

Cross docking operations: a simulation model for the validation and robustness assessment of IP-based truck schedules

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In cross-docking facilities, goods are unloaded from incoming trucks, sorted, and reloaded within 24 hours onto outbound trucks based on their destination. In an earlier work [1], we proposed an IP-based model for truck scheduling that is based on dock reservation and storage policies. The resulting schedule both maximizes the transportation providers' satisfaction and minimizes the number of items temporarily stored.

While IP models cannot consider many detailed operational aspects of the cross-docking facility, discrete-event simulation models can represent systems closer to real-life situations. Therefore, in this research, we use a simulation model to assess the performance and robustness of the IP model and its resulting schedule. In the validation phase, we check that the assumptions made for the IP model are not too restrictive by determining their validity range. In a second phase, stochastic events are introduced in the simulation model to assess the robustness of an IP-generated schedule. As such, we address such questions as, does the proposed schedule still perform well (with minor modifications) when a truck arrives late, or if the content of a truck is different than expected?

The insights gathered will be used to refine the IP model formulation to increase its robustness.

References

[1] Anne-Laure Ladier and Gülgün Alpan. Scheduling truck arrivals and departures in a cross dock: earliness, tardiness and storage policies. In *International Conference on Industrial Engineering and Systems Management*, 2013. To appear.