

## Optimizing the Location of Parking Areas Adapted for Dangerous Goods in the European Road Transport Network

**Authors :** María Dolores Caro, Eugenio M. Fedriani, Ángel F. Tenorio

**Abstract :** The transportation of dangerous goods by lorries throughout Europe must be done by using the roads conforming the European Road Transport Network. In this network, there are several parking areas where lorry drivers can park to rest according to the regulations. According to the "European Agreement concerning the International Carriage of Dangerous Goods by Road", parking areas where lorries transporting dangerous goods can park to rest, must follow several security stipulations to keep safe the rest of road users. At this respect, these lorries must be parked in adapted areas with strict and permanent surveillance measures. Moreover, drivers must satisfy several restrictions about resting and driving time. Under these facts, one may expect that there exist enough parking areas for the transport of this type of goods in order to obey the regulations prescribed by the European Union and its member countries. However, the already-existing parking areas are not sufficient to cover all the stops required by drivers transporting dangerous goods. Our main goal is, starting from the already-existing parking areas and the loading-and-unloading location, to provide an optimal answer to the following question: how many additional parking areas must be built and where must they be located to assure that lorry drivers can transport dangerous goods following all the stipulations about security and safety for their stops? The sense of the word "optimal" is due to the fact that we give a global solution for the location of parking areas throughout the whole European Road Transport Network, adjusting the number of additional areas to be as lower as possible. To do so, we have modeled the problem using graph theory since we are working with a road network. As nodes, we have considered the locations of each already-existing parking area, each loading-and-unloading area each road bifurcation. Each road connecting two nodes is considered as an edge in the graph whose weight corresponds to the distance between both nodes in the edge. By applying a new efficient algorithm, we have found the additional nodes for the network representing the new parking areas adapted for dangerous goods, under the fact that the distance between two parking areas must be less than or equal to 400 km.

**Keywords :** trans-european transport network, dangerous goods, parking areas, graph-based modeling

**Conference Title :** ICDSM 2015 : International Conference on Decision Sciences and Management

**Conference Location :** Istanbul, Türkiye

**Conference Dates :** April 21-22, 2015