Title

A Decision Tree Model for Evaluating Countermeasures to Secure Cargo at United States Southwestern Ports of Entry

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Abstract

This paper presents a decision tree model for evaluating countermeasures to reduce vulnerabilities to terrorism in commercial truck crossings at United States southwestern land ports of entry. The model includes critical events in four phases of cargo movement: cargo transfer in Mexico, Mexican customs, U.S. customs, and the inland phase. Improvements in transportation security, inspections at Mexican ports, and at U.S. ports, are comparatively evaluated using parameterized variables. Costs and benefits of such improvements are analyzed to counter a radiological dispersion device (also known as a "dirty bomb") attack. The results suggest that security decisions depend primarily on the probability of attack and parameters that influence the overall cost of false alarms. Extensive exploratory analysis reveals that improving security at Mexican ports is not recommended, mainly due to the cost of false alarms. However, a high percentage and a high cost of false alarms may justify new radiation portal monitors at U.S. ports even when improvements in the capability to detect dangerous cargo are insignificant. Better transportation security is not recommended if the probability of attack is less than 0.15. When the probability of attack exceeds 0.15 and false-alarm related costs are high, the model recommends enhancing transportation security. In addition, the parameters modeling economic consequences of an attack in a populated area, the probability of discovering weapons after smuggling into the United States, the probability of detonation, as well as the probability of detection at U.S. ports of entry, have significant impact on the countermeasure decision.

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