

Fleet Management Optimization Program for Fuel Distribution in Indonesia, Study of Pertamina Subsidiaries

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Abstract

Fuel distribution is crucial to Indonesia's economy and society, as delays can lead to significant social issues. One of Pertamina's subsidiaries manages this essential task, which involves the business process of trade and product transportation. Fleet management is the core activity within this process, ensuring effective distribution to end-users and various distributors. The complexity of fleet management arises from coordinating with multiple partners, such as tank truck/transporter providers, tank truck crew service providers, and maintenance service providers. This paper offers an approach to optimizing the management system, focusing on human and machine-centered aspects, and presents its implementation in a case study of one of Pertamina's subsidiaries. The case study details the operating system and the challenges in the process, including root cause analysis. Potential improvements for mitigation are also discussed, providing an optimistic outlook for the future of fuel distribution in Indonesia. By addressing these challenges and implementing effective strategies, the paper aims to enhance the operational excellence of fuel distribution, ensuring efficiency and sustainability.

Keywords

Fleet management, supply chain, logistics, safety, and systems improvement

1. Introduction

Fuel distribution is a cornerstone of Indonesia's economy and society. The timely and efficient delivery of fuel is a critical task, as delays can lead to significant social issues, such as disruptions in transportation, energy shortages, and economic instability. This responsibility is shouldered by the subsidiaries of Pertamina, the state-owned oil and natural gas corporation. These subsidiaries play a vital role in managing fuel distribution in Indonesia, ensuring the smooth

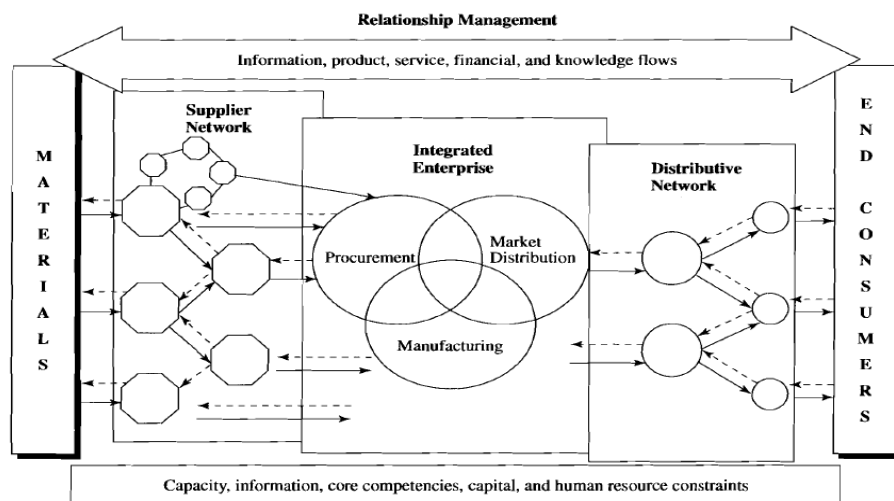
operation of the country's energy supply. Fuel management by these subsidiaries encompasses the entire Business Process of Trade and Product Transportation. Within this broad process, Fleet Management emerges as a core activity, ensuring the effective distribution of fuel to end-users and various distributors. The complexity of Fleet Management is heightened by the involvement of multiple supporting partners, including tank truck/transporter providers, tank truck crew service providers, and maintenance service providers. Collaborating with numerous partners introduces significant management challenges, necessitating a robust and optimized system to ensure smooth operations. The fuel distribution system is a crucial link in supply chain logistics management, consisting of several key components. An integrated supply chain involves multi-firm relationship management within a framework characterized by capacity limitations, information flow, core competencies, and capital and human resources constraints. Within this framework, the structure and strategy of the supply chain arise from efforts to operationally connect a business with its customers, as well as supporting distribution and supplier networks, to gain a competitive advantage. Business operations are, therefore, integrated from the initial purchase of materials to the delivery of products and services to end customers. Logistics is the primary conduit for the flow of products and services within a supply chain arrangement. Every firm involved in a supply chain participates in performing logistics. Fleet management is a core element in executing logistics, ensuring the efficient distribution of products to their final destinations

1.1 Objectives

The objective of this paper is to emphasize the pivotal role of fleet management in supply chain logistics, highlighting its multiple essential components. It aims to underscore fleet management as a core element in executing logistics, ensuring the efficient distribution of products to their final destinations, and maintaining the overall efficiency and reliability of the supply chain. The goal is to define an operating system that includes the challenges in the process, problem analysis, and potential improvements for mitigation. Ultimately, effective fleet management can significantly contribute to the operational excellence of the supply chain, ensuring that the fuel distribution system operates smoothly, efficiently, and sustainably.

2. Literature Review

Supply chain (the value chain or demand chain) management consists of firms collaborating to leverage strategic positioning and improve operating efficiency. Logistics, in contrast to supply chain management, is the work required to move and position inventory throughout a supply chain. Logistics is the process that creates value by timing and positioning inventory; it is the combination of a firm's order management, inventory, transportation, warehousing, materials handling, and packaging as integrated throughout a facility network. Integrated logistics links and synchronize the overall supply chain as a continuous process and is essential for effective supply chain connectivity. (Bowersox et al. 2002). The general concept of an integrated supply chain is typically illustrated by a line diagram that links participating firms into a coordinated competitive unit. Figure 1 illustrates a generalized model adapted from the supply chain management program at Michigan State University. (Michigan State University).



Source: Adapted from supply chain faculty, Michigan State University.

Figure 1. Generalized Supply Chain Model

The context of an integrated supply chain in multi-firm relationship management within a framework characterized by capacity limitation, information, core competencies, capital, and human resources constrain. Within this context, supply chain structure and strategy result from an effort to operationally link an enterprise with customers as well as supporting distributive and supplier network to gain a competitive advantage. Business operations are therefore integrated from initial material purchase to delivery of products and service to end customers. Logistics is the primary product of product and service flow within a supply chain arrangement. Each firm engaged in a supply chain is involved in performing logistics. To realize the maximum strategic benefit of logistics, the full range of functional work must be integrated. Decisions in one functional area will impact the cost of all others. It is this interrelation of functions that challenges the successful implementation of integrated logistical management.

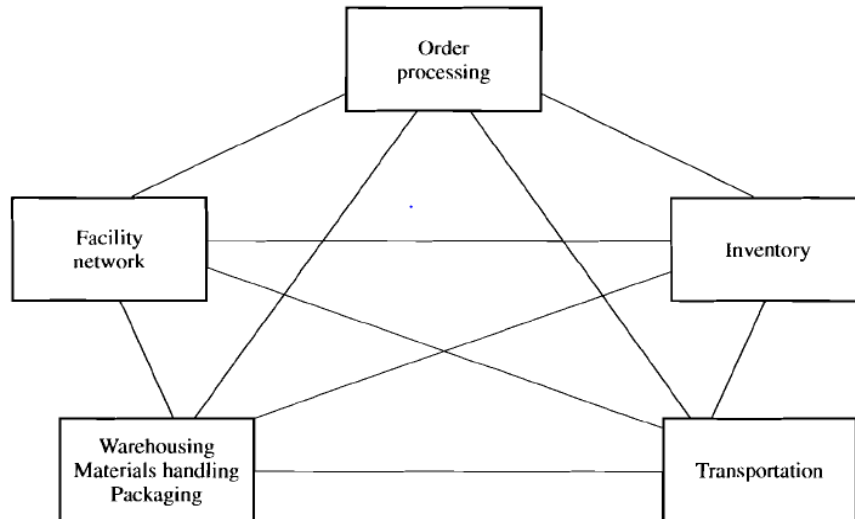


Figure 2. Integrated Logistics

Figure 2 provides a visual representation of the interrelated nature of the five areas of logistical work: (1) order processing, (2) inventory, (3) transportation, (4) warehousing, materials handling, and packaging, and (5) facility network. As described, work related to these functional areas combines to create the capabilities needed to achieve logistical value.

Transportation is the operational area of logistics that geographically moves and positions inventory. Because of its fundamental importance and visible cost, transportation has traditionally received considerable managerial attention. Almost all enterprises, big and small, have managers responsible for transportation. Transportation requirements can be satisfied in three basic ways. First, a private fleet of equipment may be operated. Second, contracts may be arranged with dedicated transport specialists. Third, an enterprise may engage the services of a wide variety of carriers that provide different transportation services on a per-shipment basis. From the logistical system viewpoint, three factors are fundamental to transportation performance:

The **cost** of transport is the payment for shipment between two geographical locations and the expenses related to maintaining in-transit inventory. Logistical systems should utilize transportation that minimizes total system cost. This may mean that the least expensive method of transportation may not result in the lowest total cost of logistics.

Speed of transportation is the time required to complete a specific movement. Speed and cost of transportation are related in two ways. First, transport firms, capable of offering faster service, typically charge higher rates. Second, the faster the transportation service is, the shorter the time interval during which inventory is in transit and unavailable. Thus, a critical aspect of selecting the most desirable method of transportation is to balance speed and cost of service.

Consistency of transportation refers to variations in time required to perform a specific movement over several shipments. Consistency reflects the dependability of transportation. When transportation lacks consistency, inventory

safety stocks are required to protect against service breakdowns, impacting both the seller's and buyer's overall inventory commitment. With the advent of new information technology to control and report shipment status, logistics managers have begun to seek faster movement while maintaining consistency. Speed and consistency combine to create the quality aspect of transportation.

A delicate balance must be maintained between transportation cost and service quality in designing a logistical system. In some circumstances, low-cost, slow transportation is satisfactory. In other situations, faster service may be essential to achieving operating goals. Finding and managing the desired transportation mix across the supply chain is a primary responsibility of logistics. (Bowersox et al. 2002). Fleet management is a core element in executing logistics, ensuring the efficient distribution of products to their final destination. Fleet management is using a set of vehicles to provide a service to a third party or to perform an activity internally in an organization most efficiently and productively with a determined level of service and cost. Fleet management is a key aspect of developing the general system of the organization. For this reason, it has to be designed and implemented based on the guidelines, characteristics, and goals of said organization. (Advance Fleet Management Consulting).

3. Methods

This paper focuses on optimizing an operations system in fleet management to ensure the fuel distribution system operates smoothly, efficiently, and sustainably. The analysis is built using the 5M Ishikawa method for analyzing the causes of a problem and defining the possibility of improvement. By finding the root cause of the problem, this method creates an optimal environment in the teams for an effective search for solutions and anticipates other causes that could aggravate the problem. (Feldman, Ked., 2023)

The process of constructing the analysis is carried out in several stages:

1. Identify the problem of the current carrier situation
2. Define causes that could explain the problem on the Ishikawa diagram to represent the causes of a problem and rank them graphically.
3. Define the Possibility of improvement

4. Analysis - Identify the problem of the current carrier situation

Previously, one of Pertamina's Subholding directly managed fuel stock management and distribution. However, in alignment with the subholding concept that emphasizes business strategy development, Pertamina's Subholding has established a dedicated subsidiary focused on Fleet Management to enhance its focus on business development, especially in fuel distribution management. Figure 3. below provides an overview of the Fleet Management activities managed:

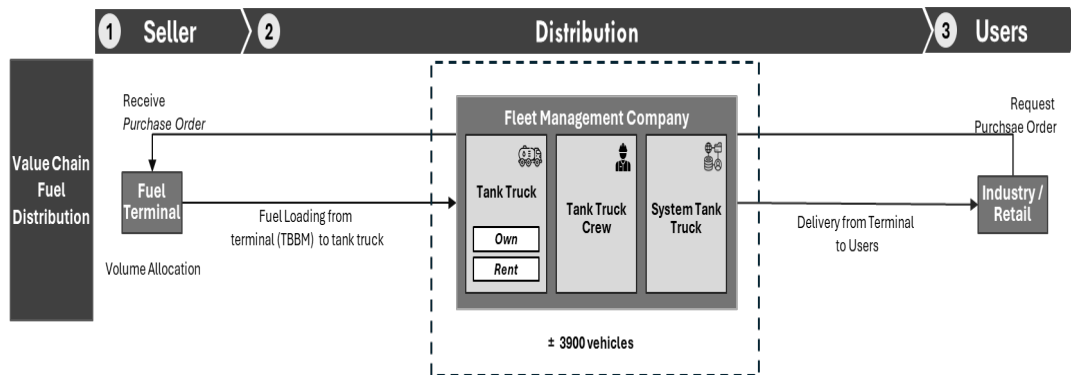


Figure 3. Fleet Management Activities Overview

Various operational challenges have emerged during the phased transition system to the subsidiary. The Fleet Management business process involves multiple supporting partners, such as tanker/transporter providers, crew service providers, and maintenance service providers, leading to complexities in management. Consequently, problems such as delivery delays, shipment losses, and transportation incidents have surfaced. From the mapping conducted, transportation incidents contribute significantly as the primary cause of the issues in current Fleet

Management activities. According to the internal report, 299 incidents in 2023 – 2024 contributed significantly to the primary cause of problems in current fleet management activities.

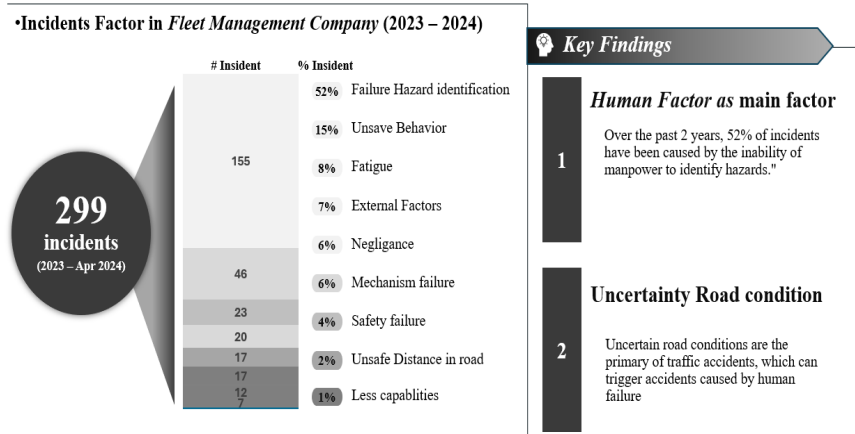


Figure 4. Incidents Factor in Fleet Management Company
 Source: Internal report of transportation accidents involving Subholding Pertamina for the year 2024

5. Results and Discussion

5.1 Define cause and effect by Ishikawa Diagram

From the data, we map to fishbone diagrams, or cause-and-effect diagrams, for identifying and organizing potential causes of a problem or issue. We find the problem-solving processes by visually displaying the various factors contributing to a particular outcome. (Feldman, Ked, 2023)

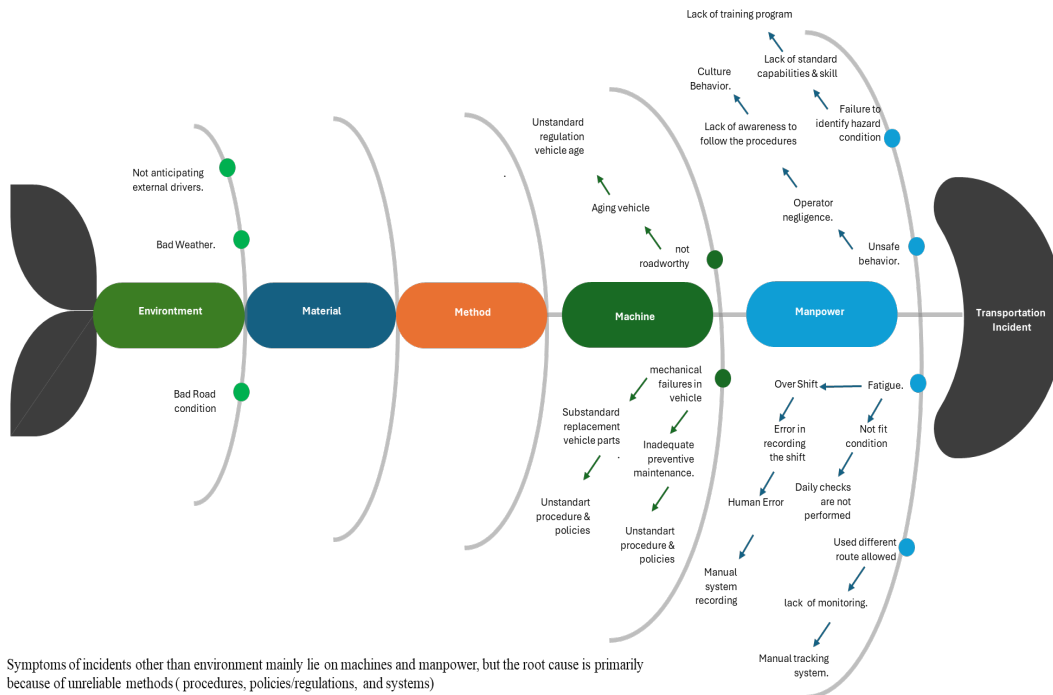


Figure 5 Ishikawa Diagram

Based on the Ishikawa Diagram, the problem is divided into five-element problems. These elements, often referred to as the 5Ms, are:

1. **Manpower:** Refers to the personnel involved in fleet management, including drivers, mechanics, and administrative staff.
2. **Machine:** Encompasses the vehicles themselves, including trucks, cars, vans, or specialized equipment.
3. **Methods:** Refers to the processes and procedures used to manage the fleet, including scheduling, routing, dispatching, maintenance planning, fuel management, and safety protocols.
4. **Materials:** Includes everything necessary to support fleet operations, such as fuel, lubricants, spare parts, and consumables.
5. **Environment:** Represents the external aspect of fleet management

This mapping of the element core problem defines particular issues for each core problem and determines the possibility of improvement. The fishbone showed symptoms of incidents involving mainly three aspects:

Manpower, Machine, and Environment

Symptoms of incidents other than environment mainly lie on machines and manpower, but the root cause is primarily because of unreliable methods (procedures, policies/regulations, and systems). From this fact, we define problem-solving by mapping improvement for each key factor and developing some program to execute it.

5.2 Define the Possibility of improvement.

To define the possibility of improvement, we must determine each problem's key factors. From the key factors, we will conduct critical improvements to describe the action. By focusing on these objectives, fleet management can significantly contribute to the operational excellence of the supply chain, ensuring that the fuel distribution system operates smoothly, efficiently, and sustainably. 4.3 below provides an overview of key improvements from each factor:

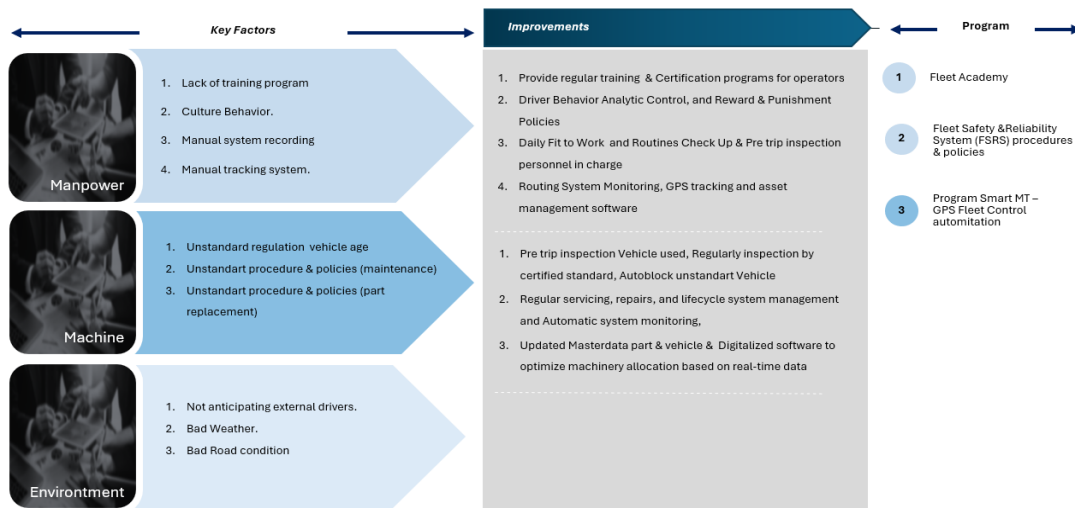


Figure 6. Keys Improvement

5.3 Improvement Program

This improvement will achieve the objective of fleet management in operational excellence. Achieving operational excellence in fleet management will impact the optimization of the distribution process within the supply chain, ensuring efficiency, reliability, and cost-effectiveness. As a result, to make sure the objective of the improvement is delivered, the fleet management company has to conduct some programs below :

Fleet Academy

The Fleet academy program includes driver training programs and crew certification, adherence to safety regulations, daily health checks and monitoring by the system, and a Culture Safety Program, developing automatic system monitoring. By focus of people on safety helps prevent accidents and reduces liability risks.

Fleet Safety & Reliability System (FSRS) Procedure & Policies

FSRS program includes ensuring consistent and dependable delivery and maintenance schedules, ensuring adherence to legal and regulatory requirements, providing standard system Procedures & Policies, and applying to all aspects involved, providing Master data part & vehicle & Digitalized software to optimize machinery allocation based on real-time data. Staying compliant with transportation laws and regulations helps avoid legal issues and fines, ensuring smooth operations. (Advance Fleet Management Consulting)

Program Smart MT – GPS Fleet Control Automation

Smart MT – GPS Fleet Control Automation program includes leveraging data analytics system vehicles with Routing System Monitoring, behavior sensor tracking, GPS tracking, and asset management software. (Stecca G,2013). And Incorporate eco-friendly practices to reduce the environmental impact, using fuel-efficient vehicles, optimizing routes to decrease emissions, and adopting alternative energy sources where possible. (STM Journal 2023) By delivering on this program, fleet management can significantly contribute to the operational excellence of the supply chain, ensuring that the fuel distribution system operates smoothly, efficiently, and sustainably. Improve service quality to meet or exceed customer expectations. Efficient and reliable fleet management ensures timely deliveries, which is essential for customer satisfaction and retention

6. Conclusion

Fuel distribution is essential to Indonesia's economy and society, with Pertamina's subsidiaries playing a crucial role in managing this process. Delays in fuel deliveries can lead to significant social issues, making efficient fleet management critical. This paper explored the complexities of fleet management within Pertamina's subsidiaries, particularly the coordination with multiple partners and the integration of human and machine-centered aspects. Using the Ishikawa Diagram, we identified the core problems in fleet management, categorized into the 5Ms: Manpower, Machine, Methods, Materials, and Environment. Our analysis revealed that most incidents were due to unreliable methods, highlighting the need to improve procedures, policies, and systems.

We proposed several key improvements to address these issues:

1. Fleet Academy: A program focused on driver training, crew certification, safety regulations, health monitoring, and developing a safety culture.
2. Fleet Safety & Reliability System (FSRS): Procedures and policies to ensure consistent delivery and maintenance schedules, legal compliance, standardization, and real-time data optimization.
3. Smart MT – GPS Fleet Control Automation: Leveraging data analytics for routing, behavior tracking, GPS tracking, asset management, and eco-friendly practices.

Implementing these programs will enhance the operational excellence of fleet management, ensuring efficient, reliable, and sustainable fuel distribution. By focusing on these improvements, Pertamina's subsidiaries can optimize the distribution process within the supply chain, contributing significantly to Indonesia's economic stability and social well-being. Achieving these objectives will improve service quality and customer satisfaction and ensure a resilient and responsive fuel distribution system capable of meeting future challenges.

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