

# Providing an Accurate Performance Measure of the Economic Contribution of the Freight Industry: An Input-Output Analysis

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## ABSTRACT

The economic impacts of freight movement on Maryland's economy were estimated by input-output analysis using the 2010 IMPLAN data. This effort was motivated by the absence of defensible performance measures for the economic contribution of freight transportation services. The analysis revealed that the freight industry generates sizable ripple effects. While the trucking sector is the largest by absolute employment size, the spillovers of maritime freight and port services are about seven times their employment size. The impact of government spending is also significant. The study findings and method will help decision-makers understand the role that each freight mode plays to make more informed decisions on transportation investments. The economic indicators used in this study (jobs, income, and gross domestic product (GDP)) can be used to mitigate the negative perceptions of freight movement. While travel time reduction and increased business productivity (used in past studies) are useful performance measures, jobs and income measures are more informative for public discourse.

## KEYWORDS

Economic Impact, Freight Movement, Freight Transportation, Input-Output Analysis, Performance Measurement,

## INTRODUCTION

Freight transportation services enable various economic activities by connecting people, businesses, goods, and resources (Wood & Wang, 2018). Appropriate techniques and policies to manage freight transportation services will benefit the community (Wu & Haasis, 2013). Fluctuations in the economy are closely associated with changes in freight industry trends since the volume of freight movement is often a reliable barometer of short-term variations in the level of trade among regions and nations (U.S. DOT, 2010). Thus, ensuring the seamless movement of freight is critical for the continuing economic growth of a region. Economists frequently studied and monitored the economic impacts

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in order to track the effectiveness of the past investment in transportation infrastructure (National Economic Council and the President's Council of Economic Advisers, 2014), deal with the aftermath of natural disasters (Ivanov & Moore, 2008; Mesa-Arango, 2013), ensure the compliance with rules and regulations, and explore the feasibility of proposed alternatives (Wang et al., 2013). Most studies in freight transportation planning seemed to focus on evaluating the impacts of public investment on the reliability of the freight transportation system (BMW Group, 2007; EDRG & Cambridge Systematics, 2012; Mallett, Jones, Sedor, & Short, 2006; National Cooperative Freight Research Program, 2011). Widely used performance measures in these studies include speeds, travel time reliability, vehicle emissions and crashes involving trucks.

On January 11-12, 2011, a Peer-To-Peer Exchange on Freight Performance Measures, sponsored by the Federal Highway Administration, was convened in Baltimore. "The main objective of the meeting was to identify and discuss issues and needs surrounding performance management systems for freight at the Maryland Department of Transportation (Federal Highway Administration, 2011)." Whereas the Peer Exchange "identified commonly-tracked performance measures" such as travel speeds and delay reduction, questions were raised as to what the freight-specific economic performance measures should be and how they would be measured. The questions came from the notion that traditional measures are hardly freight-specific. Moreover, the general public does not recognize the benefits because of their often-negative perceptions of freight transportation. The authors suggested at the Peer Exchange the development of performance measures that are tangible and visible to the general public, ones that measure the economic impacts of the freight industry in terms of jobs and income rather than the impacts of government actions on the freight industry's competitiveness/productivity. The general public is more interested in jobs and income rather than reliable and efficient freight movement. Highlighting jobs and income as effects of improved freight movement is critical information for public outreach promoting the importance of freight movement, which people used to take for granted. Past studies' definition of the freight industry—e.g., a 2016 study by Federal Highway Administration (Federal Highway Administration, 2016)—was defined too broadly, including non-transportation specific sectors such as manufacturing, wholesale, and retail. Freight movement costs are already accounted for by such sectors' business models, and they are a small fraction of the total business revenue and costs. Such a broad definition of the freight industry resulted in a largely inflated estimate of the industry's economic impact. To the best of the authors' knowledge, no study has clearly measured the contributions of the freight industry, built on a clear and stringent definition of the industry, to the economy of a sub-national level.

This paper provides an objective assessment of the economic contribution of the freight industry to Maryland's economy. The economic contribution was measured as jobs, income, and gross domestic product (GDP) generated directly, indirectly and induced by the freight industry. The freight industry was defined as industry sectors whose primary purposes are to provide freight transportation services and/or support services.

## **LITERATURE REVIEW**

Public investment in transportation brings positive and statistically significant economic benefits (Bhatta & Drennan, 2003). Freight transportation services are capable of important contributions to sustainable development (Havenga & Simpson, 2018). In particular, changes in freight transportation activity generally have similar patterns to the GDP; thus, they are quoted as indicators of economic growth and recovery (Bhatta & Drennan, 2003; BMW Group, 2007; Young & Notis, 2009). This is because the changes in freight shipment imply shifts in demand for raw materials, intermediate input for production, and final products, eventually expanding or contracting economic activity.

The main focus of most studies was to answer the question: What are the impacts/benefits of transportation infrastructure investment in the freight industry? Productivity gains from travel time reduction and economic multipliers of public investment have been commonly used

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