

How many containers to inspect to deter terrorist attacks

Naraphorn Haphuriwat, Vicki M. Bier

University of Wisconsin-Madison, Department of Industrial and Systems Engineering

This poster will present a model for identifying the optimal number of containers to inspect in order to minimize the defender's expected loss, using game theory to reflect the fact that attackers are simultaneously trying to maximize their expected rewards. The research is based on the hypothesis that disclosing the number of containers to be inspected might deter terrorist attacks (if that number is sufficiently high). In the model, we consider multiple types of attackers; each deciding whether to smuggle a particular type of weapon into the U.S. Results show that with a sufficiently high detection probability (and a sufficiently high smuggling cost to the attacker), attackers can be deterred with less than one hundred percent inspection. This suggests that it will be more feasible to deter high-cost attack strategies (such as smuggling in a nuclear weapon) than low-cost attack strategies (such as dirty bombs or surface-to-air missiles), since the cost of obtaining a nuclear weapon is likely to be much greater. If deterrence cannot be obtained with less than one hundred percent inspection, then the optimal strategy is for the defender to inspect either all containers (if the inspection cost is sufficiently small), or no containers. In general, if some intermediate level of inspection is optimal, then the defender will generally want to inspect just enough containers to deter (some subset of) the attackers. We are currently working on an extended model that takes into account the possibility of retaliation by defenders, as another form of deterrence. We hypothesize that the option of retaliating against a successful attack will reduce the number of containers that the defender must inspect in order to deter terrorist attacks.