

CHAPTER 1 – INTRODUCTION

1.1. Background

Engineering trade firms, particularly those in technical sectors such as pump and system manufacturing, face unique challenges in balancing cost, delivery time, and quality standards. In today's competitive landscape, firms often focus on manufacturing optimization while overlooking logistics as a strategic driver. Logistics is frequently viewed merely as a cost center, despite its potential to enhance customer satisfaction, reduce operating expenses, and improve profitability.

The global perspective highlights the urgency of this issue. According to the World Bank's Logistics Performance Index (LPI), Indonesia has experienced a steady decline in its logistics standing: from rank 59 in 2012 to 46 in 2018, and most recently to 61 in 2023 out of 139 countries. While neighboring ASEAN countries such as Singapore (ranked 1st), Malaysia (26th), and Thailand (34th) improved or maintained their competitiveness, Indonesia has fallen behind, particularly in custom, infrastructure, logistics competence and quality score and timeliness indicators (World Bank, 2023). This downward trend underscores systemic inefficiencies in logistics management and data integration.

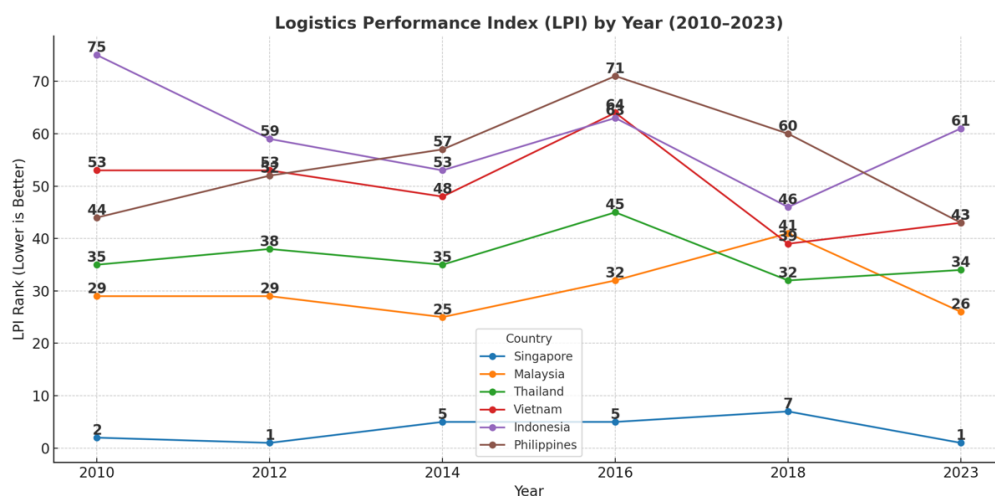


Figure 1. 1. LPI (Logistic Performance Index) (World Bank, 2023)

Figure 1.1 illustrates the Logistics Performance Index (LPI) rankings of Singapore, Malaysia, Thailand, Vietnam, Indonesia, and the Philippines between 2010 and 2023, showing overall logistics performance trends in ASEAN countries. Singapore consistently maintained a leading global position, ranking first in 2012 and 2023, reflecting its strong logistics infrastructure and trade connectivity. Malaysia demonstrated relatively stable performance with fluctuations, reaching its lowest point at 41st in 2018 but improving to 26th in 2023. Thailand experienced volatile changes, dropping to 45th in 2016 before improving to 32nd in 2018 and settling at 34th in 2023. Vietnam showed a significant upward trend, improving from 53rd in 2010 to 39th in 2018 and holding 43rd in 2023, demonstrating rapid logistics development. Indonesia improved steadily from 75th in 2010 to 46th in 2018, but declined to 61st in 2023, reflecting persistent infrastructure and governance challenges. Overall, ASEAN logistics performance has improved, though disparities remain, with Singapore maintaining global leadership while Indonesia's decline signals a need for strategic reforms.

At the company level, PT XYZ Indonesia reflects similar challenges. Internal reports show logistics costs have remained consistently high averaging 14% of annual sales between 2020 and 2025, while regional affiliates in Singapore, Malaysia, and Thailand have reduced logistics costs to below 10% during the same period. This persistent gap directly impacts competitiveness, as logistics costs consume resources that could otherwise be directed to innovation and customer value creation.

The inefficiency is not solely operational but also data-related. Logistics decisions in XYZ Indonesia rely on fragmented datasets, Excel-based reports, and undocumented tacit knowledge held by senior staff. This has resulted in shipment delays in nearly 24% - 27% of orders and frequent discrepancies in cost reporting, requiring up to two - three days for data correction. Without standardized data governance and integrated architecture, decision-making remains reactive, inconsistent, and unable to leverage the full value of historical and real-time data.

Looking ahead, Company XYZ is exploring the establishment of a manufacturing facility in Indonesia by fiscal year 2027 (BY27). The feasibility study highlights logistics cost optimization as a critical success factor. If logistics costs remain at 14% of sales, the projected BY27 operations could face significant competitive disadvantages compared to peer operations in Malaysia and Thailand.

To address these foundational gaps, this thesis proposes a structured, three-phased approach. First, the development and implementation of a data governance framework will ensure standardized definitions, clear ownership, and integration across data sources. Second, governed data will be used to extract insights on delivery times and freight costs, enabling reliable logistics analytics. Finally, these insights will be presented through a business intelligence dashboard, providing management with transparent, real-time visibility into logistics performance.

By aligning data governance, process optimization, and visualization, this research seeks to transform logistics from a perceived cost center into a strategic enabler of efficiency and competitiveness. Ultimately, it demonstrates how structured data practices and digital transformation can bridge the gap between uncoordinated operational activities and long-term performance management at PT XYZ Indonesia.

1.2. Research Problem

PT XYZ Indonesia is confronted with persistently high logistics costs, averaging 14% of total sales, compared with below 10% for its regional counterparts in Singapore, Malaysia, and Thailand. This cost disadvantage not only reduces profitability but also undermines the company's competitive position in the engineering trade industry, where cost efficiency and delivery performance are decisive factors.

The problem extends beyond operational inefficiencies. It is largely rooted in the absence of structured data governance, poor data quality, and fragmented information systems. These deficiencies manifest in several critical ways:

- No standardized ownership or accountability for logistics data

- Inconsistent or poor-quality records across departments
- Lack of integrated data architecture linking logistics and business systems
- Reliance on manual analysis and tacit knowledge instead of data-driven processes
- Limited ability to monitor cost and delivery performance consistently

As a result, PT XYZ Indonesia struggles with delivery delays, redundant workflows, limited visibility, and ineffective decision-making, preventing logistics from becoming a strategic tool for cost reduction and customer satisfaction.

As summarized in Figure 1.1, these three domains form the central causes of high logistics costs and delivery inefficiencies at PT XYZ Indonesia.

Fishbone diagram Figure 1.1 helps to summarize the problem: 

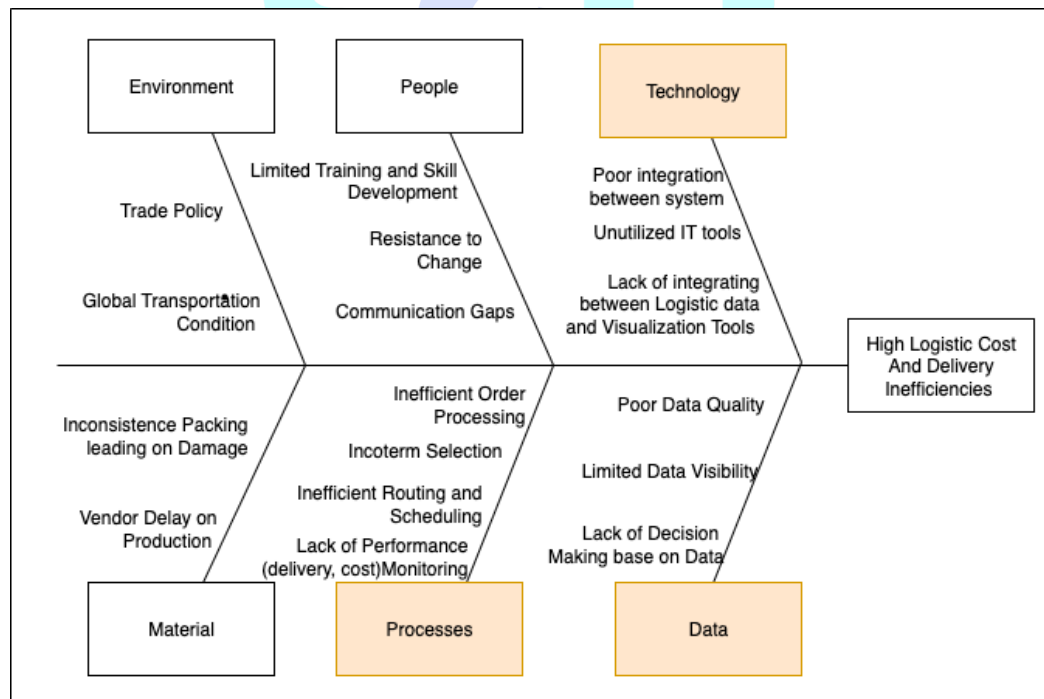


Figure 1. 2. Fishbone diagram summary of research problem

The fishbone diagram illustrated in Figure 1.1 highlights a problem addressed in this research, which focuses on reducing cost and delivery time by leveraging data-driven logistics. Although the diagram identifies six main subjects, this research concentrates on the gaps related to processes, technology and data. These gaps include poor data quality, limited data visibility, lack of data-based decision-making, lack of performance monitoring, unutilized IT/BI tools, and lack of integration between data and visualization tools.

1.3. Research Objective

As discussed previously in the introduction, the objective of this research is to empower the engineering trade company, PT.XYZ Indonesia to thrive in the highly competitive pump and system engineering market. The key research aims are as follows:

1. To establish a structured data governance and management framework for logistics operations to ensure consistency, accuracy, and ownership of logistics-related data.
2. To assess how governed and high-quality data optimize logistics decisions, leading to cost reduction and improved delivery accuracy.
3. To design and implement a business intelligence (BI) dashboard that enables real-time monitoring of logistics costs and delivery lead times for timely decision-making.

1.4. Research Question

The pump and system engineering trade company XYZ Indonesia operates in a highly competitive market, where technical expertise and product quality are not the only factors that determine success. As discussed in the previous section, these industries must also adapt to the evolving role of information technology (IT) and data-driven approaches to gain a sustainable competitive advantage. This research aims to answer the following key questions, each corresponding to the stages outlined in the research objectives:

1. How can structured data governance and data management be developed and implemented to support logistics operations at Company XYZ Indonesia?
2. How can improved data governance and data management practices contribute to reducing costs and enhancing timelines in Company XYZ Indonesia?
3. How can a Business Intelligence (BI) dashboard be designed effectively support real-time monitoring of logistic performance on managing delivery lead time?

1.5. Hypothesis

To address the key research questions outlined in the previous section, this study examines the following hypotheses:

1. The implementation of a structured data governance and data management framework significantly improves the quality, consistency, and accessibility of logistics data in Company XYZ Indonesia.
2. The availability of governed and high-quality logistics data enables more accurate and actionable analysis, leading to the identification of cost-saving opportunities and delivery time improvements.
3. A well-designed Business Intelligence (BI) dashboard that visualizes key logistics performance indicators of Delivery lead time enhance managerial ability to monitor operations, identify inefficiencies, and make timely adjustments in logistics processes.

1.6. Research Scope and Limitation

This research focuses on improving the logistics operations of Company XYZ Indonesia by addressing core issues related to data governance, data management, and data architecture within operational practices. The study is designed to develop and implement a structured data governance framework that defines clear data ownership, standardization practices, and quality controls for logistics-related data. Additionally, the research includes the design of a data architecture that enables integration across existing data sources such as delivery tracking and logistics cost records, ensuring centralized and consistent access.

A significant part of the research involves analyzing historical logistics data, once it is governed and cleaned, to identify inefficiencies, delays, and cost-driving factors in the current logistics processes. This analysis serves as a foundation for developing actionable insights to improve operational decision-making. Based on these insights, the research designs and implements a set of business tool dashboard using Microsoft PowerApps. This tool aims to enhance managerial visibility into logistics performance, enable interactive tracking of delivery times, and can be used to provide estimates of logistics costs in a user-friendly and accessible format.

Although this research is carried out specifically within the context of Company XYZ Indonesia, the frameworks and tools developed are intended to be adaptable to similar companies in the engineering trade sector with appropriate contextual modifications.

However, the study is subject to certain limitations. First, the success of the data analysis is highly dependent on the availability and quality of logistics data. Incomplete or inconsistent records may limit the depth and accuracy of the analysis. Second, the technical implementation of dashboards relies on tools currently available in the organization, namely Microsoft Power BI and Power Apps. While these platforms offer strong capabilities, their limitations in terms of system integration or advanced customization may affect the scalability of the solution.

Third, the research assumes a degree of organizational readiness and willingness to adopt structured data governance practices. Challenges such as change resistance, lack of internal training, or siloed departments may affect the long-term effectiveness of the proposed framework.

1.7. Significance of Study

This research offers substantial practical value for industry practitioners, particularly for Company XYZ Indonesia, which operates in the highly competitive pump and system engineering trade sector. By addressing the foundational challenges of poor data governance, fragmented systems, and limited logistics visibility, the study provides a structured and implementable framework to improve logistics data quality and

usability. Through the development of a data governance framework and its integration with business tools such as Microsoft Power BI and Power Apps, the research delivers a practical model to enhance delivery time monitoring and optimize logistics cost estimation.

This study moves beyond theoretical discussions by presenting a real-world application of structured data practices to solve tangible business problems. It demonstrates how a data-centric approach, starting from governance and extending to analytical use, can empower companies to make faster, more accurate, and better-informed decisions across their logistic operations. The ability to visualize delivery performance and cost drivers in real-time supports not only operational effectiveness but also enables management to respond proactively to market demands.

For academia, this research contributes to the growing literature on the application of data management and business intelligence in logistics operations within industrial sectors, particularly in emerging markets like Indonesia. It bridges the gap between theoretical models of data governance and the operational reality faced by companies that rely heavily on human expertise and informal processes. The study serves as a case-based reference for future research on how data frameworks can be adapted to fit human-centric and technical environments.

At a broader level, the findings also carry implications for policymakers and industry stakeholders. The results emphasize the importance of investing in digital infrastructure and workforce upskilling to enable wider adoption of data-driven practices in Indonesian trade industries. By showing how structured data and simple business applications can deliver strategic advantages even within resource-constrained settings, the study supports goals of improving operational efficiency and long-term sustainability.

1.8. Thesis Structure

Chapter 1 outlines the background of this study, including the relevancy of the study for current business conditions, research problem, research question and hypothesis, research scope and limitation, and the significance of the study.

In the Chapter 2, this chapter presents a comprehensive review of existing literature relevant to the subject of this research. The literature review is organized into several sections to cover various aspects of the study. These include theoretical perspectives and topics such as data governance, logistic optimization, business intelligence, an overview of Company XYZ, BI visualization tools, and frameworks such as OMD-BDA, CRISP-DM, and the Data Governance Framework

In the Chapter 3, this chapter presents a practical framework tailored for engineering trade companies to overcome challenges into three pillars related to data governance, logistics process improvement, and data visualization.

Chapter 4 is the most critical part of this study, as it presents the findings of the study. This chapter presents the results derived from the implementation of the data governance framework, the logistics improvement process, and the development of a visualization dashboard. The discussion interprets the findings and connects them to the research objectives outlined in Chapter 1. The results are organized based on the three core pillars of the research: Data Governance Implementation, Logistics Improvement Analysis, and Visualization for Monitoring.

Conclusions and recommendations are the last chapter, chapter 5. This chapter provides a summary of the key findings from the study, discusses the implications of these findings and offers recommendations for PT. XYZ Indonesia. The chapter also suggests opportunity for future research based on the limitations and insights gained from the study.