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# Digital Transformation in Transportation Management at PT Pos Logistik Indonesia

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## Abstract

The advancement of information technology has transformed the role of transportation management from a supporting operational function into a strategic component that enhances efficiency and effectiveness in logistics operations. This study aims to analyze the implementation of a web-based transportation management system at PT Pos Logistik Indonesia and to evaluate the system's impact on operational performance and organizational competitiveness. Using a qualitative descriptive method, data were collected through observation, semi-structured interviews, and documentation review. The results indicate that the implementation of the system improves fleet management efficiency by optimizing maintenance schedules, reducing operational costs, increasing asset control accuracy, and improving occupational safety. Moreover, the integration of digital technology facilitates faster and more accurate decision-making through real-time data visibility. Despite these advantages, several challenges remain, including dependency on Excel-based systems and limited automation. Overall, the study concludes that digital transformation in transportation management plays a strategic role in supporting operational excellence and long-term competitiveness at PT Pos Logistik Indonesia.

## Keywords

Transportation Management, Information System, Digital Technology, Operational Efficiency

## Article History

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## Introduction

The transportation sector represents a crucial component of the logistics and supply chain industry, functioning as the core enabler of the global flow of goods, services, and information. Efficient transportation management ensures that logistics operations run smoothly, costs remain under control, and customer demands are met in a timely manner. In the past decade, the rapid advancement of information and communication technology (ICT) has transformed the transportation domain from a purely operational activity into a strategic pillar of industrial competitiveness. According to Hafsari, Pudjiantoro, and Santikarama (2020), the role of information technology in logistics has evolved from being merely supportive to becoming a primary driver of operational efficiency, service quality, and innovation.

In logistics operations, Transportation Management Systems (TMS) have become an essential digital framework that integrates various logistical functions, from vehicle scheduling to route optimization and performance analysis. A TMS enables companies to manage fleets more effectively by monitoring utilization rates, optimizing maintenance schedules, and providing insights into operational performance. Within PT Pos Logistik Indonesia, a subsidiary of PT Pos Indonesia (Persero), the transportation management division is responsible for overseeing routine and major vehicle maintenance, driver scheduling, and performance tracking across multiple distribution routes. The adoption of a digitalized transportation management approach has proven instrumental in reducing operational costs, minimizing downtime, and improving road safety. Empirical research by Wang et al. (2022) also supports this, emphasizing that digital TMS implementations lead to measurable improvements in fuel efficiency, maintenance precision, and delivery punctuality.

Recent global developments underscore the urgency of digital transformation in the logistics sector. As noted by Syaifur Rahmatullah Abdul Rojak, Setiyawan, and Irmawati (2024), the ability of logistics organizations to adapt to digital disruption determines their long-term resilience and competitiveness. Digital transformation enables data-driven decision-making, real-time communication, and predictive analytics for proactive maintenance and resource planning. Moreover, Karo Sekali and Sopiah (2023) highlight that integrating digital information systems into logistics operations enhances coordination efficiency and enables managers to make accurate, evidence-based decisions. In line with these findings, the shift toward intelligent, automated, and web-based systems has become a defining characteristic of modern logistics ecosystems.

In particular, web-based TMS platforms offer significant advantages over traditional desktop or spreadsheet-based tools. By utilizing real-time data access, web systems promote transparency, accountability, and operational responsiveness, allowing logistics managers to monitor and respond to issues instantly. Wahyudi and Muzakir (2020) note that the adoption of online data management platforms facilitates cross-departmental collaboration and centralized reporting, which are crucial for optimizing logistics networks across multiple regions. The integration of web-based features such as dashboard visualization, predictive analytics, and digital document management can further streamline communication between dispatchers, drivers, and maintenance personnel—fostering a more connected and efficient operational ecosystem.

Despite these clear benefits, many organizations—including state-owned and private logistics companies—continue to rely on manual Excel-based data management systems, which significantly limit automation, scalability, and analytical capabilities. Marlindawati and Maza (2022) emphasize that such legacy systems hinder data consistency, increase the risk of human error, and make performance evaluation difficult. In the context of increasingly data-intensive logistics operations, manual approaches are no longer sustainable. As Gul and Ellahi (2021) assert, the global logistics industry's digital evolution requires organizations to adopt smart, web-based management systems that can support real-time analytics, integrate IoT-enabled monitoring, and ensure the long-term sustainability of logistics networks.

Based on these considerations, this study focuses on the design, development, and implementation of a web-based Transportation Management System (TMS) at PT Pos Logistik Indonesia as part of its ongoing digital transformation efforts. The research aims to evaluate the system's effectiveness in improving operational performance, optimizing maintenance scheduling, and enhancing decision-making capabilities within transportation management. By adopting a web-based approach grounded in digital transformation principles, this study contributes to the broader discourse on how logistics organizations in Indonesia can leverage technology to achieve greater efficiency, reliability, and sustainability in national and global logistics operations.

## Methodology

### *Research Method*

This study employed a qualitative descriptive research approach. The qualitative method was chosen to provide an in-depth understanding of the implementation process, challenges, and benefits of the transportation management system at PT Pos Logistik Indonesia. Data were collected through direct observation, semi-structured interviews with logistics and maintenance staff, and document analysis of company reports (Nina Adlini et al., 2022).

### *System Development Method*

Data from the survey were collected through a questionnaire and analysed The research applied the Waterfall Model as the system development framework. The model comprises five key phases: (1) Communication, (2) Planning, (3) Modeling, (4) Construction, and (5) Deployment (Tujni & Hutrianto, 2020). This structured approach was selected due to its suitability for projects with well-defined system requirements and sequential implementation stages (Ginting & Lee, 2025).

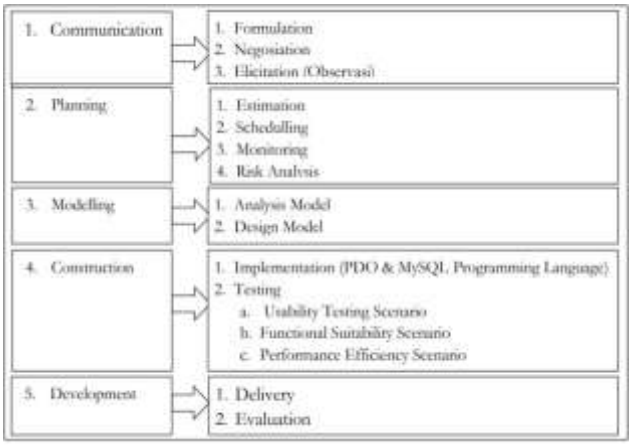


Figure 1. System Development Phases Using the Waterfall Model.

### System Design

Tools The system was modeled using the Unified Modeling Language (UML) to describe the functional and structural relationships between system components. UML diagrams facilitate visual representation and understanding of the system's design and data flow (Narulita, Nugroho, & Abdillah, 2024).

### Use Case Diagram

The Use Case Diagram outlines user interactions within the transportation management system, showing functional capabilities accessible to each actor (user role).

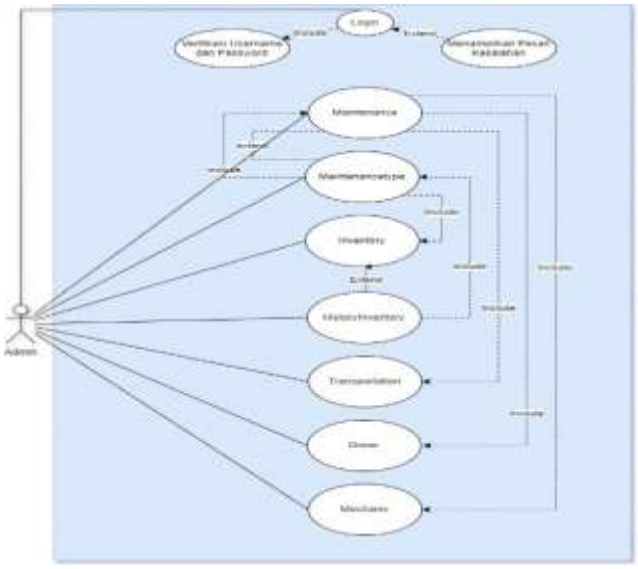

Figure 2. Use Case Diagram of the Transportation Management System.

### Use Case Scenario

The Use Case Scenario defines the sequence of events or processes executed by the system when a user interacts with it. This includes system inputs, responses, and expected outcomes.

Table 1. Use Case Scenario Description.

| | | |
|---|---|---|
| Use Cases | : | Maintenance |
| Description | : | Use case maintenance handles the management of truck maintenance data. Includes information related to maintenance and repair of trucks such as driver's name, police number, mechanic's name, kilometer, repair shop where maintenance is carried out, maintenance entry date, maintenance completion target, maintenance completion date, next maintenance date, and maintenance proof images . |
| Actor | : | Admin |
| Initial Conditions | : | The system will display the maintenance menu . |
| Final Condition | : | A admin chooses to save , add, modify, delete, print, or archive maintenance data truck . Maintenance data trucks are stored in the database |

| Normal Scenario | |
|---|---|
| Actor Action | System Reaction |
| 1. Admin chooses the maintenance menu. | |
| | 2. The system displays truck maintenance data. |
| 3. Admin selects menu add truck maintenance schedule. | |
| | 4. The system displays a form for adding truck maintenance schedule data. |
| 5. The admin enters data on the truck maintenance schedule and saves it. | |
| | 6. The system displays a successful data message. |
| 7. Admin selects menu change, delete, print, and archive truck maintenance schedule data. | |
| | 8. The system displays a successful change, delete, print, and archive data message. |

| Failed Scenario | |
|---|---|
| Actor Action | System Reaction |
| 1. Admin chooses the maintenance menu. | |
| | 2. The system displays truck maintenance data. |
| 3. Admin selects menu add truck maintenance schedule. | |
| | 4. The system displays a form for adding truck maintenance schedule data. |
| 5. The admin enters data on the truck maintenance schedule and saves it. | |
| | 6. The system displays a message data failed to save. |
| 7. Admin selects menu change, delete, print, and archive truck maintenance schedule data. | |
| | 8. The system displays messages data failed to change, delete, print, and archive. |

### Activity Diagram

The Activity Diagram illustrates the procedural workflow of vehicle maintenance within the transportation management system, detailing user actions and system responses.

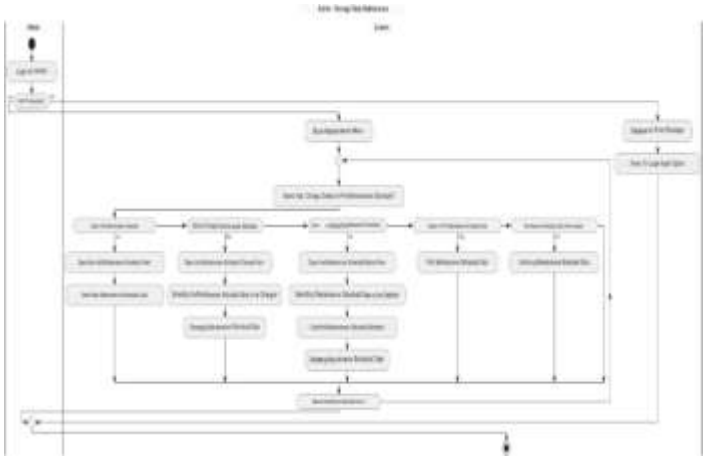

Figure 3. Activity Diagram of the Maintenance Process.

## Class Diagram

The Class Diagram depicts the structure of the system, defining the attributes, methods, and relationships among system classes. It supports the object-oriented design of the transportation management application.

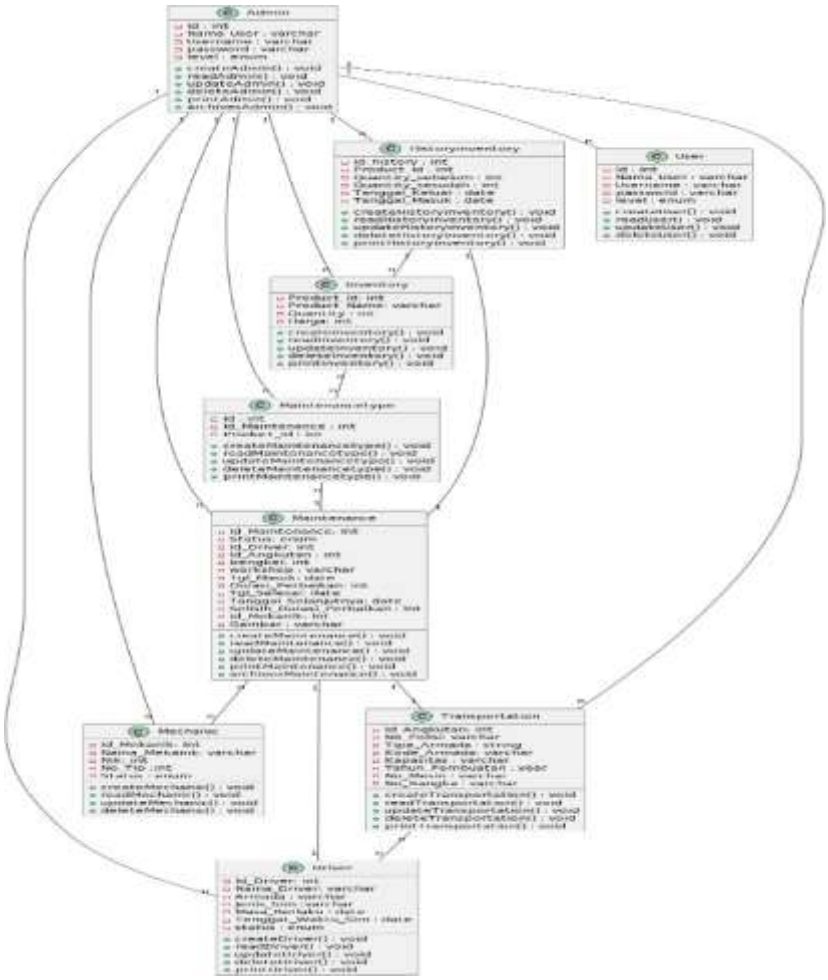

Figure 4. Class Diagram of the Transportation Management System.

## Results

The developed web-based transportation management system provides an integrated platform for managing vehicle operations, maintenance scheduling, and data reporting at PT Pos Logistik Indonesia. The system was developed and implemented using the Waterfall model, ensuring that all requirements were analyzed and verified before deployment. Key results include the following:

1. The system automates vehicle maintenance scheduling and record-keeping, significantly improving operational efficiency.

2. The use of centralized data storage facilitates real-time access to maintenance records and vehicle information.
3. The UML-based design ensures system modularity, allowing for future scalability and integration with other logistics management modules.

Furthermore, the system enhances data accuracy and reduces redundancy, thereby improving coordination between the operational and administrative divisions of PT Pos Logistik Indonesia.

## Discussion

The implementation of a web-based transportation management information system has produced substantial operational improvements. The integration of vehicle maintenance, spare part inventory, and personnel management in one digital platform promotes efficiency, transparency, and data accuracy.

The study demonstrates that the system aligns with the company's digital transformation goals, emphasizing automation and data-driven decision-making. By leveraging web-based architecture, users can access data remotely and in real time, improving coordination between departments. The digital system also reduces reliance on manual Excel files, which often cause data inconsistencies and limit analytical capabilities (Marlindawati & Maza, 2022).

The system contributes to cost reduction and enhanced safety performance. The automatic scheduling of vehicle maintenance minimizes downtime and prevents mechanical failures that may compromise safety. In addition, historical data analytics allow management to identify maintenance trends and anticipate future resource needs.

Despite these advantages, the transition to a digital platform requires proper user adaptation and training. The study also highlights the importance of network reliability and data security as critical factors for sustaining system performance. These findings are consistent with prior research emphasizing the significance of digital resilience in logistics systems (Dintén, García, & Zorrilla, 2022).

## Conclusion and Recommendations

The results of this study confirm that the implementation of a web-based transportation management system at PT Pos Logistik Indonesia effectively supports digital transformation initiatives within the logistics sector. The system enhances operational performance by improving efficiency, reducing costs, and ensuring timely maintenance management.

This transformation contributes to the company's strategic objectives by fostering a data-driven culture and aligning operational practices with Industry 4.0 principles. While challenges such as user readiness and infrastructure limitations remain, the digitalization of transportation management provides a robust foundation for continuous improvement and sustainable growth.

Future research should explore the integration of cloud-based technologies and Internet of Things (IoT) solutions to further enhance real-time fleet tracking and predictive maintenance capabilities

## Disclosure Statement

The author declares no conflict of interest concerning the research, authorship, or publication of this article.

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## Biographical Notes

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