The Impact of the International Liner Market on Coastal Space Utilization

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PAUL HALL

(1914 - 1980)

Paul Hall was respected in all quarters of the marine transportation field. As President of the Seafarers International Union of North America, Senior Vice President of the AFL-CIO, and as head of that organization's Maritime Trades Department of 43 national unions whose memberships total eight million American workers, he was a unifying force in bringing together all elements of the maritime industry. His lifelong respect for, and interest in, education was reflected in the establishment of the unique and successful Seafarers Harry Lundeberg School of Seamanship at Piney Point, Maryland, a vital source of trained seagoing personnel.

Throughout his working career he sought to bring together the industry, to improve working conditions, to meet the challenge of foreign competition, and to advise government on how the U.S. Merchant Marine might be revitalized.

THE PAUL HALL ENDOWMENT

The Paul Hall Memorial Endowment promotes marine transportation educational programs inside and outside the University of Southern California. The endowment was established at USC in 1981 through contributions from friends and associates in marine industry, organized labor and the private sector to honor Mr. Hall, who died in 1980. USC uses endowment income to support USC Sea Grant Program projects in marine transportation and port and harbor management. The Memorial Lecture Program was developed in 1987. It honors distinguished contributors to marine transportation, bringing to the public their thoughts in the form of an annual lecture series.

THE IMPACT OF THE INTERNATIONAL LINER MARKET ON COASTAL SPACE UTILIZATION

Henry S. Marcus

I am honored to be giving the second Paul Hall Memorial Lecture. It is also an honor to be following in the path of Herbert Brand who gave the first lecture.

INTRODUCTION

The international liner market consists of common carriers moving oceanborne trade consisting mostly of manufactured and semi-manufactured goods. Liners use published sailing schedules and published tariffs. Almost all modern liner vessels are capable of carrying marine containers and most major liner operators in U.S. foreign trade operate fully cellular ships. The facilities in the U.S. used by liner operators are owned by public port authorities. As public entities, these port authorities must demonstrate that their actions are in the public interest.

In order to understand the impact of the international liner market on coastal space utilization, it is useful to begin with a brief overview of the market structure. Two major trade routes are considered in slightly more detail.

The liner operators and supporting port industry share characteristics of both concentration and fragmentation. Although there are hundreds of liner firms and ports worldwide, the top twenty handle the lion's share of the cargo. At the same time, hundreds more ocean carriers and ports exist. Therefore, there must be many small segments of the market that allow all these carriers and ports to exist.

The needs of the liner operators, in terms of port facilities and services provided by public port authorities, are described. To facilitate this discussion, the liner market is first divided into three categories, where each category has different requirements. Finally, some conclusions are drawn as to the impact on coastal space utilizaton.

BROAD MARKET CHARACTERISTICS

A key factor of international liner trade is the degree of concentration that exists. For example, Exhibit 1 shows that of 360 ports that responded to a survey by the *Containerization Yearbook 1989*, the top 20 ports handled 51.7% of all the containers in 1987, measured in twenty-foot equivalent units (TEU's).

The trend in concentration among container ports goes hand-in-hand with the concentration among liner operators as shown by an analysis made by *Containerization International* in their October 1988 issue. Of the more than 600 companies offering container liner services worldwide, the article described the top 20 carriers, defined as those projected to possess the most TEU capacity in service by mid-1990 in all types of liner vessels. Exhibit 2 focuses on fully cellular containerships and shows that the top 20 carriers accounted for 60.3% of the TEU capacity of existing fully cellular containerships and 72.7% of those on order. In addition, by the middle of 1990, these carriers will control almost 89% of all the fully cellular containerships of 2500 TEU capacity or larger.

THE MAJOR TRADE ROUTES

If one considers the impact of concentration on major trade routes, one might expect the only participants to be a small number of huge carriers serving a few huge ports. Since a single major carrier might have the slot capacity to carry on the order of 15% of the trade, seven liner firms could theoretically take care

EXHIBIT 1
World Container Port Traffic 1987

No.	Port	1987 TEU	Country/Region
1	Hong Kong	3,457,182	Hong Kong
2	Rotterdam	2,813,395	Netherlands
3	Kaohsiung	2,778,786	Taiwan
4	Singapore	2,634,500	Singapore
5	New York/New Jersey	2,089,421	USA
6	Busan	1,949,143	South Korea
7	Keelung	1,939,854	Taiwan
8	Kobe	1,877,459	Japan
9	Los Angeles	1,579,657	USA
10	Long Beach	1,460,287	USA
11	Hamburg	1,451,351	West Germany
12	Antwerp	1,437,193	Belgium
13	Yokohama	1,348,383	Japan
14	Tokyo	1,287,974	Japan
15	San Juan	1,169,808	Puerto Rico
16	Felixstowe	1,053,000	UK
17	Bremen/Bremerhaven	1,043,218	West Germany
18	Seattle	1,026,398	USA
19	Oakland	953,861	USA
20	Tacoma	696,800	USA

TOTAL..... 34,047,670
WORLD TOTAL RECORDED 65,843,815
TOP 20 SHARE (%) 51.7

Source: *Containerization Yearbook, 1989*

EXHIBIT 2

Top 20 container service operators based on projected TEU slots in service by mid-1990, analyzed on the basis of fully cellular (& converted to cellular) ships, TEU capacity and number of ships (in parentheses).

OPERATOR	CURRENT TEU'S (NO. SHIPS)	TEU'S ON ORDER (NO. SHIPS)
Evergreen	112,594 (64)	6,858 (2)
Maersk	75,359 (41)	31,200 (8)
Sea-Land	101,330 (51)	
NYK	59,992 (36)	
MOL	49,877 (23)	
APL	53,659 (23)	8,680 (2)
K-Line	45,735 (27)	10,350 (3)
Yangming	46,817 (20)	10,500 (3)
Cosco Shanghai	32,206 (31)	13,620 (5)
ZIM	39,172 (34)	10,800 (4)
OOCL	47,553 (26)	7,000 (2)
Hapag-Lloyd	39,388 (19)	6,700 (3)
Hanjin/KSC	38,788 (21)	10,660 (4)
P & OCL	37,606 (20)	7,210 (2)
CGM	15,531 (11)	2,525 (1)
NOL	24,329 (15)	9,900 (3)
ScanDutch	33,232 (18)	
BSC	12,350 (16)	
Nedlloyd	12,613 (08)	
POL	1,513 (01)	3,026 (2)
TOTAL	**889,576 (505)**	**139,029 (44)**
WORLD TOTAL	**1,474,897 (1,280)**	**191,251 (83)**
TOP 20 SHARE (%)	**60.3 (39.5)**	**72.7 (53.0)**

Source: "Top 20 Lines on Course for Larger Slice of World Fleet", *Containerization International*, October 1988.

of an entire trade route. The three main areas of container trade are between North America and the Far East, between North America and Europe, and between Europe and the Far East. The ocean liners on two of these trade routes serving parts of the U.S. in 1981 and 1988 are shown in Exhibits 3 and 4. Between the North American West Coast and the Far East, the number of liners has decreased over the time period from 37 to 30 carriers. Between the U.S., East Coast and Europe, the number of liner operators increased from 14 to 27 in this same time period. In 1988, the top 20 carriers from Exhibit 2 represented 14 out of 30 carriers on the Pacific trade and 9 out of 27 operators on the Atlantic trade.

One can obviously question how so many carriers can survive. Economies of scale exist in containership size and are reflected in the orderbook for new vessels. As shown in Exhibit 5, the largest single size category of full containerships on order is 2,000 TEU and over. The average size of the 53 containerships in this category of the orderbook is 2,866 TEU. Why didn't the carriers with the huge ships drive out the operators with the smaller ships from major trade routes, rather than having three or four times as many carriers as would appear to be necessary?

NEEDS OF EACH TIER

Each tier of carrier may require quite different port facilities and services. The first tier carrier is looking for huge modern intermodal port facilities. In addition, it requires good road and rail access to the port. Typically the first tier carrier will be desiring facilities for handling double-stack container trains, hopefully on or very near the docks.

In contrast, the third tier firm has limited but specialized needs. The second tier carrier may pose the most ambiguous situation. This carrier would like to utilize the same type of facilities and services used by the first tier company.

EXHIBIT 3

LINER OPERATORS IN THE NORTH AMERICAN WEST COAST - FAR EAST TRADE

1981	1988
APL	APL
BBS	BBS
Cosco	Cosco Shanghai
CSC	EAC (TPS)
EAC	Evergreen
Evergreen	GBSC
Fesco	Hanjin
Galleon	HKIL
Hanjin	Hoegh
Hapag-Lloyd	Hyundai
HKIL	K-Line
Hoegh	KSC
Japan Line	Maersk
K-Line	MOL
KMTC	Nippon Liner
Knutsen	NOL
KSC	NSCP
Lykes	NYK
Maersk	OOCL
MOL	P,M&O
NOL	SCI
NYK	Scindia
OOCL	Sea-Land
Phoenix	Seaboard
P,M&O	Senator
Ro-Lo	Star Shipping
SCI	TMM
Scindia	Westwood
Seaboard	Yangming
Sea-Land	Zim
Seatrain	
Showa	
Star Shipping	
US Lines	
Yangming	
Y-S Line	
Zim	
Total: 37	**Total: 30**

Source: *Containerization Yearbook*, 1981 and 1989.

EXHIBIT 4
LINER OPERATORS IN THE EUROPE-NORTH AMERICAN EAST COAST TRADE

1981	1989
ACL	AAEL
CMC	ABC
Dart	ACL
Hapag-Lloyd	AEL
Ibero	AmTrans
Jadroplov	CGM
POL	Eimskip
Prudential	Evergreen
Sea-Land	Faroe Shipping
Star Shipping	Hapag-Lloyd
TFL	Incotrans
Transatlantica	Independent
US Lines	Lykes
Waterman	Maersk
	Nedlloyd
	Ocean Star
	OOCL
	POL
	Rainbow
	Samband
	ScanCarriers
	Sea-Land
	Senator
	TFL
	Topgallant
	Troll Carriers
	United Fruit
Total: 14	**Total: 27**

Source: *Containerization Yearbook*, 1981 and 1989.

EXHIBIT 5

WORLD CONTAINER SHIP FLEET(a)
(M. TEU)

TYPE/TEU	END DEC 88 NO.	END DEC 88 TEU	ORDERBOOK NO.	ORDERBOOK TEU	ORDERBOOK OF CURRENT FLEET
Full Container(b)					
400 - 700	196	101.1	21	11.9	11.8
700 - 1000	143	121.7	20	17.7	14.5
1000 - 1500	213	266.7	21	23.1	8.7
1500 - 2000	159	287.0	12	20.1	7.0
2000 +	206	579.9	53	151.9	26.2
TOTAL F/C	917	1,356.4	127	224.7	16.7

(a) Excludes vessels less than 400 teu
(b) Includes barge carriers

Source: Drewry Shipping Consultants Ltd., *Shipping Statistics and Economics*, No 219, January 1989.

However, the second tier firm does not possess the financial resources to afford these luxuries. There are many services that the port can provide or coordinate for the second tier firm, such as warehousing/distribution, truck and rail services, and information services. A port can even use services to substitute for facilities. For example, rather than providing on-dock facilities for double-stack trains, the port can absorb the drayage of moving the container to an existng rail yard for such an activity. The port could also build an inland port to help substitute for more expensive and extensive facilities on prime waterfront property.

PUBLIC REACTION

Segments of the public will be watching the public port authority because of concern for a number of different factors.

These concerns typically fall into one of the three following categories: economics, land use, environmental impact. Each category is described below.

In addition to being concerned with the overall cost/benefit relationship of investments made by the public port authority, the public is also interested in the distribution of those costs and benefits. For example, consider a large investment in on-dock facilities at a West Coast port to handle double-stack trains for movement to Chicago. To the extent this investment has a negative return on investment, the costs involved may be largely borne -- directly or indirectly -- by the local taxpayers. On the other hand, this same facility may bring significant benefits to shippers and consignees of cargo a few thousand miles away.

The public may feel that a new port facility is not the best use for a particular piece of prime waterfront property. They may feel that a port terminal is not compatible with adjacent property (e.g. residential). They may think that other commercial uses may bring greater economic benefits. Finally, they may feel that the land should be utilized as a public recreational area.

Port activities such as dredging and landfill will have environmental impacts on the water-side. On the land-side, port activities may cause traffic congestion, air and noise pollution, and possible public safety problems.

IMPACT ON COASTAL SPACE UTILIZATON

The impact on coastal space utilization from liner activities will depend on the liner tier being targeted by the port authority, the port authority's resources, and the degree of public support involved. Ports focusing on third tier carriers should not encounter problems with the public. Typically, such a port is underutilized. The specialized facility needed by the carrier generally results in local benefits that are easy to recognize and support.

The port that attracts a first tier carrier will have to provide extensive facilities; however, this investment will result in significant benefits. Because of the financial resources of the first tier carrier, the port will typically be taking little financial risk. On the other hand, the public may not like the distribution of costs and benefits. In fact, as the port becomes more successful, the local taxpayers may become more concerned with resulting by-products such as trafic congestion and pollution.

The port focusing on second tier carriers may face the widest range of public reactions. The port is faced with the widest range of choices and the carriers may have limited financial strength. Consequently, the port may find itself having to justify why it did not take alternative actions and why it appears to be taking high financial risks.

FUTURE SCENARIOS

In the future, the same factors will apply but waterfront property will become even more expensive and environmental factors in many areas will become even more important. The ports of Los Angeles and Long Beach are planning for the year 2020 to develop more than 2,000 acres of new land through dredging, at a cost of more than $4 billion dollars. Few if any other ports in the U.S. will have the resources or public support to attempt to develop on this scale in the future. In fact, more port areas may follow the actions of Oakland, California, where more emphasis was placed on general real estate activities, rather than just marine transportation facilities.

For the ports wanting to expand to maintain or attract first tier carriers, technology may play a greater role. Use of advanced computer systems and automated or semi-automated equipment may result in smaller terminals for the same throughout. High rise parking garage-type storage facilities for containers would also reduce the need for waterfront property. Eventually, ports

may even build offshore container terminals (either floating or fixed structures).

The public should be aware of the impact of hazardous waste liability on future port development. Under current law, the owner of property containing hazardous waste may face huge liability exposure, even though the waste might be buried in the ground due to the activities of a previous owner. A possible result of this legal dilemma is that ports may prefer to develop pristine waterfront property rather than underutilized industrial land.

The future will also see some ports with highly utilized, newly developed terminals suffering from the "agony of success". Attracting more huge containerships of first tier carriers to a port may result in traffic congestion on the inland side. A successful port may have to work on improving road and rail access, often involving geographic areas outside of its jurisdiction. In addition to huge amounts of containers, successful ports typically face significant peak demand on one or two days of the week.

Peak truck traffic may cause air pollution problems as well as traffic congestion. In the future, ports may pay greater attention to trying to spread out the pattern of ship arrivals during the week. In severe situations, the movement of trucks from port terminals might be restricted during rush hours. More emphasis will also be placed on improving rail services to the docks.

In conclusion, the liner market will continue to have a significant impact on coastal space utilization. While advanced technology may help reduce some of the negative impacts involved, there is no substitute for careful planning that includes all the parties affected.

REFERENCES

Containerization Yearbook 1981, National Magazine Co., Ltd., London, England, 1981.

Containerization Yearbook 1989, National Magazine Co., Ltd., London, England, 1989.

Drewry Shipping Consultants Ltd., *Shipping Statistics and Economics* No. 219, London, England, January 1989.

Gibney, R.F., "Container Lines: The Strategy Game", A Lloyd's Shipping Economist Study, Essex, England, November 1984.

Japan Maritime Research Institute, "Advent of the Large Scale Intermodalism and Underlying Problems", JAMRI Report No. 27, Tokyo, Japan, April 1988.

-----"The Effects of Containerization - The Winners and The Losers", JAMRI Report No. 14, Tokyo, Japan, February 1986.

-----"Where Conference and Non-Conference Carriers Meet: What Fixed-Day-of-the-Week-Service Aims At", JAMRI Report No. 23, Tokyo, Japan, November 1987.

Marcus, Henry S., *Planning Ship Replacement in the Containerization Era*, Lexington Books, D.C. Heath and Company, Lexington, MA, 1974.

"Competing in the International Liner Trade: The Challenge for Public Port Authorities", Coastal Society, Boston, MA, October 1988.

-----"Trends in U.S. Liner Shipping: Past, Present and Future", World Conference on Transportation Research, Vancouver, May 1986.

Marcus, Henry S. and Martland, Carl D., "Moving Marine Containers By Rail", May 1985.

Pearson, Roy and Fossey, John, *World Deep-Sea Container Shipping*, Gower Publishing Co. Ltd., Harts, England, 1983.

Porter, Michael E., *Competitive Advantage*, The Free Press, New York, NY 1985.

Sclar, Michael L., "The Future of World Trade and its Meaning for Ports", Seatrade International Ports Congress, Ghent, October 1988.

"Top 20 Lines on Course for Larger Slice of World Fleet", *Containerization International*, The National Magazine Co. Ltd., London, England, October 1988.

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His educational background consists of a B.S. from Webb Institute of Naval Architecture, two M.S. degrees from M.I.T. and a doctorate from Harvard Business School. He has authored or co-authored five books related to marine transportation. His next book will contain a collection of case studies dealing with intermodal movement of marine containers.

Dr. Marcus has participated in committees and panels for the Marine Board and the Transportation Research Board of the National Research Council; the Society of Naval Architects and Marine Engineers, and the National Advisory Committee on Oceans and Atmosphere (a presidential commission).

Through nearly two decades of extensive consulting for domestic and international maritime industries, Professor Marcus has been able to make major contributions to the field of marine transporation.