

A Risk Adverse Model for Hazardous Material Transportation

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Abstract

Risks associated with the transportation of hazardous materials (hazmats) and the location of hazmat facilities, are sometimes overlooked due in part to the small probability that an accident occurs during shipment. But when considering the catastrophic effects of an accidental release of a hazmat (nuclear fuel, radioactive materials, gasoline, toxic gases, medical waste, flammable materials, among others), appropriate locations and routing planning for reliable shipping are greatly desirable, instead of models that favor closeness or speed. This work considers a single facility location and routing model for minimizing the expected number of hazardous material transport accidents. A risk adverse approach is used where users are concerned with the capability to establish safe routes to some service provider. The objective function minimizes the maximum expected number of hazmat accidents with respect to all nodes over a planning horizon. A polynomial time algorithm is presented that finds the expected number of accidents from demand nodes to service facilities using the r -shortest paths policy. An efficient algorithm is proposed that solves the problem when it is applied on general networks.

Keywords

Hazmats Logistics, Network Reliability, Reliable 1-center, Location Theory

Biography

José A. Santiváñez is an Associate Professor in the Department of Industrial and Management Engineering at Universidad del Turabo, Puerto Rico, USA. He earned a B.S. in Industrial Engineering from Khulna Pontificia Universidad Católica del Perú, Perú, MS in Operations Research and PhD in Industrial Engineering both from Northeastern University, Boston, MA. His research interests include logistics and supply chain risk assessment and management, critical transportation infrastructure resiliency, hazardous materials transportation, network centric warfare, locational theory, and social network. His areas of expertise include operations research, service systems, stochastic modeling, and quantitative and statistical analysis. He is member of IIE and INFORMS.