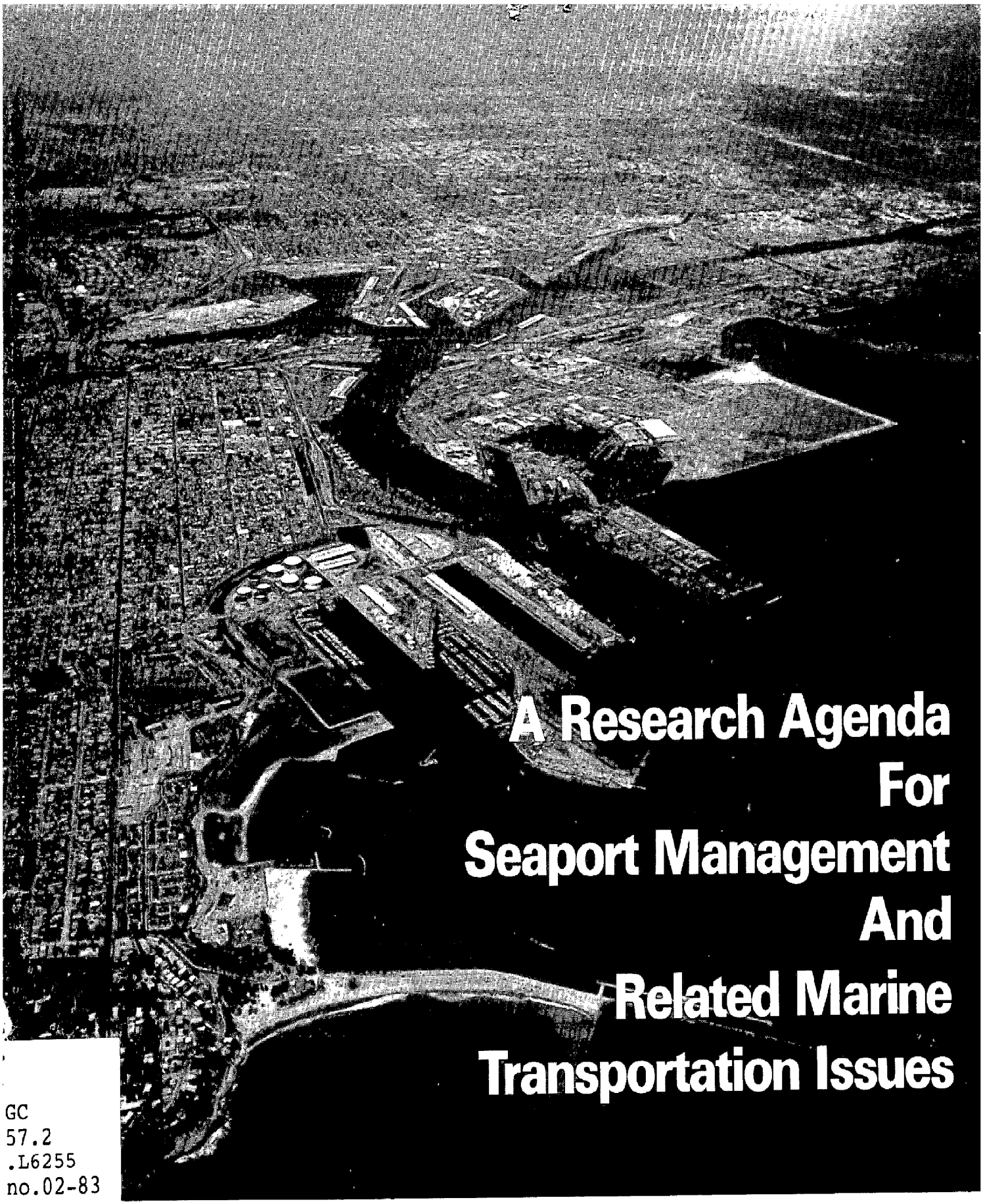

A Research Agenda For Seaport Management And Related Marine Transportation Issues

Price • Friedheim • Ross

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for
Seaport Management
and
Related Marine Transportation Issues

USCSG-TR-02-83

Proceedings of a national workshop

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Workshops and workshop proceedings require the efforts of many people.

This workshop was conceived through the efforts of Robert Friedheim, director of USC Sea Grant; the Council of Sea Grant Directors; and the staff of the National Sea Grant College Program. Stuart Ross, assistant director of USC Sea Grant, coordinated substance and logistics throughout. Lola Williams, secretary for USC Sea Grant, mastered all the details of meals, facilities, schedules and transportation. Holly Kennedy, secretary for USC Marine Advisory Services/Marine Support Facility, assisted in arranging the tour of the Los Angeles and Long Beach harbors. Penelope Jones, John Dmohowski and Lois Hitz, all graduate students in the USC Master of Marine Affairs Program, served as rapporteurs for the discussion sections. Karen Charest, editor for USC Sea Grant, turned our rough draft into a readable document.

The Port of Los Angeles graciously provided the use of their meeting facilities, and special thanks go to Ernest Perry, executive director; Robert Kleist, then director of marketing; and Frank Mercier, port real estate agent.

Eight topic coordinators and selected resource persons contributed to the important substance of the workshop and ensured our results. These individuals deserve recognition.

International Trade and Seaport Demand	Bernhard Abrahamsson, coordinator; James Jones; Gib Carter; Robert Kleist; Jerry Fruin
Technology and Productivity in Seaports and Marine Transportation	Ernst Frankel, coordinator; Harry Dudley; Dennis King; Howard Bunch; William Gaither; Richard Kolf
Regional Seaport Planning	Marc Hershman, coodinator; Anatoly Hochstein; Stanley Euston; Willard Price
Environmental Goals and Seaport Planning	Calvin Hurst, coordinator; Marc Hershman; Gilbert Siegel; Jan Terveen; Thomas Sweeny
Land Transportation and Seaports	Peter Shaw, coordinator; Dennis Fay; John Pullen; Ezra Hauer; Stanley Euston
Seaport Management Systems	Frederick Smith, coordinator; Jeffrey Stander; Ronald Heilmann
Seaport Personnel and Professional Development	Roger Stough, coordinator; Thomas Brillat; Joseph Carrabino; Gilbert Siegel
Seaport Finance	Thomas Dowd, coordinator; Robert Waters; Willard Price; Gib Carter; John Pullen

Of course, many other participants provided useful contributions in the topical sessions they attended. The overall cooperative attitude of the group was most evident and appreciated.

— Willard Price, Workshop Coordinator

CONTENTS

INTRODUCTION

Over the last 20 years or so, a relatively small group of researchers has gradually advanced our understanding of seaport management and related marine transportation issues. These researchers have investigated particular economic and engineering problems, certainly, but also broader problems of regional planning and federal policy toward ports. They have studied seaports' responses to changes in shipping technology and international trade, changes that came rather suddenly in the '60s after decades of more gradual advances. More recently, attention has focused on the political problems within a port and its region – problems such as how to allocate waterfront space among public and private demands, how to adapt to environmental regulations, and how to distribute the financial burdens of expansion.

During the last several years, Sea Grant programs around the country have taken an increasing interest in seaports and marine transportation, and the national Sea Grant office has supported several of the more recent studies (see Appendix, page 32). Given this interest, and the growing breadth of academic fields pursuing the subject, it seemed appropriate that Sea Grant sponsor a review of the efforts to date and of the efforts most needed in the future. The Council of Sea Grant Directors asked the University of Southern California Sea Grant Program to take the lead in conducting a national workshop to develop a research agenda. The workshop was held in March 1983 at the Port of Los Angeles with about 40 academics and practitioners attending (See Appendix, page 34).

The intent of the workshop was to help researchers, research sponsors and seaport managers by providing a research agenda for seaport management – a set of research topics judged important by a broadly based group representing both academics and practitioners. We could not, and did not, attempt to provide specific research designs or hypotheses or to detail the result of previous research efforts. The literature suggested in the selected bibliography (see Appendix, page 36) mentions some of the principal studies.

We intended that the workshop would focus on the problems of large, multifunction maritime ports. (USC Sea Grant, with the support of the National Sea Grant College Program, is planning a workshop for the spring of 1984 that will examine the distinctive problems of small ports and ports specializing in a limited number of cargoes. We hope to complete the series of port workshops with one covering marina management in the spring of 1985.)

The format of this workshop included an opening session followed by eight topical sessions across two tracks, and a concluding plenary session. For each topic, a person with knowledge of the field was chosen as topic coordinator and a few participants were selected as key resource persons.

The opening session began with welcoming remarks by Dr. Ernest Perry, executive director, Port of Los Angeles. Dr. Ross Clayton, dean of USC's School of Public Administration, provided insights into developing research agendas with his "coalignment model." Dr. Willard Price then presented a keynote address from an overview paper, "A Research Framework for Seaport Management." In addition, James McJunkin, executive director, Port of Long Beach, offered a practitioner's view in a luncheon presentation on the first day. At the end of the second day, participants came together to hear summaries by topic coordinators and to begin a discussion of funding sources and strategies.

Content of the Proceedings

These proceedings consist of three sections:

The first section provides a general framework for understanding seaport management and was the basis for developing the eight discussion topics. Each discussion group was responsible for producing a set of recommendations as a result of their session.

The second section records the recommendations made on each of the eight topics, based on a written draft prepared by each of the topic coordinators. Many of the recommendations include multiple aspects and could suggest several viable research projects.

Finally, the third section arranges the recommendations in three levels of priority. This arrangement is primarily the work of the workshop coordinator, Willard Price, although it is based upon the record of the workshop and workshop participants were given a chance to review the priorities by mail.

We are happy to report that the workshop itself was a productive and informative experience in documenting the progress and potential that exists in the study of seaport management, according to the comments and letters received. The results of the workshop represent fairly brief statements of research needs and priorities as determined at that point in time. It is based on the participants' knowledge of existing research and their collective judgment on future work. We hope that this document conveys all that the workshop revealed and will encourage continued interaction among the researchers concerned with seaports and related marine transportation.

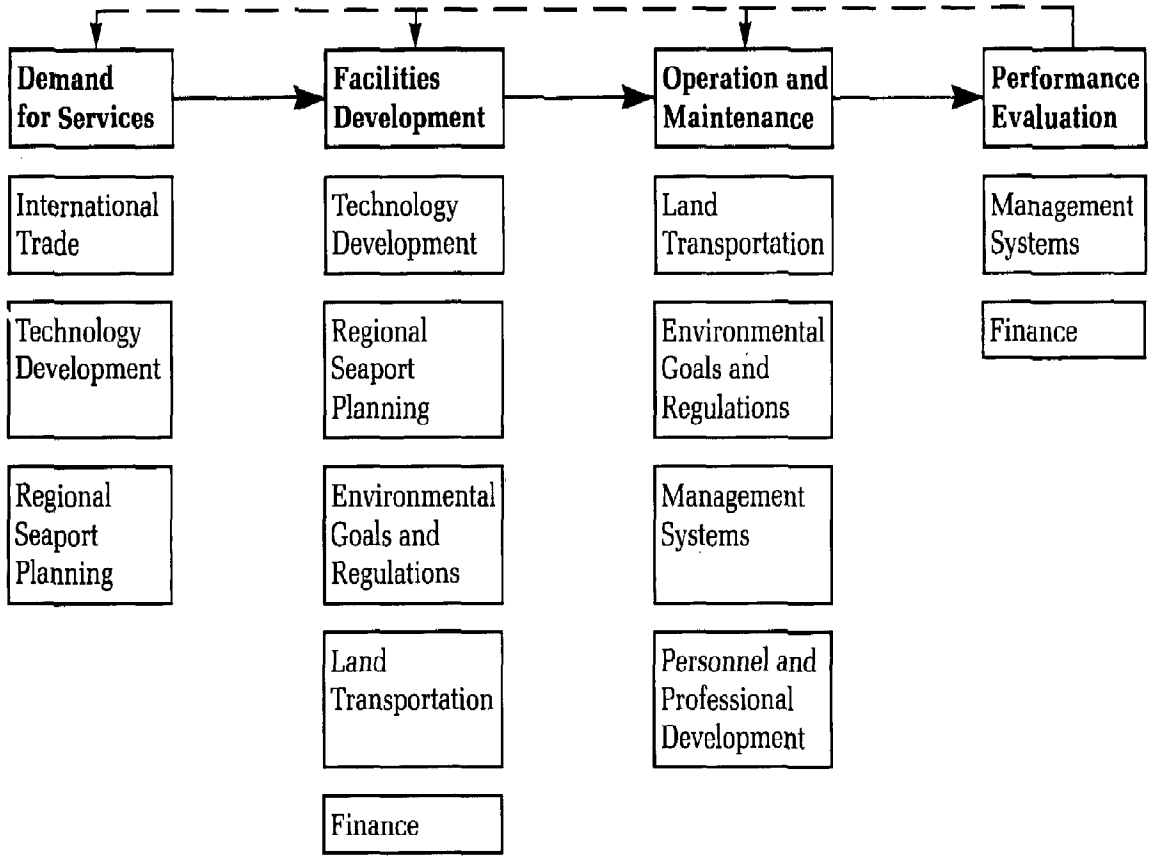
GENERAL FRAMEWORK FOR SEAPORT MANAGEMENT RESEARCH

The workshop topic covered "Research on Seaport Management and Related Marine Transportation Issues," and discussion focused primarily on the management decisions made by major ports. Other factors, such as international trade, labor unions, the environmental movement and so on, are treated in the context within which management must operate. Although each of these other topics has received extensive individual attention in the literature, tying them together has been done less frequently. To a large extent, we are trying to build an integrated look at familiar topics.

Although no model or framework can capture all there is to understand about seaport management and related marine transportation issues, we developed a framework that at least suggests the major components in a logical fashion. It models four stages in the decision to develop facilities and provide services at a seaport and includes the main substantive components in each stage (Figure 1). These stages include:

1. Demand for Services
2. Development of Facilities
3. Operation and Maintenance of Facilities (or Provision of Services)
4. Performance Evaluation (with feedback into the other stages for renewed decision cycles)

Figure 1
The Decision Cycle In Seaport Management



Each of these stages in the decision cycle is dependent upon many different aspects of the context in which seaport decisions are made. We have focused on the following relationships:

1. ***DEMAND FOR SERVICES*** is tied to:

International Trade. Which cargoes, which routes and which customers are forecasted?
Technology Developments. How are ship construction and cargo handling changing? What is required of a port?
Regional Seaport Planning. What is each port's expected share of the market? Do ports coordinate planning and marketing activities?

2. Given a level of demand, ***DEVELOPMENT OF FACILITIES*** is tied to:

Technology Developments.
Regional Seaport Planning.
Environmental Goals and Regulations. Can new facilities be made compatible with environmental quality goals? What are possible environmental trade-offs or mitigations?
Land Transportation. What facilities can be developed? What existing facilities can be used? Are there advantages or disadvantages with the geography?
Finance. How and from whom can the needed capital be raised?

3. Given a developed facility or set of facilities, ***OPERATION AND MAINTENANCE OF FACILITIES*** are tied to:

Land Transportation.
Environmental Goals and Regulations. Which practices are permitted and which are prohibited?
Management Systems. What is the organization structure? What decisions are made? What information is needed?
Personnel and Professional Development. What skills, training or professional preparation are required? What are labor relations issues?

4. Given a developed and operating facility, ***PERFORMANCE EVALUATION*** is tied to:

Management Systems. How is the port's performance evaluated and by whom? Whose evaluation counts? Does the seaport's performance satisfy the constituency to whom seaport management is responsible?
Finance. Is the seaport financially viable? If so, is there any surplus and what is its distribution?

Thus, we came to suggest eight topics for discussion:

- International Trade and Seaport Demand
- Technology and Productivity in Seaports and Marine Transportation
- Regional Seaport Planning
- Environmental Goals and Seaport Planning
- Land Transportation and Seaports
- Seaport Management Systems: Information, Computers and Analysis
- Seaport Personnel and Professional Development
- Seaport Finance: Debt, Fees and Surplus

DISCUSSION TOPICS AND RECOMMENDATIONS

TOPIC 1: INTERNATIONAL TRADE AND SEAPORT DEMAND

General Comments

Seaport demand is directly dependent on the volume and composition of seaborne trade. Hence, both international and domestic factors embodied in a "macro" and "micro" view, respectively, affect seaport demand.

The "macro" view refers to the overall international trade context. Given that trade is the result of many complex economic and political relationships among nations, port managers need to know how trade is divided among nations. There is a need to follow worldwide economic trends and relate these to the direction and composition of trade flows and to possible changes in these flows.

The "micro" view refers to specific ports in relation to the "macro" variables. That is, how is the country's trade, both domestic and international, divided among its ports? A major question is whether ports should merely react to the trade trends or whether they should actively pursue and promote trade opportunities and trends. In general, the "micro" view raises issues of port competition and the need for port-by-port data on trends in commodity flows.

While much research has been done on these issues by numerous agents (local and federal agencies, consultants, carriers and shippers), these are typically one-of-a-kind efforts with little or no continuity in terms of follow-up or updating. In addition, there is no mechanism for cooperative efforts. Ongoing data analyses (which do exist) are not commonly known among all those who could benefit. Therefore, there is a basic need for continuity and cooperation in port research.

Topic Coordinator: Bernhard Abrahamsson, Dean, Graduate School of International Studies, University of Denver

Specific Research Recommendations

1-1. Identify potential commodity flows for each port, encourage their development and determine the resulting port facility needs. This implies access to specific information not commonly collected at present from ports and shippers. This also raises the issue of applying quantitative analysis by using mathematical modelling or simulations.

The potential for such modelling for other port purposes raises problems of a different nature: the volume of data required, the disparity of sources, the timeliness and the differing needs of small versus large ports.

1-2. Examine the potential for:

A) Centralizing the federal government's port, shipping and trade data collection into one agency. There is too much overlap and duplication of data collection of the Maritime Administration, the Corps of Engineers and other agencies.

B) Promoting data sharing among ports and users. Ports and related industries tend to protect the proprietary nature of specific data, although such protection is often unnecessary. A mechanism for sharing data would facilitate decision making and permit more realistic scenarios for planning.

C) Establishing regional research centers or institutions through, for example, the National Sea Grant College Program or other federal agencies. Such centers would answer the regional needs for sustained research, national data bases and the coordination of regional resources.

1-3. Sustain research in areas of relative importance as identified by the practitioners.

Minimally, these items should be followed for their effects on ports:

A) Major international political and economic events such as economic summits, trade agreements and arrangements (GATT, UNCTAD, etc.), and major financial developments.

B) Changes in trade patterns (including fluctuations of foreign exchange rates).

C) Deregulation of land carriers.

D) Changes in capital markets.

E) Changes in cargo handling technology.

Timeliness is important in such studies because trade and technology patterns change rapidly.

TOPIC 2: TECHNOLOGY AND PRODUCTIVITY IN SEAPORTS AND MARINE TRANSPORTATION

General Comments

Seaport technology developments have raised seaport productivity manyfold since World War II. The handling of unitized cargo and dry bulk cargo has undergone major technological and operational revolutions after centuries of unchanging methods.

These technology developments have largely been reactive: ports have introduced them in response to user demand and requirements, as ship operators and other users have introduced increasingly higher technology vessels and equipment. The opportunities for further change in port user technology are many. It is also increasingly recognized that a balance in technology and capacity must be achieved between ports and port users to assure effective technology utilization and efficient transportation.

Yet, ports face real problems of prediction and response. Users generally can change their technologies in a much shorter time than ports can, and it is not always easy to separate the substantial changes from the unsubstantial ones. Furthermore, most technological change requires institutional change as well.

Specific Research Recommendations

2-1. Determine the effects of technology change on port and transportation productivity and effectiveness. Research is required to study the effects of technology change on capital, labor and other resource use. What is the impact of a reactive approach and possible delay in port technology change on port productivity and market share among ports?

2-2. Ascertain any voids in port and port-interface technology in cargo handling and management information systems, with particular reference to the integration and consistency of technology use by ports and port users.

2-3. Investigate the regulatory, labor and institutional obstacles and constraints to port technology change and adoption.

2-4. Identify the current state of:

A) Ship handling technology, with reference to port approaches, ship mooring and ship docking.

B) Port construction technology, with reference to prefabrication technology and the development of port facilities that can be relocated.

2-5. Examine the status of cargo handling, storage and interface technology, particularly with regard to labor productivity and human resource requirements. What is the role of labor in technology assessment, including research in retraining and/or relocation? When and why does labor accept or reject technology development?

2-6. Explore what role the port industry plays in marine transportation technology development, especially in terms of performance data collection and evaluation.

2-7. Determine a systems approach to port technology assessment, development and information systems.

Topic Coordinator: Ernst Frankel, Professor of Ocean Systems, Massachusetts Institute of Technology

TOPIC 3: REGIONAL SEAPORT PLANNING

General Comments

There have been several major studies of multiple ports in a "regional" context, although the definition of the relevant region has varied. Some useful references include *Regional Port Seminar*, the proceedings of the New England River Basin Commission, Boston, August 1980; Jack Knecht and Stanley Euston's "Regional Port Planning and Coastal Zone Management," *Proceedings of Coastal Zone '78*, American Society of Civil Engineers, March 1978; and Joseph Carrabino's "Regional Port Development — A Reality in the Northwest," *World Ports*, March 1976. The Maritime Administration, the Water Resource Council and the Office of Coastal Resources Management also have funded regional port planning efforts.

Because seaports are closely integrated with the economy and infrastructure of their hinterlands and because ports near each other often compete for the same trade, regional planning of some sort would seem to be desirable to efficiently allocate resources.

Specific Research Recommendations

3-1. Measure the "success" of these regional planning efforts. Has the information been used, by whom and for what purposes? Have recommendations been implemented? Has regional port planning resulted? What are the ingredients for successful regional planning?

3-2. Address the issues associated with competition between ports and regional economic efficiency. Basic economic analysis could help to determine under what conditions a competitive environment among ports is economical (lower shipping costs, better service, capacity for peak demands, etc.) or uneconomical (excessive land use, idle equipment and labor, etc). What factors of competition are best retained? What efficiencies would result from regional cooperation or plans? What policies interfere with better cooperation?

3-3. Define the optimum size of a region for planning purposes. The size of the regions already studied varies greatly: multi-state regions like the Great Lakes and New England are on one end of the scale, while metropolitan regions like the Delaware and lower Columbia rivers are on the other end. What common problems, issues or opportunities — whether economic, social or physical — help define a region? Does it make sense to conduct regional studies at the state level, as has been done frequently?

3-4. Analyze present regional cooperation among ports for marketing, lobbying, and other specific functions. This has occurred in the Delaware River area, Great Lakes, Washington State and elsewhere. What was the impetus for these efforts? How successful have they been? Can marketing and lobbying be the first step toward cooperation in planning new facilities?

3-5. Ascertain whether the scope of regional plans should be broad or narrow. Broadly conceived plans might deal with the many uses of a harbor waterfront — commercial/retail development, marinas and fishing fleets, and traditional maritime industries. Narrowly conceived regional plans might deal with just one issue, e.g., landfill for new container handling terminals.

3-6. Determine if regional issues can be adequately handled by providing guidelines to ports on master planning (the traditional way in which ports plan for new facilities). Has the master planning mandated for Southern California ports by coastal zone legislation been successful in incorporating consideration of regional issues? Could the California model be applied elsewhere?

3-7. Analyze the effectiveness of regional studies conducted by the Corps of Engineers, e.g., Delaware River, Mississippi River, Great Lakes, San Pedro Bay, San Francisco Bay. Have these efforts, which have been requested by Congress, provided information, changed project-level planning or eliminated the need for new planning forums or organizations at the regional level?

3-8. Compare the experience of other countries in regional planning. Japanese and Western European experiences in studying and planning for regions could provide a checklist of factors to be considered in the United States or a list of mistakes to avoid.

Topic Coordinator: Marc Hershman, Professor of Marine Studies, Institute for Marine Studies, University of Washington

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TOPIC 4: ENVIRONMENTAL GOALS AND SEAPORT PLANNING

General Comments

There are clearly competing values in the question of the environmental consequences of seaport development and operation, with many perceiving that environmental goals and regulations have excessively constrained and delayed the development of seaport facilities. Without any judgment on this hypothesis, there is a widely held expectation that seaport managers ought to consider environmental variables in decision making. At the least, they are expected to:

A) Maintain air quality within the port.
B) Maintain water quality within the port.
C) Minimize noise problems within the port.
D) Control environmental impacts outside the port caused by activities within the port.
E) Protect endangered species.
F) Maintain habitat values.
G) Balance all of the above with commercial needs.
H) Provide input to regulatory agencies.
I) Assist port management with environmental analysis.
J) Maintain adequate environmental baseline data bases.
K) Maintain communication with the scientific community.
L) Monitor new legal and regulatory developments.
M) Communicate these issues to the public.

Specific Research Recommendations

4-1. Determine the requisite skills and appropriate structuring of the port environmental staff. In choosing port environmental personnel, consideration should be given both to their knowledge of the marine and ecological sciences and to their abilities to communicate with lawyers, business managers and other nonscientists. In choosing how to structure the environmental staff, ports must decide whether to use consultants or create new civil service classifications, how closely to monitor the specialists and where in the organizational structure to place them.

Topic Coordinator: Calvin Hurst, Harbor Environmental Scientist, Los Angeles Harbor Department

4-2. Explore mechanisms for environmental mitigation, including arbitration or mediation. The categories of mitigation facing ports when they seek permits from regulatory agencies include wildlife impact mitigation or compensation, air emissions trade-offs, and mitigation and/or compensation payments to the state coastal zone agencies with jurisdiction over the port applicant.

Currently, wildlife agencies are negotiating with ports on the basis of arbitrarily determined wildlife habitat values, which can be examined in terms of their scientific credibility. Research is needed to determine an equitable and credible methodology for assessing habitat values.

With respect to air emissions mitigations, research is needed to determine a fair system of brokerage and banking of air emissions rights as they are transferred from one company or agency to another.

4-3. Define appropriate environmental controls for the prevention of catastrophic accidents in ports and harbors, such as large oil spills and tank or ship explosions. Investigations should consider the effects on ports and harbors, the most feasible administrative arrangements for setting up early warning systems, the reporting and correction of identified risk areas, and the assignment of responsibility for corrective procedures.

Particular attention should be given to the newer category of hazardous facilities that have accident potentials characterized as low risk/high consequence hazards.

4-4. Investigate means of increasing the effectiveness of communication with the public in the environmental review process. Environmental documents submitted for public review need to be sufficiently technical to be defended scientifically in courts of law, while at the same time clearly comprehensible to laymen. Achieving both of these objectives heavily taxes the communication skills of environmental personnel. Research can identify typical environmental assessments that meet this dual test.

A specific area where effective public communication is needed is risk management and risk acceptability. The port should assist the public in understanding the levels of risk that characterize proposed or existing port facilities, in determining what are acceptable levels of risk, and in framing alternatives for public debate. Research should also be done in the use of gaming simulations to improve lay understanding of port environmental issues.

TOPIC 5: LAND TRANSPORTATION AND SEAPORTS

General Comments

The interaction of seaports and land transportation is quite complex, reflecting the myriad public and private participants in the American public policy system. The system is so fragmented that any one group, given the proper conditions, can prevent major transportation changes or activities.

On the other hand, no single group has the power to accomplish major changes. Such stalemates are not unique to this part of American public policy, but that makes them no less vexing. Add the vagaries of international trade and economic systems, and port or land transportation organizations may find themselves caught on an uncontrollable roller coaster.

Overall, primary concerns for exports and imports are identified as:

A) Domestic transportation demand.
B) Domestic transportation capacity.
C) Future capacity and projected demand.
D) Public policy relationships.

The research recommendations focus on these four primary concerns.

Specific Research Recommendations

5-1. Determine transportation demand. Researchers must first address the interrelationships of seaports and international trade and demand for domestic land transportation facilities and services. To do this, it is necessary to know what is being produced for sale abroad; what is being purchased; where is the point-of-origin in the United States; what is the best route to the seaport; whether there are modal choices; and what is the effect upon the seaport and surrounding community.

Of critical importance is the reliability of international demand for American exports. Currently, agricultural products, some natural resources (coal, wood, etc.) and machinery products are in demand; however, changes in the international economic/monetary systems are affecting this demand.

5-2. Determine transportation capacity. Discussion suggested that the current system may be sufficient, in most cases, to meet the export logistical requirements, but this is likely a temporary situation. Demand — both export and import — is down along with the economy. Before the recession, real problems were evident for coal and grain. Now, for example, backlogs and traffic jams no longer exist. There are sufficient freight cars in the rail system. Nevertheless, it is believed that demand will quickly pick up with the recovery, and conflicts will occur.

Research questions in this aspect include: What is the condition of the land transportation system? What areas are stressed? What is the condition of each port area complex? What is the effect of deregulation of trucking and railroads?

5-3. Determine projected capacity and demand. Given projections that the world population will increase more than 50 percent, from four billion to six billion people, by the year 2000, the United States may be in an excellent position to serve world needs.

The question, therefore, is what will the world purchase from the United States, or, what will it be able to purchase if American goods and commodities are too high priced? Presuming, minimally, that current exports (coal, grain, wood and machinery) will still take place, will additional demand overload the land transportation system to the ports? Will the port system be able to handle the volume? Will the urban areas permit the expanded activities or new facilities? Will transportation companies and exporters independently decide to use more rural port areas or create new nonurban facilities?

Another key aspect is the fact that the economy, according to some observers, is shifting to service sector and information processing activities. Production, and thus export sales, will continue to diminish. What is the impact of such possibilities upon the fully developed land transportation systems and port complexes in those areas of the country affected by the decline of smokestack industry exports? Will the system become more of a one-way import activity, with empty containers or vehicles on the outbound trip?

5-4. Analyze other policies relating to transportation. The current economic uncertainty and changes in the industrial system affect the public policy environment, and they are also changed by it. Whether the topic is deregulation, technology, labor, productivity, hazardous cargo, safety, congestion or the conflict between national and local needs, public policy will be involved in transportation. Research is needed into how these contacts occur, what level of intensity they display, what mechanisms for cooperation among public and private sectors will exist, and how positive outcomes may be produced from the interaction. Case studies of individual ports could be very helpful.

Topic Coordinator: Peter Shaw, Director of Institute for Transportation Policy and Planning, and Professor of Public Policy and Administration, California State University, Long Beach

TOPIC 6: SEAPORT MANAGEMENT SYSTEMS: INFORMATION, COMPUTERS AND ANALYSIS

General Comments

The seaport management topic potentially covers a wide range of subjects, from comprehensive management systems and methodologies to individual and group behavior and human issues. However, our terms of reference were established as follows:

A) Reference seaports include all ports, regardless of the volume of seaborne traffic. Sea Grant research may have a greater payoff if applied to the smaller ports because larger ports are more likely to have the resources to research and develop their own management systems.

B) It is important to focus on management at the upper echelons. The opportunities and needs for improved management systems at the operations level are more obvious and more easily met by private sector resources. Strategic decision making at the upper management level is a more appropriate area for Sea Grant research.

C) The computer is a tool that has rapidly increasing potential to improve management. With the advent of the microcomputer, applications are possible for all seaport organizations, both large and small.

D) In particular, Sea Grant could provide leadership in the standardization of software, data formats, etc., for small ports.

E) Computer applications will be different at different decision levels within the port, and the applications will be different for structured and unstructured decisions.

F) We are concerned more with the use of computers and models by seaport managers in their own decision-making than in the use of computers and models by researchers studying seaports.

Topic Coordinator: Frederick Smith, Professor of Agricultural and Resource Economics, Oregon State University

Specific Research Recommendations

We identified two general research needs relative to seaport management systems:

— Improved understanding of seaport decision-making processes and structures. We recognize that there has been much research on decision-making; however, because of ports' quasi-public nature and their economic influence, some new research needs and opportunities are apparent regarding management policies and practices.

— Knowledge of the role of the computer in the upper-level management process. There is potential major impact as personal computers are employed for management and financial information systems, project management, cargo control, inventory management and other analyses.

We identified many aspects of these two general research needs. A few of these aspects are reported below. Each could be one or more research projects. Obviously, researching these topics will require close rapport with seaport managers.

6-1. Identify what decision-making data and information are available and what is needed for decision making. How are data and information used? How does such information need to be analyzed?

6-2. Determine if there are differences between the actual decision structure and the official structure. If there are differences, how do they occur? How are strategic decisions made? Is it a group process? What decision-making tools are used?

6-3. Explore how the application of the computer will affect the decision-making process and structure. How can the computer be used most effectively in port management? What knowledge or training will be needed for effective use of computers?

6-4. Ascertain if the computer increases the potential for data sharing among port managers. Does the available data/information match up with the demand created by application of a computer?

TOPIC 7: SEAPORT PERSONNEL AND PROFESSIONAL DEVELOPMENT

General Comments

This topic focuses on identifying problems and issues concerning:

A) Recruitment, selection and training practices for seaport personnel.

B) Seaport labor relations.

C) Seaport job requirements and the resulting professional development needs.

Unlike most of the other workshop topics, this topic is characterized by an almost total lack of published material that's generally available. The only major reference on port personnel training is *The International Survey of Port Training, Advisory Facilities and Requirements*, published by the International Association of Ports and Harbors (IAPH) in May 1979. This report identifies training programs that are offered by the members of IAPH, as described by those members who chose to respond to a request for such descriptions. Consequently, the content is limited. The IAPH report is also limited in that it fails to include non-member programs such as those conducted by universities.

It was observed that there is considerable literature concerning labor relations and bargaining, but there are apparently no published job skill standards for seaport personnel. In short, there seems to be a paucity of literature relating to the topic of seaport personnel and professional development.

Specific Research Recommendations

7-1. Determine the existing recruitment, selection and training practices for personnel at U.S. seaports. There is a general and fundamental agreement that there is little understanding and knowledge of these practices among members of the U.S. seaport community.

7-2. Investigate what standardized job skills and test requirements are needed for positions in the U.S. seaport industry. It is important to note that similar industries, e.g., airlines, railroads and the maritime industry in general, have standardized requirements. Such an investigation should include a look at the certification requirements for the Port of Singapore's personnel training program.

7-3. Explore the training needs of the port industry at all levels – vertically within seaports, as well as horizontally across the broader port industry.

A) Vertically: While there is a need for more training on the part of all port personnel, there is a strong consensus that the greatest need is to educate port commissioners, especially in the small to medium-sized ports. It was observed that commissioners frequently arrive in their position with little or no knowledge about the peculiar nature of and constraints placed upon ports (e.g., as public enterprises). It was believed that the American Association of Port Authorities (AAPA) should take the lead in developing training programs for commissioners. However, AAPA has avoided this. Consequently, universities were viewed as the appropriate place for developing and implementing commissioner training programs. The content of these training programs should focus on:

– The responsibilities and the role of the commissioner.
– The enabling legislation under which the port must function.
– Port operations and management.

Traditionally, universities in the United States have not fared well in their attempts to provide port training and port management curricula. Consequently, there is a need to examine how universities can effectively deliver training programs. This could be a fruitful role for Sea Grant.

Other training needs, such as those for port directors and other port personnel (especially middle management), are suggested. The general conclusion is that there is a need for more coordinated training that is closely tied to job standards at all levels in the seaport. Again, universities, in conjunction with ports, should assume a primary role in port personnel training.

B) Horizontally: Many of the personnel problems, including training, stem from the fact that seaports are at the interface of different labor markets (land and sea) and that port operations at most seaports are performed by different operators (e.g., labor unions, terminal operators, etc.). There is a critical question of how to involve these different constituents in management decisions. In short, how do we introduce organizational change and development in port authorities when they are so intimately tied to different labor markets and operators? This question will become more important as the pressure to adopt new management technologies, including more participative management practices, increases.

Topic Coordinator: Roger Stough, Director, Center for Metropolitan Affairs and Public Policy, College of Charleston (South Carolina)

TOPIC 8: SEAPORT FINANCE: DEBT, FEES AND SURPLUS

General Comments

The finance topic was examined in terms of current issues in public finance, particularly debt, service fees and surplus revenues. Declining government support and declining cash flows create difficulties for capital project financing and strategic planning. The result of increasing fiscal stress has apparently caused seaports to be less willing to take capital risks, and they are depending more and more on private capital and risk sharing.

From these perspectives flow a multitude of related problems and policy alternatives related to seaports. Several research projects emerged from this initial scoping effort. These projects fell into ten broad categories.

Specific Research Recommendations

8-1. Investigate user fees. Research is needed into alternative user fee systems and their probable economic and social effects. What are the effects of user fee systems on specific ports or regions? The University of Minnesota's Sea Grant Extension Program has published a brief proceedings of a January 1983 conference on "Maritime User Fees: Perspectives on the Upper Great Lakes" (Nancy Berini, ed., MSGEP-83-500).

8-2. Investigate pricing arrangements. What are the alternative methods of pricing services and leasing facilities? What are their effects on port finance and on cargo movement? What alternative accounting systems could give better breakdowns of expense and revenue data by function?

8-3. Investigate investment issues. What are the decision criteria for new projects and new functions? How does policy or managerial decision-making use input from the accounting system? What are alternative financing methods and their effects?

8-4. Investigate cross-subsidization issues. A seaport produces many services from a common cost base. What are the criteria (economic, political and social) to determine how costs are allocated among recipients of services?

8-5. Examine the role of ports in economic development. Economic, political and social perspectives are needed. The methods used to conduct economic impact studies should be examined.

8-6. Analyze the balance between public and private benefits. What are the questions of political and financial accountability stemming from the "public enterprise" status of ports. Annmarie Hauck Walsh's work, *The Public's Business*, is a good start in this area, but more needs to be done.

8-7. Examine the factors that determine port growth, including internal and external factors. A starting point is James Bird's study, "The Future of Seaports in the European Communities," *Dock and Harbour Authority*, June 1977.

8-8. Examine the special problems of small and medium-sized ports. How do their financial problems differ from those of large ports?

8-9. Explore modes of financing channel improvements and maintenance. Determine the need for, feasibility of, and alternatives to maintaining and increasing channel depth with major dredging projects.

8-10. Define how long-term or strategic financial planning is to be accomplished when important factors in planning seem to be variables rather than constants.

Topic Coordinator: Thomas Dowd, Port Industries Specialist, University of Washington Sea Grant College Program

RESEARCH RECOMMENDATIONS ARRANGED BY PRIORITY LEVEL

As noted in the introduction, Willard Price, the workshop coordinator, has — after the fact but with some help from participants — arranged the set of research recommendations into three levels of priority. The levels of priority are:

— Recommendations considered critical to seaport management at this time.

— Recommendations that are desirable for seaports and for the academic maturity of the field of study.

— Recommendations that are useful in establishing a data base for seaport research.

So that the recommendations may be aggregated by priority level as well as by topic area, we present three tables here:

— Table I lists the eight topic areas, with each set of recommendations divided by level of priority. For convenience, we have used the numbers and abbreviated phrasing from the recommendations discussed more fully previously.

— Table II lists the three priority levels, each divided according to the eight topic areas.

— Table III summarizes the other two tables in a matrix format.

TABLE I – PRIORITY LEVELS WITHIN EACH TOPIC

TOPIC 1: INTERNATIONAL TRADE AND SEAPORT DEMAND

Critical for Seaport Management Now

1-3. Trends in trade, technology and investment

Desirable for Academic Maturity of the Field

1-1. Quantitative analysis of cargo flows for individual ports

1-2. National or regional seaport data centers

TOPIC 2: TECHNOLOGY AND PRODUCTIVITY IN SEAPORTS AND MARINE TRANSPORTATION

Critical for Seaport Management Now

2-1. Technology change and transport productivity

2-6. Port industry role in technology development

Desirable for Academic Maturity of the Field

2-2. Technology information transfer

2-3. Obstacles to technology change

2-4. Current state of ship handling and construction technology

2-5. Cargo handling technology and role of labor

Useful in Establishing a Data Base for Seaport Research

2-7. Technology assessment and systems approach

TOPIC 3: REGIONAL SEAPORT PLANNING

Critical for Seaport Management Now

3-1. Existing regional studies

3-4. Existing regional cooperation for specific functions

Desirable for Academic Maturity of the Field

3-2. Port competition versus regional efficiency

3-3. Size of port regions

3-5. Breadth of regional planning issues

3-7. Corps of Engineers' studies and port planning

Useful in Establishing a Data Base for Seaport Research

3-6. Seaport master planning and regional issues

3-8. Regional planning in other countries

TOPIC 4: ENVIRONMENTAL GOALS AND SEAPORT PLANNING

Critical for Seaport Management Now

4-2. Mitigation methodologies

4-3. Risk management

Desirable for Academic Maturity of the Field

4-4. Public communication on environmental assessment and risk management

Useful in Establishing a Data Base for Seaport Research

4-1. Personnel requirements for environmental staff

TOPIC 5: LAND TRANSPORTATION AND SEAPORTS

Critical for Seaport Management Now

5-3. Future capacity and projected demand

Desirable for Academic Maturity of the Field

5-1. Domestic transportation demand and trade
5-2. Domestic transportation capacity
5-4. Public policy relationships and land transportation

TOPIC 6: SEAPORT MANAGEMENT SYSTEMS: INFORMATION, COMPUTERS AND ANALYSIS

Critical for Seaport Management Now

6-1. Decision making: data/information availability
6-3. Computer effects on decision-making process and structure

Desirable for Academic Maturity of the Field

6-2. Decision structures and strategic decision-making
6-4. Computer data/information sharing among ports

TOPIC 7: SEAPORT PERSONNEL AND PROFESSIONAL DEVELOPMENT

Critical for Seaport Management Now

7-3. Training needs:
A) Vertically within the port
B) Horizontally across the port industry

Desirable for Academic Maturity of the Field

7-1. Personnel system inventory

Useful in Establishing a Data Base for Seaport Research

7-2. Standardized job skills and requirements

TOPIC 8: SEAPORT FINANCE: DEBT, FEES AND SURPLUS

Critical for Seaport Management Now

8-5. Role of the ports in economic development
8-7. Port growth factors
8-8. Special problems of small ports
8-9. Financing of channel improvements

Desirable for Academic Maturity of the Field

8-1. User fees
8-2. Pricing — alternative methods and accounting systems
8-3. Investment decision criteria
8-4. Cross-subsidization among rate payers
8-6. Public versus private benefits and public enterprise

Useful in Establishing a Data Base for Seaport Research

8-10. Strategic planning and long-term financing

TABLE II – SPECIFIC RECOMMENDATIONS WITHIN EACH PRIORITY LEVEL

I. *RECOMMENDATIONS CONSIDERED CRITICAL FOR SEAPORT MANAGEMENT NOW*

Topic 1: International Trade and Seaport Demand
- **1-3.** Trends in trade, technology and investment

Topic 2: Technology and Productivity in Seaports and Marine Transportation
- **2-1.** Technology change and transport productivity
- **2-6.** Port industry role in technology development

Topic 3: Regional Seaport Planning
- **3-1.** Existing regional studies
- **3-4.** Existing regional cooperation for specific functions

Topic 4: Environmental Goals and Seaport Planning
- **4-2.** Mitigation methodologies
- **4-3.** Risk management

Topic 5: Land Transportation and Seaports
- **5-3.** Future capacity and projected demand

Topic 6: Seaport Management Systems: Information, Computers and Analysis
- **6-1.** Decision making: data/information availability
- **6-3.** Computer effects on decision-making process and structure

Topic 7: Seaport Personnel and Professional Development
- **7-3.** Training needs:
  - A) Vertically within the port
  - B) Horizontally across the port industry

Topic 8: Seaport Finance
- **8-5.** Role of ports in economic development
- **8-7.** Port growth factors
- **8-8.** Special problems of small ports
- **8-9.** Financing of channel improvements

II. *RECOMMENDATIONS DESIRABLE FOR ACADEMIC MATURITY OF THE FIELD*

Topic 1: International Trade and Seaport Demand
- **1-1.** Quantitative analysis of cargo flows for individual ports
- **1-2.** National or regional seaport data centers

Topic 2: Technology and Productivity in Seaports and Marine Transportation
- **2-2.** Technology information transfer
- **2-3.** Obstacles to technology change
- **2-4.** Current state of ship handling and construction technology
- **2-5.** Cargo handling technology and role of labor

Topic 3: Regional Seaport Planning
- **3-2.** Port competition versus regional efficiency
- **3-3.** Size of port regions
- **3-5.** Breadth of regional planning issues
- **3-7.** Corps of Engineers' studies and port planning

Topic 4: Environmental Goals and Seaport Planning
- **4-4.** Public communication on environmental assessment and risk management

Topic 5: Land Transportation and Seaports
- **5-1.** Domestic transportation demand and trade
- **5-2.** Domestic transportation capacity
- **5-4.** Public policy relationships and land transportation

Topic 6: Seaport Management Systems: Information, Computers and Analysis
- **6-2.** Decision structures and strategic decision making
- **6-4.** Computer data/information sharing among ports

Topic 7: Seaport Personnel and Professional Development
- **7-1.** Personnel system inventory

Topic 8: Seaport Finance: Debt, Fees and Surplus
- **8-1.** User fees
- **8-2.** Pricing — alternative methods and accounting systems
- **8-3.** Investment decision criteria
- **8-4.** Cross-subsidization among rate payers
- **8-6.** Public versus private benefits and public enterprise

III. *RECOMMENDATIONS USEFUL IN ESTABLISHING A DATA BASE FOR SEAPORT RESEARCH*

Topic 2: Technology and Productivity in Seaports and Marine Transportation
- **2-7.** Technology assessment and systems approach

Topic 3: Regional Seaport Planning
- **3-6.** Seaport master planning and regional issues
- **3-8.** Regional planning in other countries

Topic 4: Environmental Goals and Seaport Planning
- **4-1.** Personnel requirements for environmental staff

Topic 7: Seaport Personnel and Professional Development
- **7-2.** Standardized job skills and requirements

Topic 8: Seaport Finance: Debt, Fees and Surplus
- **8-10.** Strategic planning and long-term financing

TABLE III – SUMMARY MATRIX OF PRIORITY LEVELS AND RECOMMENDATIONS

DISCUSSION TOPICS / PRIORITY CATEGORIES	Topic 1: International Trade & Seaport Demand	Topic 2: Technology & Productivity in Seaports & Marine Transportation	Topic 3: Regional Seaport Planning	Topic 4: Environmental Goals & Seaport Planning	Topic 5: Land Transportation & Seaports	Topic 6: Seaport Management Systems: Information, Computers & Analysis	Topic 7: Seaport Personnel & Professional Development	Topic 8: Seaport Finance: Debt, Fees & Surplus
A. Critical for Seaport Management Now	1-3	2-1 2-6	3-1 3-4	4-2 4-3	5-3	6-1 6-3	7-3	8-5 8-7 8-8 8-9
B. Desirable for Academic Maturity of the Field	1-1 1-2	2-2 2-3 2-4 2-5	3-2 3-3 3-5 3-7	4-4	5-1 5-2 5-4	6-2 6-4	7-1	8-1 8-2 8-3 8-4 8-6
C. Useful in Establishing a Data Base for Seaport Research		2-7	3-6 3-8	4-1			7-2	8-10

APPENDIX

ADDITIONAL COMMENTS BY WORKSHOP PARTICIPANTS

Participants of the workshop were quite supportive of the draft of these proceedings, and we have incorporated their responses into this document. Nonetheless, we want to include some significant reactions of those respondents who prepared a lengthier set of comments.

William S. Gaither, Dean, College of Marine Studies and Director, Sea Grant College Program, University of Delaware
"Missing, though not necessarily treated with heavy emphasis at the workshop, were several important topics. These are:

— The role of shippers in deciding what is needed in seaport and shipping services.

— The role of labor to take a constructive and enlightened view to help the nation improve its competitive position in world trade.

— The issue of air cargo versus sea cargo, and how systems can be established to let shippers shift easily from one mode to another.

— Case studies are needed to focus national and international attention on real methods and systems to modernize U.S. seaports and air cargo terminals, as well as the infrastructure to service these new facilities. The U.S. is suffering from 'pork barrel paralysis' and is making little, if any progress in improving its capability to compete in world trade."

Thomas Brillat, Harbor Master, South Carolina State Ports Authority
"One major comment is valid for all the topics: The utilization and value of port research in the United States can best be gained through close working relationships between ports and the academic community. If these interactions can be established, it is my opinion that many ports in the country will be interested in the results of the research. If not, it is questionable which, if any, ports will regard the project with more than a passing interest. This should be kept in mind, especially when considering funding for the following research recommendations.

1-3 — Although each of the specifics are of interest to ports, deregulation of land carriers, changes in capital markets and changes in cargo handling technology are high priority topics.

2-1, 2, 3, 5 — These topics all require the participation of terminal operators, as well as the port agency. The ability to gain this participation is an unknown. There is significant technology research being conducted by private industries already.

4-1, 2, 3, 4 — Most ports would agree that increased knowledge is required in the environmental areas. It should be remembered that most ports do not have environmental staff members and the need for quality input for accurate decisions is essential.

6-1, 2, 3, 4, and 7-1, 2, 3 — These recommendations require extremely close working relationships with port authorities.

8-1, 2, 3, 4, 5, 6, 7, 8, 9, 10 — Finance items are a big topic for all ports at this time. Any means to provide an easier path for financial decisions will be considered by most ports. Innovation and pricing economic development and channel depth will attract much attention."

Sea Grant Marine and Coastal Transportation Projects

The 1982 Annual Retreat Report of the Office of Sea Grant lists these port-related projects being supported at universities around the country.

A Multi-Jurisdictional Urban Waterfront Planning and Management Model
Roger R. Stough
College of Charleston (South Carolina)

An Analysis of Proposed Changes in U.S. Shipping Legislation; Their General Effects on Trade in the North Pacific Ocean
Edward Miles and Stephen Gibbs
University of Washington, Seattle

Application of Computer Technology in Marine Economics
F. J. Smith and D. Langmo and J. Stander and R. Johnston
Oregon State University

Curriculum Development in Seaport Management with a New Course in the Application of Systems Analysis and Operations Research to Seaports
Willard T. Price
University of Southern California

Design of Small Harbor Basins to Reduce Fine Sediment Intrusion
A. J. Metha and R. Ariathurai
University of Florida, Gainesville

Economics Analysis of the Competitive Position of Northern Great Plains Coal Exported Through Great Lakes Ports
Jerry E. Fruin and Charles L. Eldridge
University of Minnesota, Twin Cities

Evaluation of the GPS System as a Civil Marine Navigation System in the Coastal Zone
Phil Noe and Tom Rhyne
Texas A&M University, College Station

Great Lakes Transportation in the 1980s
Eric Schenker and H. Mayer and R. Heilmann
University of Wisconsin, Milwaukee

Hydrodynamics of Harbor Entrances and the Maneuverability of Ships Moving Through Entrances
W. C. Webster and R. L. Wiegel
University of California, Berkeley

Impacts of Port User Charges on Duluth Superior and Surrounding Regions
Jerry Fruin
Minnesota Sea Grant Institute

Management of Great Lakes Water
Erhard Joeres and M. David and K. Potter
University of Wisconsin, Madison

Pacific Rim Trade Relations and Maritime Commerce on the Columbia/Snake Navigation System
J. R. Jones and K. L. Casavant
University of Idaho

Port Related Research
John Armstrong
South Carolina Sea Grant Consortium

Ports and Waterways Advisory Services
Michael Liffman
Louisiana State University

User Fees for Coastal Resources: Issues of Application and Implementation
Mark E. Tompkins
University of South Carolina

Western Washington State Public Ports Governance Structure and Finance Resources and Requirements
David J. Olson
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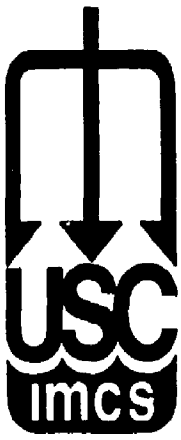

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