



Estimating the Economic Impacts of Disruptions of Movements of Commodities: A Supply Chain Case Study

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Abstract

The Northwest Indiana region, located in the center of the United States, could have great impacts on economic activities related to freight transportation, if a major natural or man-made disaster occurred. More than 13 billion tons of freight, valued at \$11.8 trillion, were transported nearly 3.5 trillion ton-miles in the United States, according to the 2007 U.S. Commodity Flow Survey. About half of the total commodity flows in the U.S. were related to the greater Midwest freight transportation network.

This paper is a section from a research project funded by NEXTRANS, Region V, Regional University Transportation Center, U.S. Department of Transportation. The purpose of this paper is to provide a theoretical framework and a methodology to estimate and analyze the economic impacts of disruptions of movements of commodities due to natural or man-made disasters. Loss and damage caused by unscheduled events, especially natural disasters, have sudden and significant impacts not only on the region's economy where the event occurs but also on other regions. The economic impacts from such an event are analyzed using the estimates of commodity flow data from the major flood of 2008. This recent flood caused major disruptions in freight movements due to many highways closures. Using data from an interregional commodity flow model and the corresponding transportation network flow model, mean travel time of truck shipments, transportation costs, and the dollar value of 43 2-digit Standard Classification of Transported Goods (SCTG) classes were estimated both before and after the flood. Then, a regional input-output model was applied to measure the regional input-output impacts from the change in the values of these commodities among the various industries in the region. Finally, the model was applied to estimate the direct, indirect, and induced economic impacts on the region.

Key words: input-output model, regional economic development, economic impacts, freight transportation, interregional commodity flow

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