

THE CORPS OF ENGINEERS EXPERIENCE WITH MULTIPORT ANALYSIS

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Background

In 1982, The Assistant Secretary of the Army for Civil Works, Mr. William Ginanelli, asked the U.S. Army Corps of Engineers (Corps) to develop procedures for analyzing deep draft ports, which included data and analysis of competing ports. This resulted from a concern that the project by project study, analysis and recommendation procedures used for Corps projects de-emphasized information and insight into system-wide implications.

The Methodology

The basic problem was defined to be the need for a methodology to identify the traffic which could swing from or to the port under study with modest shifts in relative costs (between ports). The Corps' basic context for study would be individual projects, but with more open consideration of what if the competing ports would be deepened to various depths. Finally, the emergence of increased project study cost sharing would mean that economic analysis of the demand for any given port should contemplate how cost recovery through user charges might affect revenues which could be used to repay part or all of the local costs for the project.

Assumptions of Multiport Methodology

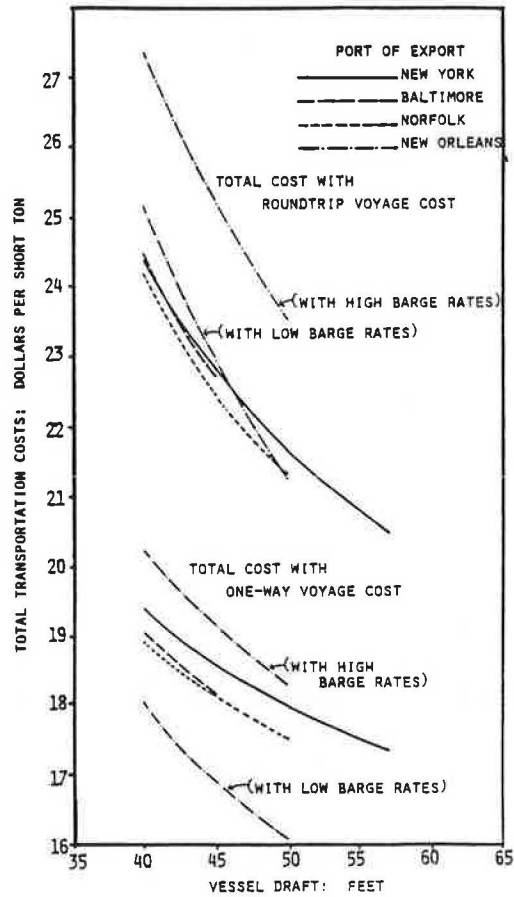
"Without Project" assumptions are defined as the existing or authorized project at the port under study and at competing ports. "Without Project" assumptions for the base case Benefit/Cost ratio is the project alternative which is environmentally acceptable, financially acceptable to project interests, economically feasible and reasonably maximizes net benefits. Additional "with & without" project assumptions would be explored in a sensitivity analysis. An example of a practical demonstration of the economics of multiport analysis is shown in figure 1, from economic analysis of New York Harbor deepening, prepared in 1982. Analytically, multiport analysis requires information about the ocean leg, port and land leg costs of moving goods from inland origins to foreign destinations and from foreign originating points.

The traditional approach to port analysis by the Corps has been to estimate benefits by comparing the ocean leg costs of the "with & without" project scenario, normally assuming existing or authorized depths at the pairs. For a deepened port alternative, it is assumed that larger vessels drawing deeper drafts which operate at lower costs per ton of cargo would use the deeper channel (subject to depth constraints at the other end of the haul). By assessing the savings that occur to existing and to projected traffic in the "with or without" project scenario, benefits are generated.

The multiport analysis approach generates much more information. First, the potential benefits due to savings on the land leg are evaluated. Second, port cost differentials are evaluated. Thus, combined land leg, port and ocean leg costs are obtained for the port under study and its competing ports. Finally,

FIGURE 1

AN EXAMPLE OF TOTAL TRANSPORTATION COSTS FOR U.S. COAL EXPORTS FROM MINE VIA SELECTED PORTS TO ROTTERDAM IN VESSELS OF DRAFTS OF 40 TO 57 FEET^{2,3}



NOTES: 1) INCLUDES RAIL AND BARGE RATES, PORT CHARGES AND VESSEL COSTS; 2) ADAPTED FROM FIGURE V-1 OF IWR REPORT, NEW YORK HARBOR AND ADJACENT CHANNELS STUDY, ECONOMIC ANALYSIS, STAGE 1, SEPTEMBER 1982; 3) RAIL DISTANCE (MILES) FROM MINE TO PORT ARE: NEW YORK 387; BALTIMORE, 334; AND NORFOLK 373. BARGE SHIPMENTS ARE FROM EVANSVILLE, In, 1058 MILES TO NEW ORLEANS.

the conditions under which some part of the traffic would logically be diverted from one port to another can be discerned. To get a better understanding of how the methodology works, a discussion of a case studies follows.

The Delaware River Ports Study

The Philadelphia District of the Corps has a comprehensive study of the deep-draft channels serving several ports in Delaware, Pennsylvania, and New Jersey underway. The analysis came to an early finding that the primary commodities affected by deepening of the Delaware River would be coal, petroleum and grain. The origin of the coal would be the northern part of the Central Appalachian coal fields via Conrail. There would be potential diversions of export coal from Baltimore and Norfolk. The origin for oil would be crude imports from the Middle East to be refined in the Philadelphia/New Jersey refineries. These would be potential diversions from the Gulf and New York Harbor. The origin for grain is the eastern portion of the Midwest, primarily Ohio and Indiana with some diversion potential from Great Lakes ports or from New Orleans.

The analysis confirmed that export coal diversions from Baltimore and Norfolk were possible, due to an existing \$2.00 per ton lower rate by Conrail to Philadelphia than the Norfolk Southern to Norfolk and by CSX to Baltimore. The rail rate advantage is a marketing effort by Conrail to build volume of the railroad and for a Conrail coal loading dock at Philadelphia. If the rail rate advantage were to be eliminated, the diversions to Philadelphia would, in large part, be negated.

There are several refineries located in the greater Philadelphia area. For the most part, these refineries have not been expanded, but refineries along the Gulf Coast have expanded in recent years. The multiport analysis concludes that, if the refineries accessible to Philadelphia could be expanded, that a deeper channel would divert sizable quantities of crude from the Gulf to Delaware ports. A relatively small diversion from New York Harbor would also be expected if the Delaware is deepened and New York is not deepened.

The following table indicates the amount of cargo that would be diverted to ports on the Delaware River from other U.S. ports as a result of the river being deepened by 1995 while the competing ports were not deepened. For channel depths increasing from 42 feet to 50 feet, Delaware River ports would gain 9.6 to 10.8 million tons annually, and shippers would save \$3.1 to \$12 million.

Delaware River Deepening Cargo Diversions and Cost Savings

<u>Channel Improvement</u>	<u>Cargo Diversion</u> (Millions of Tons)	<u>Transport Savings</u> (Millions)
42 feet	9.6	\$ 3.1
45 feet	9.7	\$ 7.9
50 feet	10.8	\$12.1

The multiport analysis for the Delaware River ports also found that if the Delaware was not deepened, and their competitors did deepen, that the Delaware ports would lose substantial tonnage. If competing ports were deepened to 42 feet, a total of 7.0 million tons of cargo would be diverted from the Delaware River ports, at a saving to shippers of \$1.7 million, while deepening competing ports to 50 feet would result in the diversion of 10.3 million tons at a savings of \$4.2 million.

Conclusion

Analysis of competing ports can be accomplished with moderate investment in time and money. It holds open an opportunity to obtain more comparable data and analysis from various studies, and it systematically explores more "what if" scenarios in both the "with and without" project context.

PORTS: MANAGING THE CHALLENGES OF CHANGE

By

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To successfully manage the challenges of change, ports should assess the following factors:

- What changes have occurred in the external environment?
- What are the implications for ports?
- How are ports responding?
- What does the future hold?

A. External Environment

1. Trade Patterns

The dominance of the Far East in U.S. liner trades will continue, and ocean shipments will involve increased numbers of high-value containers that require faster transit times. This reflects the growing trend toward just-in-time manufacturing and retail operations. Container shipments in the U.S./Far East liner trades increased from 2.7 million twenty-foot equivalent units (TEU) in 1982 to 4.4 million TEU in 1987, while container shipments between the U.S. and Europe increased only from 1.1 million TEU to 2.0 million TEU. It is forecast that container shipments in the U.S./Far East trades will increase to 6.5 million TEU by 1991, while the U.S./Europe trade will reach only 2.7 million TEU by 1991.

The outlook in U.S. trade patterns is for continued healthy growth in imports along with strengthening export demand. However, the persistent imbalance in favor of import shipments will continue. This imbalance is particularly evident in the U.S./Far East trade, where