

Conceptual proposal for the use of data for risk assessment and decision-making support in the transport of dangerous goods by road

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INTRODUCTION

Background information

The transportation of dangerous goods is a routine component of road freight in countries with advanced industrial production. The release of dangerous goods during transit can result in extensive environmental damage and significant threats to human life and health. The adverse impacts of such incidents are determined by the physical and chemical properties of the dangerous goods, while the scale of the accident and its consequences are further influenced by various site-specific factors.

Problem Statement

A comprehensive risk assessment is essential for the preparation and planning of measures in the event of hazardous substance releases during road transport. By identifying potential consequences, timely and appropriate decisions can also be made during the response phase. In the Slovak Republic, the key document Territorial Analysis in Terms of Potential Emergency Events currently lacks the necessary information. The required outputs can be achieved through software tools and geographic information systems. However, it is first necessary to identify and categorize the key variables that serve as input data for the risk assessment process.

Objectives

The aim of this paper is to propose a conceptual model of a system for the use of data for risk assessment and decision support in the field of road transport of dangerous goods.

Conceptual proposal for the use of data in the process of risk assessment and decision support for crisis managers in the transport of dangerous goods by road

INPUT VARIABLES IN THE RISK ASSESSMENT FOR THE TRANSPORT OF DANGEROUS GOODS

Categories	Meteorological data	Data on dangerous goods	Territorial and population data	Road network data	Historical data
Variables	- wind speed - wind direction - vertical air stability - air temperature - altitude of meteorological measurements - the nature of the weather	- name of the goods - UN code - Kemler code - ADR class - Hazard Statements code - amount of goods - the purchaser of the dangerous goods - the provider of the dangerous goods	- number of inhabitants - layer of objects - a layer of water sources, streams or areas - layer of protected landscapes/national parks	- road network layer - division of roads - road restrictions - road congestion	- accidents time data - the name of the leaked goods - the amount of leaked goods - location of the accident - number of persons affected - affected: water source, stream, other area
Use	Software tools for calculating hazardous goods spills		Geographical information systems - determination of transport routes for dangerous goods. Determination of exposure and effects on the population and the environment.		Software tools for calculating hazardous goods spills (prevention), determining the frequency of incidents and their consequences for risk assessment, case studies.

CONCLUSION & IMPLEMENTATION PATH

The model is divided into two parts, with the second part focusing on the use of data depending on the circumstances of the crisis event.

Under normal circumstances, historical data is primarily used to identify vulnerabilities, risk analysis and develop different scenarios for hazardous substance releases. The results of the analyses carried out and the scenarios developed serve as a basis for crisis planning. In the conditions of the Slovak Republic, these are mainly plans for the protection of the population of municipalities.

The second part of the data use model assumes that an incident has occurred. Here the emphasis is on the need for real-time data, as crisis managers need the most up-to-date and accurate data when making decisions. This includes data relating to the meteorological situation, the location of the incident and the type of hazardous substance being transported.

The key steps to implement a comprehensive data-driven system for assessing the risks of transporting dangerous goods are:

- Data integration and data management → Database creation
- Establishment of a methodological procedure for the risk analysis of the transport of dangerous goods
- Use of GIS and software tools

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