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RESEARCH NEEDS IN INLAND WATER TRANSPORTATION

mode
5 other

subject areas
11 administration
12 planning
13 forecasting
14 finance
15 socioeconomics



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INTRODUCTION

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Chairman, Committee on Inland Water Transportation

The research needs statements which follow were developed over a two-year effort by the Transportation Research Board Committee on Inland Water Transportation. The committee is composed of representation by all federal agencies currently involved in water transportation, the private carriers, major private industrial users, state DOT representation, and university and research institutions.

It is worthwhile to summarize the most visible of research concerns which are set forth in the following research problem statements. The major issues are:

1. The question of subjecting the water carrier to user charges: who pays, how is it computed, what is its impact on the total transportation system and national economy?
2. The placement of ports into a regional transportation planning context; casting ports in a major land use, intermodal and multimodal planning context.
3. The appropriate placement of responsibilities for inland waterway transportation management and administration systems across the several federal agencies currently involved in some manner with water transportation.
4. The continued development of improved forecasting and evaluation tools, to yield more accurate commodity flow forecasts, and to evaluate and justify capital and non-capital alternatives in light of environmental impact consequences, energy, world food supply, and transport regulatory consequences.

The following pages detail and elaborate on the above concerns by describing specific projects, their urgency, and costs and time periods.

It is the hope of this committee that such a comprehensive list, compiled from a broad array of viewpoints, will serve as a starting point for federal, state, and private research institutions to activate realistic research, resulting in an improved water and multimodal transportation resource base.

USER CHARGE AND NATIONAL POLICY AND MANAGEMENT ISSUES

1. DEVELOPMENT OF AN EVALUATION FRAMEWORK TO COMPERHENSIVELY ASSESS THE IMPACTS OF VARIOUS USER CHARGE POLICIES

Problem Statement

The institution of user charges on the inland waterway system represents a significant alteration in national policy which will have regional and national multimodal impacts. Several user charge schemes are proposed, singularly, and in combination. A defensible analysis framework for examining such various user charge options is needed, in order to draw accurate conclusions as to their impacts.

Proposed Research

An evaluation framework should be developed which takes into account the aspects of uncertainty, temporal sensitivity, multi-dimensionality of viewpoints, and exogenous economic and energy factors which form the environment under which the various combinations of user charges may be applied. A limited but comprehensive set of likely scenarios for the inland waterway system should be constructed relating to the above parameters, and a formal modelling framework for analysis of economic, environmental, commodity flow, and equity impacts of various user charge policies should be developed and tested, yielding significant sensitivity analysis of policy options.

Urgency

High (X) Medium () Low () (check one)

Reason

Institution of user charges will yield significant regional and national impacts. Analysis of these potential impacts is necessary to yield the most "beneficial" strategy.

Recommended Funding

\$450,000

Recommended Research Period

24 months

2. ANALYSIS OF REGIONAL-LOCAL ECONOMIC AND MANPOWER-EMPLOYMENT IMPACTS OF USER CHARGES

Problem Statement

In addition to the broad economic, environmental and equity impacts of user charge installation, highly significant localized impacts on employment, manpower and local regional value added and personal income may occur, due to the reduction of tow activity and related crew reduction, and reduction in waterway related industry siting and activity and subsequent reduction of industrial work force. Research is needed to assess these impacts.

Proposed Research

Identification of critical states and regions having significant waterway related industrial work forces. Identification of various levels of return on equity, profit margins and related user charge types and levels versus probabilities of reduction of tow schedule, declaration of towing company default or cessation of waterway related industrial siting and employment activity levels. Identification of loss of industry and tow related jobs to each of the above, and quantification of basic--non-basic ultimate indirect economic loss for the above in these critical regions and states.

Urgency

High (X) Medium () Low () (check one)

Reason

Unemployment is a critical national issue, waterway transport policy options affecting it should be critically examined and thoroughly understood as user charge options are implemented.

Recommended Funding

\$400,000

Recommended Research Period

18 months

3. DEVELOPMENT OF A NATIONAL INLAND WATERWAY SYSTEM MANAGEMENT PLAN

Problem Statement

The recent synthesis of user charge legislation with Lock and Dam 26 replacement and institution of trust fund - cost recovery capabilities in conjunction with traditional benefit-cost justification and environmental impact statement requirements, coupled with implementation of the above over several fragmented agencies dealing with waterway transport dictates the need for a comprehensive, continuous and cooperative management plan and system, capable of operation over several institutional frameworks.

Proposed Research

Develop a comprehensive management system which fuses multi-agency input and waterway system technical aspects of user charge policy, cost recovery, system modification and maintenance, economic development, environmental impact components, public participation, recreation and intermodal-commercial transportation relationships. The system should be capable of promoting dialogue, developing and modifying inventory data, and formulating a framework for comprehensive policy and decision-making with respect to specific components of the Inland waterway system, or the system at large.

Urgency

High (X) Medium () Low () (check one)

Reason

Various pressures will be exerted on the inland waterway transport resource base in the near future. Organized management and interactive control of these forces should result in a higher payoff to society and the transportation community.

Recommended Funding

\$700,000

Recommended Research Period

36 months

FEDERAL PORT AND INTERMODAL ROLES

1. THE FUTURE ROLE OF INLAND WATER PORTS - THEIR EMERGENCE INTO INLAND INTERMODAL TRANSPORTATION FACILITATION CENTERS

Problem Statement

The traditional role of a port has been to function as modal in nature, with defined O-D patterns and low value-high bulk transfer points. Technological, energy, land use, economic and legislative alterations in our society offer some potential new roles for inland waterway ports. These alterations offer the opportunity for ports to function as inland intermodal freight transportation facilitation centers. Research is needed to define this role, evaluate its regional, national, and international impact, and program its implementation trajectory.

Proposed Research

Study design and scenario evaluation research to compare the traditional port role against an intermodal freight facilitation role in the same region. Field investigation of selected case sites, data acquisition from shippers, scenario definition and multidimensional simulation-evaluation of local and regional economic, energy and environmental impacts of facilitation center versus traditional roles. Development of implementation-legislative trajectories to develop selected intermodal facilitation centers on a national scale.

Urgency

High (X) Medium () Low () (check one)

Reason

Improved surface transportation multi-modal programming is occurring at all levels of government. Integration of the port-waterway sectors with this effort is timely.

Recommended Funding

\$400,000

Recommended Research Period

 24 months

WATERWAY AND PORT TRAFFIC MANAGEMENT AND SAFETY

1. MARINE TRAFFIC CONTROL

Problem Statement

All types of marine traffic have been increasing at significant rates in waterways and ports. A significant function of this traffic involves hazardous and/or potentially polluting cargoes. Research is needed in development of traffic control systems to optimize capacity, efficiency, and safety.

Proposed Research

Define the congestion factors in ports, and in waterways. Identify the present and projected levels of hazardous and potentially polluting cargoes moving in ports and on waterways. Develop a benefit-cost framework for a marine traffic control system based on safety, efficiency and capacity criteria. Within it, compare the relative effectiveness of mandatory versus voluntary control systems, and investigate the feasibility of a continuous real time tracking system of all movement of hazardous and potentially polluting substances.

Urgency

High (X) Medium () Low () (check one)

Reason

Minimization of hazardous cargo incidents and pollutant spills on the inland waterway system is a high priority.

Recommended Funding

\$600,000

Recommended Research Period24 months

2. MAINTENANCE OF FACILITIES AND DISPOSAL OF DREDGING

Problem Statement

Current environmental actions are such as to potentially preclude new facilities and replacement facilities in ports and waterways. The virtual impossibility of gaining acceptable dredge spoil disposal sites exacerbates the problem. Research is needed to adequately analyze the impacts of facility modification, particularly dredging options.

Proposed Research

Review the governing factors in gaining acceptance of port and waterway facility projects. Develop improved methods for quantifying environmental impacts in cost-benefit calculations. Investigate technologies for using and/or disposing of dredge materials without having to dump in other locations.

Urgency

High (X) Medium () Low () (check one)

Reason

Timely replacement and modification of facilities dictates the need for improved environmental impact assessment.

Recommended Funding

\$350,000

Recommended Research Period18 months

ANALYTIC METHODS AND DATA ANALYSIS

1. U.S. DOMESTIC WATERBORNE AND RELATED COMMODITY FLOW DATA BASE

Problem Statement

Commodity flow data for waterways and related transportation modes are extremely limited. Existing sources either lack complete and reliable commodity and geographic coverage or fail to track ultimate origins and destinations. Transportation planning requires an accurate commodity flow data base. Data should be collected for a base year and a program for continuing updates should be developed.

Proposed Research

Develop and implement a program for collecting and continuously updating domestic origin-destination data for water and related transportation. The data should include movements by: (1) water only; (2) water and other modes as intermodal hauls; and (3) transportation modes competitive with water. The data records should contain commodity description and standard code, weight, value, method of handling, packaging, and other shipment characteristics. Shipper and receiver characteristics should also be obtained. Finally, modal data such as means of conveyance and transfer points should also be included. The data collection program should make maximum use of existing ongoing data collection programs, such as the Corps' Waterborne Commerce data, the Rail 1% Waybill, and the Census of Transportation. This research could be a pilot program for a total U.S. commodity flow data base development program, or could be combined with such an effort.

Urgency

High (X) Medium () Low () (check one)

Reason

The required data are basic to effective transportation planning.

Recommended Funding

\$2,000,000

Recommended Research Period30 months

2. WATERBORNE COMMERCE FORECASTS

Problem Statement

Forecasts of expected waterborne traffic are needed in several levels of detail for different planning purposes. Highly detailed data are needed for local port planning and for Corps of Engineers project planning. More aggregate data can satisfy the needs of systems and regional planning, and can be useful for quick response analyses. A need exists to develop forecasting tools suitable for each level of detail. This will have the additional benefit of establishing standardized forecasting procedures which are well understood by both waterway planners and personnel in cognizant review agencies.

Proposed Research

Establish the level of detail of commodity flow forecasts needed at each stage of waterway planning and design. Review existing and soon-to-be available sources of data for waterborne commerce forecasting. Review analytical techniques available for each forecasting stage. Select existing techniques or develop new techniques for preparing the various types of waterborne commerce forecasts. Provide documentation of the forecasting methods and prepare procedural guides for their use in waterway planning.

Urgency

High (X) Medium () Low () (check one)

Reason

Need to foster methodological consistency and reduce duplication of effort in planning agencies.

Recommended Funding

\$300,000

Recommended Research Period18 months

3. WATERWAY MODAL SHARE ANALYSIS

Problem Statement

Transportation regulation and facility development issues involving waterways often hinge upon the expected impact of the proposed regulatory change or new facility on the shares of freight traffic carried by water and by competing modes. However, there is presently no widely accepted methodology for waterway modal share analysis. There is a particular need to develop policy-sensitive modal share models.

Proposed Research

Identify generic waterway policy and planning issues which require modal share analysis. Review modal share methodologies which have been used for waterway planning and for analysis of other freight modal competition situations. Develop and test waterway modal share analysis tools, focusing on methods applicable to bulk or low value packaged goods. Prepare implementation package for those techniques found to be of practical value.

Urgency

High (X) Medium () Low () (check one)

Reason

Modal share analysis is critical to policy development

Recommended Funding

\$500,000

Recommended Research Period18 months

4. FACTORS INFLUENCING JOINT WATER/RAIL FREIGHT HAULAGE

Problem Statement

Transportation operates most efficiently if each mode is used to its best advantage. The existence of successful water/rail movements indicates that there are circumstances where these two modes can be profitably combined. The lack of a strong promoter of such movements has hindered research into the relevant freight markets and assessment of the resulting efficiencies.

Proposed Research

Search freight guides and tariffs and contact shippers, carriers, and forwarders to identify intermodal water/rail hauls that are currently operating. Identify the factors that have made these hauls attractive to the participants. Assess the benefits of these hauls, in terms of cost, energy use, and shipper service. Determine the transferability of the favorable factors and benefits to other shipping circumstances, and identify any institutional or other impediments to realization of the full potential of water/rail intermodalism.

Urgency

High () Medium (X) Low () (check one)

Reason

Payoff is not immediate, but the long-term energy and capital funding outlook dictate efforts to utilize each mode to fullest potential.

Recommended Funding

\$85,000

Recommended Research Period

12 months

5. WATERWAY TRAFFIC INFORMATION STORAGE AND RETRIEVAL SYSTEM

Problem Statement

Extensive and detailed data on waterborne commerce are collected by the Corps of Engineers. However, these data are made public only in published form and on a highly aggregated basis. As a result, waterway planners and others desiring local data must disaggregate the published data and depend upon interviews with local shippers and carriers for basic traffic flow information. The availability of a computerized waterway traffic information storage and retrieval system would considerably simplify the job of the waterway planner and would promote use of more timely and accurate historical data.

Proposed Research

Interview shippers, towing companies, waterway planners, port development agencies, trade associations, and relevant Corps of Engineers and other governmental agencies to establish the expected uses and desirable characteristics of a waterway traffic information storage and retrieval system. Locate an appropriate agency willing to operate the system. Design, implement, and test the system hardware and software. Develop a system operating plan, including updating methods, query and response procedures, a financing plan, and user billing and collection system.

Urgency

High () Medium (X) Low () (check one)

Reason

Benefits are primarily to small engineering and economics firms, and to port developers.

Recommended Funding

\$250,000

Recommended Research Period

18 months

6. WATERWAY ROUTING CRITERIA

Problem Statement

There are several locations on the inland waterways where two or more paths exist between a single pair of river junctions. In general, all of these routes are used by barge traffic. In some cases, upbound and downbound tows seem to exhibit different route choices. Waterway analysts presently have only a limited understanding of the criteria used to choose among available routes. Research on this topic would greatly enhance the level of understanding of inland waterway system operations.

Proposed Research

Identify multiple path choice situations on the inland waterways, and identify the waterway operators who navigate these locations. Interview the operators to record the choices which they make in specific circumstances and to ascertain their reasons for these choices. Derive generalized decision rules which might be used by waterway analysts in the context of route choice algorithms.

Urgency

High () Medium () Low (X) (check one)

Reason

Limited general interest

Recommended Funding

\$80,000

Recommended Research Period

12 months

7. ANALYTICAL TECHNIQUES FOR INLAND WATERWAY PLANNING

Problem Statement

Most of the documentation of recent advances in waterway planning is scattered throughout the technical literature, much of it in the form of lengthy technical reports. A need exists to collate this material in monograph-length or extended paper form, so that it may be circulated widely among transportation professionals and navigation interests.

Proposed Research

Conduct a literature search and critical review of recent research and current practice in the field of inland waterway planning. Include coverage of such topics as commodity flow forecasting, modal split analysis, systems analysis, simulation, and so forth. Develop an annotated bibliography, and identify methodological deficiencies and research needs.

Urgency

High () Medium (X) Low () (check one)

Reason

Primarily of educational and informational value rather than problem oriented.

Recommended Funding

\$75,000

Recommended Research Period

12 months

8. DEVELOPMENT OF IMPROVED SHIPPER SURVEY TECHNIQUES

Problem Statement

Present methods of forecasting future water transportation demand place great emphasis on surveys of existing or potential waterway shippers. However, there is little standardization of how these shipper surveys are conducted and little quality control of the information obtained. There is evidence that shipper surveys produce erroneous and misleading information

in many instances. On the other hand, it can be equally misleading to plan for new facilities without obtaining the views of shippers. A need exists to develop improved shipper survey techniques which recognize and overcome the problems with present methods.

Proposed Research

Review representative waterway project shipper surveys and their subsequent handling and identify any serious deficiencies. Determine the type and quality of data which should be obtained from shipper surveys. Identify the types of individuals in shippers' organizations who are in the best position to supply the desired data. Develop standard methods for contacting these individuals and standard forms of queries. Develop control procedures to assure the objectivity and quality of the shipper's responses. Develop standard shipper survey processing and reporting procedures. Define the relationship between the shipper survey and other facets of the waterway project planning process.

Urgency

High () Medium (X) Low () (check one)

Reason

Payoff is not immediate, but the need for the research results is great.

Recommended Funding

\$125,000

Recommended Research Period

 12 months

Sponsorship of this Circular

Division A - REGULAR TECHNICAL ACTIVITIES

Kurt W. Bauer, Southeast Wisconsin Regional Planning Commission, chairman

Committee on Inland Water Transportation

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