



Extended Abstract

Improving Laundry Service Networks: A Simulation–Optimization Framework Applied to an Industrial Laundry

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This ongoing research examines the improvement of logistics operations for a Belgian laundry service company that manages both the execution of laundry services and the associated transportation flows. More specifically, it is responsible for the pickup of dirty laundry from customers and the delivery of clean laundry to individuals.

One of the primary objectives of this study is to extend the classical mathematical model for the vehicle routing problem with simultaneous pickup and delivery by incorporating operational constraints specific to the laundry sector. One of the main challenges of the research lies in effectively coordinating the distribution of laundry items with the corresponding washing production processes. Accordingly, beyond distribution considerations, the model seeks to incorporate production constraints, thereby offering a more comprehensive representation of the integrated production–distribution system.

The study employs a three-phase methodology integrating optimization and simulation techniques. The first phase analyzes demand patterns and operational processes, mapping logistics flows from collection points to production centers. The second phase develops a distribution model by further incorporating production capacities. This constitutes the core methodological contribution of the study. In the final phase, simulation models are used to evaluate system performance under varying demand and unexpected event scenarios, assessing machine utilization, delivery lead times, and vehicle load factors, while identifying potential bottlenecks for further improvement.