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Reducing risks in the transport of hazardous materials

One of the principal objectives in the transport of cargo is to reduce costs. However, certain types of shipments require the consideration of an additional element: minimizing risk. This applies to the transport of hazardous materials, which include flammable, corrosive, explosive, or poisonous products that are dangerous for people and the environment.

"The degree of danger depends on the size and population density of a city, a city's level of industrialization, and the material being transported," explains Andrés Bronfman, investigator at Center of Logistics and Transport of the Faculty of Engineering, Universidad Andrés Bello.

Although exposure is inevitable in urban areas, much of the population can be quickly evacuated during an emergency. However, this is not the case with vulnerable subpopulations, or those in which a large amount of people are concentrated in small areas, such as in buildings, or when evacuation is difficult, such as with hospitals, nursing homes, and schools. "It is reasonable to give special attention to these points when designing routes for this type of transport," emphasizes Bronfman.

This is the objective of the project entitled "The transport of hazardous materials in urban areas," which aims to establish methodologies for decreasing the situations of uncertainty faced by the most vulnerable populations.

The research team, which includes Universidad Andrés Bello investigators Armin Lüer and Germán Paredes as well as Dr. Vladimir Marianov of the Pontificia Universidad Católica de Chile, has developed new risk estimators and determined how these can be applied in the design of transport routes in the Metropolitan Region. "These estimators prevent the sub- or overestimation of danger, better represent public interests in route designs, and facilitate the search for a balance between these two elements," details Bronfman.

Notably, the project developed manageable formulas and algorithms for large-scale problems. Now, the difficulties of transporting hazardous materials between distinct points can be resolved in mere seconds, thus decreasing the risk of exposure for those schools with more than a thousand students in the Metropolitan Region.