OPTIMIZING RESOURCES OF UNITED STATES NAVY FOR HUMANITARIAN OPERATIONS

Aruna Apte, Graduate School of Business and Public Policy, Naval Postgraduate School, 555 Dyer Road, Monterey CA 9394, auapte@nps.edu

The United States Navy (USN) can swiftly respond to disasters due to the unique levels of readiness that are maintained on a constant basis. The maritime strategy outlined in the Cooperative Strategy for 21st Century states that the USN will focus on partnerships with all the key players in the Humanitarian Assistance and Disaster Relief (HADR) to safeguard United States' interests. The substantial contributions made by USN toward HADR are possible due to their many unique and critical capabilities. However, not all the efforts by USN have been as efficient and effective as they could have been. We develop mathematical model to optimize the deployment of USN assets during HADR operations.

There is plenty of evidence that shows the USN's willingness to make available assets in disaster relief efforts. However, in light of budget cuts, the realignment of forces and restructuring of the Services, there is need for research identifying specific naval assets and their utility for conducting humanitarian operations. Therefore, given the significant costs incurred the important research question is whether the USN deploys or diverts the right ships for HADR? The experience off the coast of Bangladesh suggests that, sometimes, it does not.

USN deployed entire Abraham Lincoln Carrier Strike Group (CSG) that included two Fast Attack Submarines (SSN) and two Flight I DDGs for the HADR in 2004 Indian Ocean Tsunami. During the response efforts following Hurricane Katrina, the USN sent nine Minesweepers. In 2007 in order to help the Bangladesh with the category 5 cyclone Sidr USS Hopper (DDG 70) was diverted to help. Based on platform capabilities some of these vessels were far from optimal in providing substantial relief and still were sent with these missions without accounting for their existing capabilities.

Articles have investigated and identified the capabilities of USN vessels deployed to meet the HADR mission requests by studying and analyzing the different platforms of the ship classes their HADR related capabilities to assess the relative utility of each vessel type using ordinally scaled expert ratings. Every ship that was deployed to respond for the 2004 Indian Ocean tsunami, the 2005 Hurricane Katrina, the 2010 Haiti Earthquake and the 2011 earthquake and Tsunami in Japan was reviewed.

We develop an optimization model based on the parameterized rating system for selecting the optimal assets of USN. Such methodology can provide an optimal mix of the ships, the optimal HADR flotilla, that should be sent based on available supply, demand and capabilities through a range of vessels in terms of best configuration for the future force structure.

Our problem posits a potential disaster in littoral environment. The problem uses previous disasters such as 2004 Indian Ocean Tsunami , 2005 Hurricane Katrina , 2010 Haiti Earthquake, and 2011 Japan Earthquake and Tsunami with the corresponding responses provided by USN. State Department of the United States is ultimately responsible for the response to such requests for HADR and has the budget for it. We base our notional costs on such budget and the funding model of the State Department and input from the subject matter experts. Grounded in the available data and analysis of the capabilities of the fleets we develop the optimization model to decide what optimal mix of ships that should be deployed to respond to this potential disaster.

In order to explore how demands affect the optimal mix of the ships, in addition to the notional scenario, we also vary demands maintaining the cost to discover which ships show up in the optimal solution often. We analyze the sensitivity of the model by first changing the relative cost of the ships and then, by changing the demands based on past disasters while keeping the costs constant, to yield a set of optimal solutions. What is important in answering the research question is which vessels show up frequently and which never do in the optimal solutions. This observation guides the formation of the HADR flotilla.