

Project Title: A Simulation Model for Intermodal Freight Transportation in Louisiana

Principal Investigators:

PI: Peter Kelle, Ph.D., Professor, Ourso Family Distinguished Professor of Business Analysis
Department of Information Systems and Decision Sciences, 3195 Patrick F. Taylor Hall, Baton Rouge, LA 70803
qmcell@lsu.edu, (225) 578-2509

Co-PI: Mingzhou Jin, Ph.D., Associate Professor, Industrial & Systems Engineering
University of Tennessee at Knoxville, 405 East Stadium Hall, Knoxville, TN 37996, jin@utk.edu, (865) 974-9992

Co-PI: Xiaoyan Zhu, Ph.D., Assistant Professor, Industrial & Systems Engineering
University of Tennessee at Knoxville, xzhu5@utk.edu, (865) 974-3905

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Project Summary:

The new Moving Ahead for Progress in the 21st Century Act (MAP-21) asks all state DOTs to evaluate and improve the operation and maintenance of their freight networks. Because of the high complexity and high variability involved in transportation flows, it is technically difficult to use analytical models to evaluate intermodal freight networks and identify improvement areas. Therefore, a simulation model is proposed to include the links and nodes of all three surface modes and the connections between different modes. In the literature and practice, the capacity and volume/speed relationships are only well defined for some infrastructure in a single mode, such as highway links, dams and ports, or rail links. There are no simulation models that incorporate the capacity at intermodal connections and the nonlinear dwelling time vs. volume relationships at connections though most freight flow time is spent at the connection nodes between modes or within modes (e.g., classification yards or ports). Those intermodal connection points are often bottlenecks for the capacity of the overall freight network. The freight transportation network is an integrated system with various impacts on the society. In addition to mobility, the intermodal simulation model should also incorporate other transportation performance metrics such as reliability, safety and security, environmental impact, economic development, etc. The proposed simulation model is expected to incorporate performance metrics that will be identified by an ongoing project of "Development of Performance Measurement for Freight Transportation" funded by the National Center for Intermodal Transportation for Economic Competitiveness (NCITEC) and Louisiana Department of Transportation and Development (LaDOTD). This proposed effort directly responds to the NCITEC's objective of *"to improve intermodal connectivity, enhanced operational integration, capacity enhancement, safety, and reduction of congestion in the nation's transportation system."* The major targeted audience of this research is State DOTs, who are expected to use the simulation model to select freight network improvement measures with best benefit-cost ratios and demonstrate the benefits of investment on freight management. The project also includes educational components for workforce development and a technology dissemination plan to reach broader audience base. The project team includes faculty members from Louisiana State University (LSU) and the University of Tennessee at Knoxville (UTK), who have a long record in intermodal transportation research and necessary modeling and simulation expertise. They have worked on freight transportation on all surface modes and have algorithms and data to support this proposed research. The research is expected to obtain supports from LaDOTD, various transportation research centers at LSU, the Oak Ridge Nation Lab (ORNL), and UTK along with the freight industry.