



RESEARCH PROJECT CAPSULE [14-2SS]

February 2014

TECHNOLOGY TRANSFER PROGRAM

DOTD Support for UTC Project: A Simulation Model for Intermodal Freight Transportation in Louisiana



This project is associated with the Louisiana Transportation Research Center (LTRC) partnership with the National Center for Intermodal Transportation for Economic Competitiveness (NCITEC). The NCITEC is a University Transportation Center housed at Mississippi State University funded by the Research and Innovative Technology Administration (RITA) of the US Department of Transportation (DOT).

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PROBLEM

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 versus 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 were identified by a recently completed project titled "Development of Performance Measurement for Freight Transportation" funded by the NCITEC and the Louisiana Department of Transportation and Development (DOTD).

JUST THE FACTS:

Start Date:
November 1, 2013

Duration:
24 months

End Date:
October 31, 2015

Funding:
SPR: TT-Fed/TT-Reg

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POINTS OF INTEREST:

*Problem Addressed / Objective of
Research / Methodology Used
Implementation Potential*

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OBJECTIVE

The objectives of this proposed project are to:

1. Develop a comprehensive simulation model for an intermodal freight network that considers the dynamics at the connections between transportation modes.
2. Conduct a what-if analysis of the performance of the Louisiana freight network under different scenarios and evaluate the benefits of selected network improvement initiatives.

METHODOLOGY

Tasks to be completed to achieve the project objectives are:

1. Summarization of existing intermodal freight transportation simulation
2. Development of the simulation framework and selection of the simulation platform
3. Development of the simulation model
4. Validation of the simulation model
5. Analysis of various scenarios on the simulation model

IMPLEMENTATION POTENTIAL

Implementation of this research is expected to help DOTD identify the best way to increase freight transportation capacity and improve flow efficiency. In addition, state DOTs will be able to use the simulation model to select freight network improvement measures with the 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 a broader audience base.