FREIGHT NEWS

Benefit-Cost Analysis of Freight Investments

In 2001, Americans spent over $313 billion on goods and services that were transported over the Nation's highway system.[1] Transportation accounts for a share of the final price of a product, ranging from 1 percent to 14 percent, depending on the commodity and distance moved.[2] Thus, changes in the physical condition and operating characteristics of the highway system can have a major effect on the final price of goods and services.

System performance also influences the business practices of shippers and carriers. Business managers pay close attention to the efficiency of goods movement, inventory, warehouse distribution activities, and other aspects of the supply chain. Since the completion of the Interstate highway network and deregulation of the trucking industry, system reliability has improved and transportation costs have fallen. In response, businesses have tended to buy more transportation as a way of reducing other logistics costs, such as owning and operating warehouses and maintaining inventory. The tendency of managers to substitute transportation for other costs is a source of economic benefits stemming from improvements in the freight transportation system.

Understanding the effects of system performance on freight productivity will help define the appropriate levels of investment needed to support efficient freight movement, develop cost-effective improvement strategies, and anticipate likely private sector responses to long-term and systemic changes in system performance. The Federal Highway Administration's (FHWA's) Office of Freight Management and Operations is conducting research into the economic effects of investments in freight transportation. A conceptual framework describing the linkages between freight investments and the economy has been completed, and a benefit-cost analysis tool (model) that can measure the full benefits of improvements in freight transportation is under development. This tool will capture both the initial user savings, as well as longer-term benefits that accrue from organizational changes. It will also provide a broader perspective on the breadth of benefits attributable to highway system improvements and the possible economic effects of system deterioration. Such a tool will help to ensure that decisionmakers at all levels of government and in the private sector can conduct both project planning and assessment in a manner that better recognizes the unique contributions of freight transportation to a region's economy.

Historically, freight transportation improvements have been the byproduct of investments that alleviate highway traffic in general. Because of significant growth in truck traffic on an increasingly congested highway network, focused attention on freight transportation investments is needed. Trucks place a strain on highway capacity; and congestion, in general, reduces the effectiveness of truck transportation and its contribution to the economy.

Freight transportation congestion problems are not limited to trucking. The Mid-Atlantic Rail Study, sponsored by the I-95 Coalition, identified $6 billion in needed investments to remove rail choke points between Richmond, Virginia, and New York City. On the West Coast, public investments in California's Alameda Corridor were made to improve rail freight flows and to reduce pressure on the highway system. Maritime port improvements are also being made to alleviate congestion.

Improvements in freight transportation are expected to have multiple economic effects. The most obvious benefit is a reduction in transportation costs to firms engaged in the production, distribution, and trade of goods. Reducing the cost per-mile may also extend a firm's market area and broaden access to supplies and labor. This, in turn, can improve economies of scale and the quality of inputs.

Several benefit-cost models have been developed for evaluating highway investments, but none accords proper treatment to freight improvements. In general, these models focus primarily on the benefits that accrue to passengers and truck operators. Benefits are

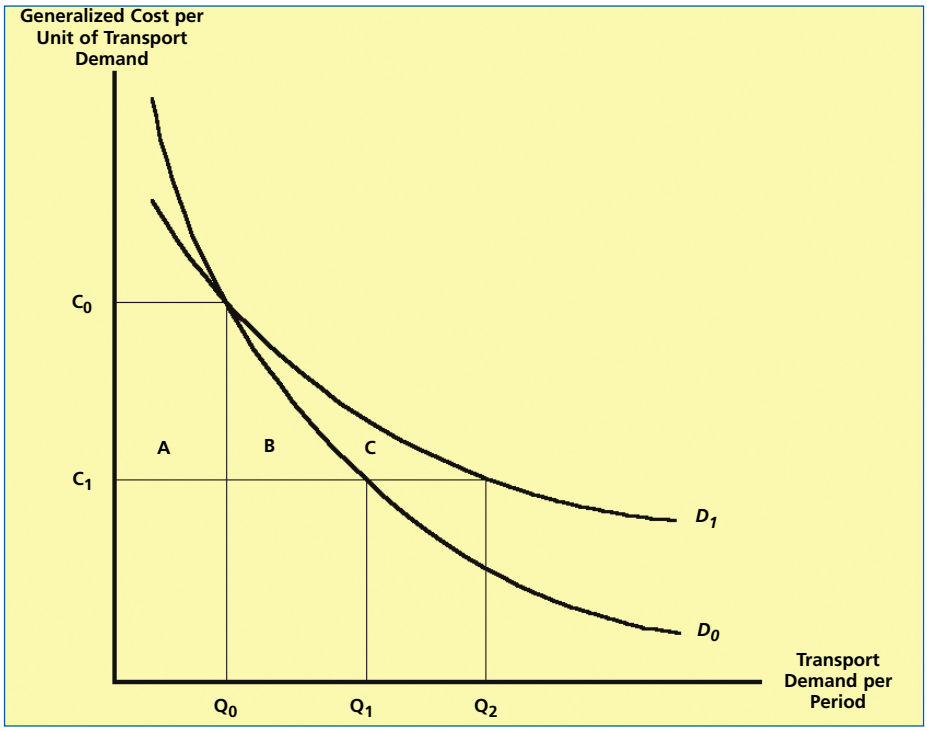
[1]U.S. Department of Commerce, Bureau of Economic Analysis, Industry Accounts Data, Gross Domestic Product by Industry.

[2]U.S. Department of Transportation, Bureau of Transportation Statistics, Transportation Satellite Accounts.

estimated based on several factors, such as reduced travel time, decreased operating costs, and reduced costs resulting from crashes. For example, the cost of travel time for a car is based on the value of time assigned to the occupants, while the cost of travel time for a truck is based on a driver's wages. As a result, the benefit valuation for a truck is based entirely on the reduction in cost to the owner, or carrier, of the truck. Effects on the owner of the cargo—the shipper—are not explicit or may not be fully accounted for in this approach.

A shipper's response to change in transportation costs is determined by the conditions of demand for freight transportation. These include market demand for a firm's products and the way freight transportation is used as an input to production and/or distribution. Figure 1 illustrates a shipper's responses to a cost reduction in freight transportation.

Figure 1. Shipper's Response to Change in Transportation Cost



- In the short run, the shipper continues to buy the same number of vehicle-miles of freight transportation (shown as Q_0). The benefit to the shipper is a reduction in the cost of moving freight over the same number of vehicle-miles (area A).

- In the next phase, the shipper may react to the cost reduction by taking advantage of the lower cost and buying more freight transportation (shown as Q_1). This response provides additional benefits (area B). The shipper's original demand curve (D_0), however, does not change because responses to cost reductions occur over a considerable period of time. In this phase, a shipper does not change the firm's basic logistics.

- After a shipper has had time to consider the cost reduction, adjustments may be made to the firm's logistics. When this occurs, a shipper's demand for transportation changes, and a new demand curve (D_1) emerges. The area between the old and new demand curves (area C) reflects an additional benefit resulting from a change in logistics (reorganization).

Thus, the full benefit of a freight improvement (realized by the reduction in cost of transportation) is reflected in the sum of areas A, B, and C.

When completed, the model will be made available to states and metropolitan planning organizations for use in planning future freight transportation improvements. Results of FHWA's research will also be incorporated in to the Highway Economic Requirements System, which is a simulation model that uses benefit-cost analysis to evaluate highway improvements. Additional information about the economic benefits of freight and other related topics are available on the Freight Office website www.ops.fhwa.dot.gov/freight.

For More Information, Please Contact

Harry Caldwell
Team Leader, Policy
Office of Freight Management and Operations
Federal Highway Administration
202-366-9215
harry.caldwell@fhwa.dot.gov

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