



Research School for Operations
Management and Logistics

Synchromodal Freight Transportation Planning

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Over the last decade, the logistics industry has experienced a change towards the use of fourth party logistics (4PL). In this change, a main contract party (i.e., the 4PL) integrates and coordinates all services and providers needed to meet the customer's logistical requirements. The difficulties posed by this integration (e.g., information control, cost reduction, coordination reliability) have driven 4PLs to develop new solution concepts such as synchromodal transportation. This concept involves combining and synchronizing different services not only among logistics service providers (LSPs), but also among a range of transportation modalities. In contrast to intermodal transportation, the choice of modality in synchromodal transportation is not fixed up front. Instead, a plan is made for each order at any given time, and taking into account operational circumstances.

Our research project deals with planning and re-planning decisions of synchromodal freight transportation. These decisions are made dynamically for each order, based on order characteristics and real-time transport-network characteristics. We investigate how and to what extent operations research techniques can support the human-planner in issues such as: (i) timing restrictions (e.g., time-windows for pickup and delivery, time-tables for LSPs), (ii) consolidation opportunities (e.g., LTL freights of different shippers into a single container, FTL freights into a single barge or train), (iii) multi-criteria decisions (e.g., costs, duration, reliability, lateness, CO2 emissions), and (iv) use of historic and real-time information (e.g., congestion trends, disruption re-planning). Finally, we study how simulation and serious gaming can reduce the resistance of customers and LSPs towards synchromodality.