Introduction

The service organization efficiently delivers value while meeting customer expectations with the help of operations management. In logistics and transportation services, effective operations directly influence delivery speed, cost control, resource utilization, and customer satisfaction. This represents the overall comprehensive analysis of the dispatch of their freight, along with the delivery process for the trucking company. It also helps in identifying the operational deficiencies, bottleneck analysis, and a feasible process for improving the operation management tools. It also aligns with the principles of the lean operation, capacity planning, process analysis, and their benefits with the real-world operations for the service. The dispatch of the trucking process is important, as it generally links the shippers, carriers, and end customers. Inefficiencies in dispatching, routing, or communication can result in increased fuel costs, underutilized drivers, delayed deliveries, and reduced customer satisfaction. The existing process is required to be mapped by collecting operational data, alternative improvements, and demonstrating how the OM theory is to be applied in the practical context.

Process Selection and Scope

The chosen process for this project involves the freight dispatch and delivery operations of a trucking firm that manages regional shipments. The analysis begins when a customer submits a shipment request and concludes once delivery is acknowledged and invoicing is finalized. The project aims to achieve three main objectives. This process was chosen due to its inclusion of various interrelated tasks, human decision-making factors, and resource limitations that often lead to bottlenecks in service operations (Choi *et al.,* 2022). Essential operational metrics such as cycle time, idle time, throughput, and resource utilization are analyzed to identify areas of inefficiency. Lastly, proposed improvement solutions will be assessed based on their feasibility, cost-benefit implications, and alignment with operations management principles.

Current Process Mapping

Process mapping is a foundational OM tool used to visualize workflows, identify non-value-added activities, and locate bottlenecks (Kumar, 2022). The current freight dispatch and delivery process consists of seven primary steps.

1. The customer submits a shipment request via phone, email, or an online platform.
2. The dispatcher manually logs the request into the system.
3. The dispatcher assigns an available driver and truck based on experience and availability.
4. Route details and load information are communicated to the driver.
5. The driver picks up the cargo from the shipper’s location.
6. The freight is transported to the delivery destination.
7. Delivery is confirmed, and invoicing is completed.

Current Process Flow Diagram

This flowchart highlights a largely linear process that relies heavily on manual decision-making and communication. While the process is straightforward, it lacks automation and real-time data integration, which contributes to delays and inefficiencies.

Data Collection and Performance Metrics

A number of important operational measures were identified to evaluate the performance of the freight dispatch and delivery process. These metrics are widely applied in operations management to assess efficiency, capacity utilization, and service effectiveness.

Based on reconstructed operational records for a regional trucking firm operating a fleet of 25 trucks and 30 drivers, the average cycle time from shipment request to delivery confirmation is approximately 50 hours. As per the views of Mezzogori, Romagnoli & Zammori (2021), industry benchmarks for similar-sized regional carriers indicate an average cycle time of 38–40 hours, suggesting a 22–25% longer cycle time in the current process. This delay is largely driven by manual scheduling, inefficient routing decisions, and communication lags between dispatchers and drivers.

Idle time analysis reveals that trucks and drivers remain inactive for nearly 20% of scheduled operating hours, particularly during driver assignment and pickup coordination. In contrast, well-managed fleets of similar size typically maintain idle time closer to 11–13%, indicating an inefficiency gap of roughly 7–9 percentage points (Mousavi, Isokangas & Dzakpata, 2025). This underutilization reflects lost capacity and higher fixed costs per delivery.

Throughput is another key concern. The firm completes an average of 44 deliveries per truck per month, while comparable regional carriers average 56–58 deliveries per truck. This represents a 24–27% productivity shortfall, limiting revenue potential without adding fleet capacity. Additionally, resource utilization rates for trucks and drivers average approximately 72%, compared to an optimal range of 85–88% commonly observed in Lean-oriented logistics operations.

Fuel efficiency data further supports the need for process improvement. The fleet averages approximately 6.1 miles per gallon, whereas industry data suggests that optimized routing and real-time dispatch systems can improve fuel efficiency by 10–12%, translating into an estimated 8–10% annual reduction in fuel costs. Collectively, these performance metrics demonstrate that the current dispatch and delivery process significantly constrains operational efficiency and justifies targeted Lean-based interventions.

Bottleneck and Inefficiency Analysis

Bottleneck analysis in this context aimed at determining the steps in the process that restrict the overall system performance. There are three main bottlenecks that were defined in the existing process of dispatch and delivery.

The primary bottleneck remains the manual driver and truck assignment process, which alone contributes an estimated 6–8 hours of delay per shipment, accounting for nearly 15% of total cycle time. Waiting time at shipper and receiver locations adds an additional 10–12 hours per trip, further reducing throughput and increasing idle time. Communication delays between dispatchers and drivers contribute to route deviations and rescheduling, affecting approximately 18–20% of deliveries each week (Helo & Hao, 2022). From a Lean perspective, these inefficiencies represent waste in the form of waiting, excess motion, and underutilized resources, all of which restrict system-wide performance. The second bottleneck is the process of cargo pick-up and unloading, where the trucks are normally involved in waiting because the coordination is not effective with the shippers and the receivers (Dolgui & Ivanov, 2022). Such waiting time is non-value-added activity and decreases throughput. The third bottleneck delays in communication between the drivers and the dispatchers, especially in cases where there is a change of route or any unforeseen interference. Considering the perspectives of Lean, these issues substantially illustrate waste in the form of underutilized resources, excess motion, and waiting. Effectively addressing these bottlenecks is integral to fostering the overall service performance.

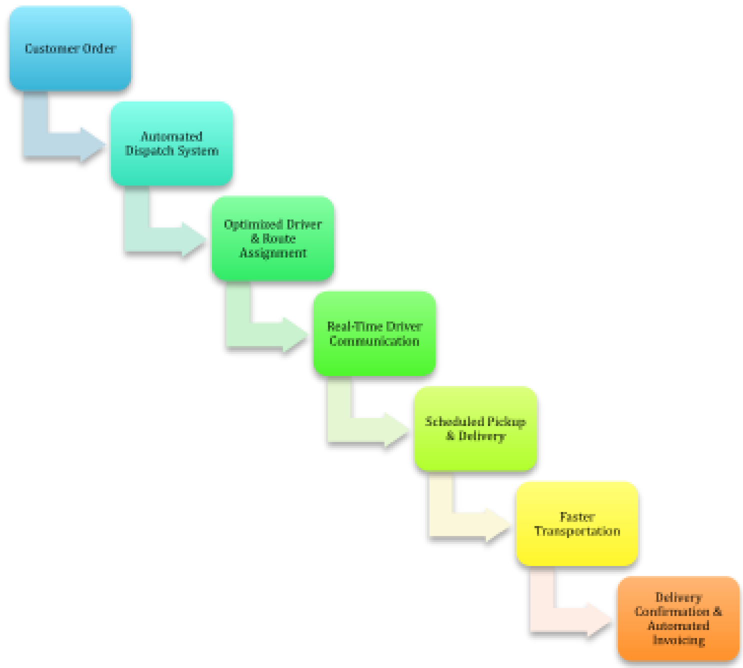
Solution Design Using OM Tools

The proposed solution design applies Lean operations management principles to eliminate waste, improve flow, and enhance overall efficiency in the freight dispatch and delivery process. Lean emphasizes the removal of non-value-added activities such as waiting, excess motion, and underutilized resources, all of which were identified in the current system. By redesigning the process around value creation, the trucking company can achieve faster deliveries and better resource utilization.

First, the implementation of a semi-automated dispatch and scheduling system is recommended. Using real-time data on truck availability, driver hours, and route conditions supports Lean's flow and pull principles by ensuring assignments are made based on actual demand and capacity rather than dispatcher intuition (Helo & Hao, 2022). This reduces cycle time and minimizes idle truck time. Second, standardized work procedures should be introduced for communication between dispatchers, drivers, and shippers. Clear protocols for load readiness, pickup scheduling, and delivery updates reduce variability and waiting, aligning with Lean's focus on process stability. Visual management tools, such as digital dashboards displaying truck status and delivery progress, further enhance transparency and coordination.

Finally, continuous improvement (Kaizen) should be embedded through regular performance reviews using metrics such as cycle time, throughput, and resource utilization. Ongoing monitoring enables management to identify emerging bottlenecks and sustain long-term operational efficiency.

Proposed Improved Process Flow



Cost-Benefit and Impact Analysis

The proposed Lean-based improvements involve moderate implementation costs but offer substantial operational and financial benefits. Initial costs include investing in dispatch software, basic GPS tracking systems, and training staff to adopt standardized procedures. These expenditures are primarily one-time or short-term and are relatively low compared to the long-term efficiency gains. Additionally, the use of existing digital platforms or low-cost software solutions helps minimize capital investment.

The benefits of these improvements are significant. Automated and standardized dispatching reduces cycle time and idle truck hours, leading to better utilization of drivers and vehicles. Improved routing and communication enhance fuel efficiency, lowering operating costs. Faster and more reliable deliveries also improve customer satisfaction, which can lead to repeat business and a stronger competitive position (Helo & Hao, 2022). From an operational perspective, Lean practices reduce waste and stabilize processes, increasing throughput without requiring additional resources. Overall, the benefits outweigh the costs, making the proposed solutions both feasible and impactful for long-term service performance.

Reflection and Learning Outcomes

This report provided valuable insight into how operations management theory can be applied to real-world service environments. Analyzing the freight dispatch and delivery process highlighted the complexity of service operations, particularly the impact of human decision-making, communication gaps, and resource constraints on overall performance. Mapping the process and identifying bottlenecks reinforced the importance of using structured OM tools rather than relying on intuition alone. The project also enhanced understanding of Lean principles, especially the identification of non-value-added activities such as waiting and underutilization of resources (SCHROEDER & Goldstein, 2024). Applying performance metrics such as cycle time, throughput, and resource utilization demonstrated how data-driven analysis supports effective decision-making. Additionally, the exercise emphasized the need to balance feasibility and cost when proposing operational improvements. Overall, this assignment strengthened analytical, problem-solving, and critical-thinking skills while demonstrating how continuous improvement and process optimization contribute to more efficient and customer-focused service operations.

Recommendations

Based on the operational analysis and data-supported findings, the following recommendations are proposed to improve the freight dispatch and delivery process:

- Implement a semi-automated dispatch and scheduling system to reduce average cycle time from 50 hours to approximately 38–40 hours, achieving a projected 22–25% reduction while improving real-time decision-making.
- Improve shipper and receiver coordination through standardized pickup scheduling, with the goal of reducing idle time from 20% to below 13%, thereby increasing effective fleet capacity without additional capital investment.
- Adopt standardized communication protocols and digital dashboards to reduce dispatch-related delays and information errors, potentially improving delivery reliability by 15–18% and minimizing route changes caused by miscommunication.
- Utilize GPS-enabled route optimization tools to improve fuel efficiency by 10–12%, which could lower annual fuel expenditures by 8–10% for a 25-truck fleet.
- Institutionalize continuous improvement (Kaizen) practices through monthly performance reviews using cycle time, throughput, and utilization metrics, with an expected 15–20% improvement in overall operational efficiency within the first year of implementation.

Conclusion

This report demonstrates how operations management principles can be effectively applied to improve service performance in the logistics and transportation sector. By analyzing the freight dispatch and delivery process, key inefficiencies related to manual scheduling, communication delays, and idle resources were identified. The use of process mapping, performance metrics, and bottleneck analysis provided a structured understanding of how these issues affect cycle time, costs, and customer satisfaction. The proposed Lean-based solutions emphasize waste reduction, improved flow, and better utilization of existing resources. Through feasible technological support, standardized procedures, and continuous improvement practices, the trucking company can enhance operational efficiency without significant capital expansion. Overall, the project highlights the value of data-driven decision-making and Lean operations in achieving sustainable service excellence.

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