

Project Title: Dynamic Decision Modeling for Inland Waterway Disruptions
Project Abstract (Brief Description): The inland waterway system is a major component of the U.S. transportation system. Disruption on the inland waterway system can have widespread economic and societal impacts, and their consequences can be significant. However, the uncertainty associated with the disruptive events, such as extreme weather conditions, have made it difficult to determine whether it is optimal to stay on the water and wait for the locked traffic to clear, or it is more economical to redirect to rail or freight transportation. In order to facilitate decision making in the event of waterway closure under uncertainty, this research proposes a dynamic multi-criteria decision framework that can be used to find a timely and optimal solution for the greatest overall societal benefits. The potential contribution of this research is threefold: (1) this is the first study to incorporate uncertainty in the decision process when facing inland waterway disruption; (2) it proposes the idea of collaborative planning in the event of disruption when all stakeholders' decision goals are considered simultaneously; and (3) it develops a user-interactive real-time decision support tool that can automate the decision process and propose an optimal solution in a short period of time.
Describe Implementation of Research Outcomes (or why not implemented): Collected and studied lock and dam closure reports, with a focus on unscheduled, weather-related disruptions. Reasons for closure and duration of disruptions were recorded. A Markov Decision Process (MDP) model was developed from the barge owner perspective that considers the uncertainty in the status of the closed or partially closed lock and dam as well as the traffic and safety status of barges remaining on the waterway. The optimal policy from the MDP model determines whether it is more economical to reroute using another mode of transportation or to wait on the waterway.
Impacts/Benefits of Implementation (actual, not anticipated) <i>To be determined upon conclusion of the project:</i>
Web Links: martrec.uark.edu
Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): \$155,218 MarTREC + \$80,947 Salary Release = \$236,165
Project Start and End Dates: 08/01/14-12/31/16
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Principal Investigator Institution (University): University of Arkansas