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An Integrated Approach for Risk Management of Transportation of HAZMAT: Use of Quality Function Deployment and Risk Assessment

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Abstract : Transportation of hazardous materials (HAZMAT) is inevitable in the process industries. The statistics show a significant number of accidents has occurred during the transportation of HAZMAT. This makes risk management of HAZMAT transportation an important topic. The tree-based methods including fault-trees, event-trees and cause-consequence analysis, and Bayesian network, have been applied to risk management of HAZMAT transportation. However, there is limited work on the development of a systematic approach. The existing approaches fail to build up the linkages between the regulatory requirements and the safety measures development. The analysis of historical data from the past accidents' report databases would limit our focus on the specific incidents and their specific causes. Thus, we may overlook some essential elements in risk management, including regulatory compliance, field expert opinions, and suggestions. A systematic approach is needed to translate the regulatory requirements of HAZMAT transportation into specified safety measures (both technical and administrative) to support the risk management process. This study aims to first adapt the House of Quality (HoQ) to House of Safety (HoS) and proposes a new approach- Safety Function Deployment (SFD). The results of SFD will be used in a multi-criteria decision-support system to develop find an optimal route for HazMats transportation. The proposed approach will be demonstrated through a hypothetical transportation case in Kazakhstan.

Keywords : hazardous materials, risk assessment, risk management, quality function deployment
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