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# Managing the Flow of Containers in a Multimodal Network

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## Abstract

Due to the project of the Seine axis and its national importance, the ports of Paris and grand maritime ports of Rouen and Le Havre met since 2009 in the Economic Interest Group HAROPA. To avoid saturation of roads, the development of new river and rail services within the Havre port becomes imperative. We are interested in organizing an extensive harbor at the operational level. Deciding the mode of transport which is going to be used and the quantities stored and transiting multimodal hubs become a first class operational problem. We propose a mathematical model taking into account the different aspects of the issue. The objective of the problem is to minimize the overall cost of transportation in compliance different specificities related to the transport and storage containers. Several constraints should be considered. First, we need to meet the demand between the sites. For each demand, we have to respect a time window for care and a time window for delivery. Traffic may be restricted or even stopped on some routes in specific time slots. In addition, for inland waterway and rail transport, the transport capacity is limited. Also, in the level of multimodal platforms, we have a storage capacity and limited productivity. We also consider additional constraints due to the incompatibility between goods (hazardous-food, chemicals-explosives, etc.). We do not encounter this problem in this form in the literature. A method based on this formulation permits to solve realistic instances.

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