | 6          | Medium     |
| R17     | Hazardous waste spillage during shipment                      | 4          | 4      | 6          | Medium     |
| R20     | Hazardous waste spillage during loading and unloading process | 4          | 3      | 6          | Medium     |

|     |                                                       |   |   |   |        |
|-----|-------------------------------------------------------|---|---|---|--------|
| R13 | Change of contract at customer's request              | 2 | 3 | 4 | Medium |
| R09 | Errors in planning and specifications                 | 3 | 3 | 3 | Low    |
| R12 | Cancellation by the customer                          | 1 | 2 | 3 | Low    |
| R19 | Environmental quality does not meet quality standards | 2 | 3 | 2 | Low    |

The table above is the result of a risk evaluation where there are 20 possible risks where there is 1 related risk (vehicles have not used environmentally friendly fuel) with a very high level, there are other risks totaling 9 (loss of goods, damage to goods, delay in delivery of goods, delivery errors, packaging materials are not environmentally friendly, environmental damage and pollution, accidents experienced by forwarders, misidentification of goods, and force majeure occurrence) is a high level of risk, There are 7 other risks (incomplete documents, vehicles cannot be used, limited number of workers, incompetent workers, hazardous waste spills during shipping, hazardous waste spills during the loading and unloading process, and changes to the contract at the request of the customer) is a medium level of risk, and there are 3 other risks (errors in planning and specifications, cancellation by the customer, and environmental quality does not meet quality standards) is a low level of risk.

**Risk treatment.** At this step, the researcher provides recommendations regarding how to overcome the possible risks that have been identified at PT Wahana Multi Logistik. The goal is to reduce the risk and make it a preventive measure against possible risks that may arise in the future. The following is the proposed risk treatment made by the researcher:

**Table 9.** Proposed Risk Treatment

| Risk ID | Risk Event                                                | Risk Level | Risk Treatment                                                              |
|---------|-----------------------------------------------------------|------------|-----------------------------------------------------------------------------|
| R15     | Vehicles are not yet using environmentally friendly fuels | Very High  | Adopt a continuous vehicle maintenance program.                             |
| R02     | Loss of goods                                             | High       | Double verification during the handling process, use of tracking technology |

|     |                                                      |      |                                                                                                                                                                                                                    |
|-----|------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R03 | Damage of goods                                      | High | Double check the condition of goods and packaging before departure                                                                                                                                                 |
| R01 | Delay in delivery of goods                           | High | Implement a real-time tracking system, optimize delivery routes                                                                                                                                                    |
| R04 | Delivery error                                       | High | <ul style="list-style-type: none"><li>- Have strict verification procedures in place before shipment.</li><li>- Training the workforce on the importance of accuracy and caution</li></ul>                         |
| R16 | Packaging materials are not environmentally friendly | High | <ul style="list-style-type: none"><li>- Replace packaging materials with more environmentally friendly options.</li><li>- Support packaging recycling and reuse initiatives.</li></ul>                             |
| R18 | Environmental damage and pollution                   | High | <ul style="list-style-type: none"><li>- Comply with applicable environmental regulations.</li><li>- Implement environmentally friendly operational best practices.</li></ul>                                       |
| R07 | Accidents experienced by forwarder                   | High | <ul style="list-style-type: none"><li>- Train forwarders regularly on safety practices.</li><li>- Follow applicable industry safety standards.</li><li>- Provide adequate health and accident insurance.</li></ul> |
| R11 | Misidentification of goods                           | High | <ul style="list-style-type: none"><li>- Implement a clear and accurate labeling</li></ul>                                                                                                                          |

|     |                                          |        |                                                                                                                                                                                                                       |
|-----|------------------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                          |        | <p>system.</p> <ul style="list-style-type: none"> <li>- Conduct double checks by different personnel before the shipment process.</li> </ul>                                                                          |
| R14 | Force majeure                            | High   | <ul style="list-style-type: none"> <li>- Include a clear Force Majeure clause in the contract.</li> <li>- Make contingency plans that cover possible scenarios.</li> </ul>                                            |
| R05 | Incomplete document                      | Medium | Regular and thorough document checks                                                                                                                                                                                  |
| R06 | Vehicle cannot be used                   | Medium | Regular vehicle maintenance, alternative vehicle backup plan                                                                                                                                                          |
| R08 | Limited number of workers                | Medium | <ul style="list-style-type: none"> <li>- Establish cooperation with third parties to increase manpower if needed.</li> <li>- Improve work efficiency through good workforce planning.</li> </ul>                      |
| R10 | Incompetent workers                      | Medium | <ul style="list-style-type: none"> <li>- Provide regular training and skill development.</li> <li>- Conduct performance assessments to identify training needs.</li> </ul>                                            |
| R17 | Hazardous waste spillage during shipment | Medium | <ul style="list-style-type: none"> <li>- Implement waste management protocols in accordance with applicable rules or regulations.</li> <li>- Train staff to handle hazardous waste safely and according to</li> </ul> |

|     |                                                               |        |                                                                                                                                                                                                                                  |
|-----|---------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                                               |        | procedures.<br>- Provide adequate personal protective equipment to reduce the risk of pollution.                                                                                                                                 |
| R20 | Hazardous waste spillage during loading and unloading process | Medium | - Train staff specifically to handle hazardous waste during the loading and unloading process.<br>- Use appropriate safety and handling equipment to reduce the risk of spillage.                                                |
| R13 | Change of contract at customers request                       | Medium | - Implement clearly documented contract change procedures.<br>- Set a reasonable time limit for accepting contract changes.                                                                                                      |
| R09 | Errors in planning and specifications                         | Low    | Conduct a comprehensive risk analysis before starting the project.                                                                                                                                                               |
| R12 | Cancellation by the customer                                  | Low    | Have a clear contract on cancellation requirements.                                                                                                                                                                              |
| R19 | Environmental quality does not meet quality standards         | Low    | - Conduct regular environmental audits to ensure compliance with quality standards.<br>- Establish a dedicated team to monitor and improve environmental quality.<br>- Conduct environmental monitoring, inspection and cleanup. |

## 5. Conclusion

Based on the result of research and discussion, the following conclusions can be drawn:

- 1) An ISO 31000:2018-based risk analysis of the goods delivery process at PT Wahana Multi Logistik in the contribution to the sustainability of green supply chain management has been carried out and resulted in 20 risk events against the operational process type of goods delivery and green supply chain environment.
- 2) Based on the risk analysis that has been carried out, risk evaluation was then carried out, where there are 20 possible risks with very high, high, medium, and low levels, as follows:
  - Very high level with one related risk (vehicles have not used environmentally friendly fuel).
  - High level with nine associated risks (loss of goods, damage to goods, delay in delivery of goods, delivery error, packaging materials that are not environmentally friendly, damage and environmental pollution, accidents experienced by forwarders, misidentification of goods, and force majeure).
  - Medium level with 7 associated risks (incomplete documents, vehicle unusable, limited number of workers, incompetent labor, spillage of hazardous waste during delivery, spillage of hazardous waste during loading and unloading, and change of contract at the customer's request).
  - Low level with three associated risks (errors in planning and specifications, cancellation by the customer, and environmental quality that does not meet quality standards).
- 3) In the risk analysis recommendations, there are suggestions for mitigating risks with very high, high, medium, and low levels.

## 6. Implications

Based on the results of the research conducted, the researcher makes the following implications:

- 1) This research can help PT Wahana Multi Logistik to improve operational efficiency and reliability of goods delivery by mitigating risks that may occur. By identifying and managing risks effectively in accordance with the ISO 31000 standard, the company can reduce incidents and obstacles that may occur during the delivery process.
- 2) This research can encourage PT Wahana Multi Logistics to prioritize and integrate the principles of Green Supply Chain Management in the operations of PT Wahana Multi Logistics. This can have a positive impact on the company's efforts to reduce the environmental impact of its operations and promote sustainability.
- 3) By implementing green supply chain management practices, PT Wahana Multi Logistik can

develop new markets and gain a competitive advantage. More and more consumers are choosing environmentally friendly products and services, so the company can take advantage of this to expand its customer base and win market share.

## 7. Research Limitation

Based on the research results and discussion, there are several research limitations that need to be considered:

- 1) Limited Environmental Factors: Although this study touches on environmental issues, it does not thoroughly describe the environmental impact of the company's operations, as the focus is more on operational risks than the overall environmental impact.
- 2) Limitations of Field Research: This research may have limitations in making a more comprehensive analysis of field risks, such as limited time, resources, or access to necessary field data. This may affect the overall understanding of risks in the field.
- 3) This research was conducted over a period of time, so it does not take into account future risks due to changes that may occur over time. Policy changes, new technologies or other changes in the external environment may affect risks that were not identified during the study.

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