

Abstract

The quality and accessibility of the port of Rotterdam and its hinterland are becoming a crucial factor for ensuring a competitive position. An important condition for a accessible hinterland is a well coordinated hinterland transport chain. The current organizational and operational structure of container transport in the hinterland of the port of Rotterdam is widely decentralized, with little cooperation between different actors (see Section 2.1). Section 2.2 analyzes the coordination problems that currently are playing a role in the hinterland of the port of Rotterdam. These concern problems like insufficient (terminal) planning, reduced load factors, infrastructure congestion and peak load, and insufficient information exchange of container data. The goal of this report is to give an overview of alternative organization structures that exist in similar sectors in which cooperation and communication can be envisioned for the port of Rotterdam and the hinterland network in order to solve the coordination problems. Chapter 3 describes five different coordination arrangements that are used in health care, aviation (2 arrangements), energy sector, and in the electronic commerce sector.

The first arrangement that is analyzed in this report, is the *SURGical Patient Safety System (SURPASS)* which is used in health care. SURPASS, described in Section 3.2, is a multidisciplinary checklist used in hospitals, that accompanies the patient in the whole process of a surgery. It incorporates all existing protocols and checks in order to provide a comprehensive framework for the surgical pathway, minimize information loss during transfers from one stage of the pathway to the next, and promote interdisciplinary communication. Research showed that SURPASS reduced the number of complications and the in-hospital mortality.

A possible implementation for the hinterland of the port of Rotterdam (PoR) is a central system that incorporates all existing communication protocols to promote interdisciplinary communication. The SURPASS concept enables a better and faster information exchange which enhances a more accurate and up-to-date planning.

The second arrangement in this report is the *code-share agreement* which originates from commercial aviation. A code-share agreement, also referred to as code-sharing, is an arrangement where two or more airlines share the same flight (Section 3.3). Code-sharing is the key feature of an airline alliance. Literature shows that these alliances increase partners' productivity, profitability, traffic routing, service quality, and alliances can also lead to a decrease of carriers' ticket prices. A possible implementation of this arrangement for the PoR hinterland is to bundle transport operators in major alliances in order to exploit the above-mentioned benefits.

The third coordination arrangement is the *hub-and-spoke (H&S) model* which is used in various communication (internet, telephone etc.) and transportation networks including the aviation industry. The H&S model, described in Section 3.4, is a network of connections arranged like a wheel with spokes and all traffic flows through the spokes connected to the hub. H&S networks require a concentration of traffic in both space and time. Hub-and-spoke models result in higher traffic densities on spokes and these models also reduce both fares and marginal cost of carrying extra passengers. The model also enables more frequent flights and flights to destinations that would not be commercially viable before.

A potential implementation for the port of Rotterdam hinterland network is to directly transship every container that arrives to strategically choses inland terminals. This will lead to an increase in load factor and a reduction in infrastructure congestion.

The fourth coordination arrangement is the *smart grid* (Section 3.5), an umbrella term for the modernization of the electric infrastructure. It allows real-time information about service parameters of the source which enables an autonomous optimization process. The shift from a manual to an automated balancing system enables a high penetration of distributed resources while maintaining the reliability and stability of the original power grid. The smart grid is expected to emerge as a well-planned plug-and-play integration of microgrids; clusters of sources and loads that can both function grid-tied as well as in island mode.

A potential implementation idea of the smart microgrid is to dynamically bundle shippers and potential transport operators in imaginary clusters that match in origin/destination and time. Then

an optimization agent autonomously considers all possible scenarios, varying from consolidating containers to rescheduling low priority transport jobs and it will then assign transport jobs of shippers to transport companies.

The fifth and last coordination arrangement described in this report, is the *electronic marketplace (EM)* which is important mechanism in the electronic commerce (e-commerce). The EM, described in Section 3.6, is an inter-organizational information system that allows the participating buyers and sellers to exchange information about prices and product offerings. EMs typically reduce the search costs of buyers and it promotes price competition and reduces the market power of sellers. Two potential concepts are derived from electronic marketplaces: 'sharecapacity.com' and 'shipcontainers.com'. Sharecapacity.com enables transport companies to easily use each others transport capacity without the use of alliances/contractual agreements. Shipcontainers.com enables shippers to book container hinterland transport in the same way as booking a flight ticket. Shipcontainers.com allows the user to compare prices and choose one of the itinerary that the website proposes. Shipcontainers.com reduces the search cost of shippers and it takes over the role of forwarder.

It is also possible to combine concepts to create more effective coordination arrangements. Shipcontainers.com would for example be an effective addition to code-sharing alliances, because it would enhance customer acquisition and service (Chapter 4). Completely restructuring the entire organization and operation of the port of Rotterdam and its hinterland towards an integrated approach in which cooperation and communication are central, will be a massive task that cannot be executed overnight. Implementing aspects of the described coordination arrangements will contribute to an improved accessibility of the Port of Rotterdam and its hinterland, both in volume as well as quality (Chapter 5).