# ADVANCED PORT RISK MANAGEMENT

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## Abstract

Port is the key node for intermodal transportation that connects ground transportation with 80% of the world's logistics transported by sea. Therefore, effective management of the risks that can affect port is very important in terms of logistics and transportation security. The following four studies are conducted for effective port risk management. First, we propose a vessel route optimization model for effective cargo operations through ports in response to adverse weather events such as hurricane, fog, and high tide. Second, we develop a mathematical optimization model and algorithms for the inspection of subsea pipelines deploying multiple autonomous underwater vehicles. Third, we create collaborative unmanned vehicle operations models and algorithms that can effectively detect, assess, and respond to threats and hazards that can be distributed through ports. Fourth, we suggest search patterns of unmanned vehicles and computer algorithms that can maximize the probability of detection of threats.