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The Maritime Transport Crisis

Hans J. Peters

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Foreword

More than three-quarter of the world's trade volume is moved across the oceans. Almost every product in today's market has been transported by sea at some stage between its raw material source and final sale. Industrialized and developing economies alike depend on maritime transport to further their economic development.

Technological progress has enabled the maritime transport industry to enhance its performance potential to unprecedented levels. As shippers started to revamp their manufacturing and marketing practices, ocean carriers sought new ways to meet their clients' changing demand for transport. Today, many of these carriers offer door-to-door transport services and assume full responsibility for supply chain management.

Unlike in the past, competitive maritime transport is now available in all corners of the world. The supply of tonnage for transporting different commodities outstrips the demand for sea transport by substantial margins. Thus all countries, regardless of their status and location, have access to efficient maritime transport services. Unfortunately, the global realities are different. A large number of countries maintains policies to protect their national fleets through cargo reservation and a variety of subsidy schemes. The economic and social costs of such policies are substantial. Adherence to maritime protectionism usually undermines trade performance, especially in the case of developing countries.

Within the context of transport sector dialogues with its borrowing member countries the Bank addresses trade performance issues that are related to national transport system inefficiencies. Quite frequently, such inefficiencies are rooted in distorting regulation and inadequate management of maritime transport services and infrastructure. In order to establish a basis for advising member countries about necessary system adjustments, the Bank monitors technological developments and changes in commercial as well as managerial practice in the international maritime transport markets. The present paper documents the outcome of investigations into the changing organization of maritime transport. It draws on the findings of two previous publications[1] which were widely distributed and subject of several workshops arranged by maritime industry and shipper organizations in different parts of the world.

The assessments and conclusions which are outlined in this paper reflect wide-spread consensus among carriers and shippers about the key issues that impede the provision of efficient maritime transport. It is hoped that the present document will contribute to finding ways and means which would enable the international maritime transport industry to deploy its full potential in support of trade and economic growth in all countries.

Louis Y. Pouliquen
Director
Transport, Water, and Urban Development Department

[1] Policy and Research Series 6. 1989. *"Seatrade, Logistics, and Transport"*; and Policy Research Working Paper 1128. 1993. *"The International Ocean Transport Industry in Crisis - Assessing the Reasons and Outlook"*.

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The final outcome of the documented work benefitted from observations by maritime industry managers and shipper representatives, as well as maritime research institutes, which ensured that the interpretations of market developments reflect realistic assessments of industry behavior. In particular, William Bolitho of Australian National Lines, Karl-Heinz Breitzmann of Rostock University, Richard Goss of the University of Wales, Christel Heideloff of the Bremen Institute of Shipping Economics and Logistics, and Deborah Seyman of Lloyd's Shipping Economist have to be thanked for their interest in the study and for their gracious supply of data and information.

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Abstract

Over the past 30 years the annual volumes of international seatrade quadrupled and grew to four billion tons in 1990. At the same time there have been fundamental changes in structure of the seatrade markets. Many traditional cargoes declined whereas new types of traded commodities appeared on the scene, and their volumes expanded rapidly. Innovative forms of packaging and handling, facilitated by technological progress, revolutionized cargo management. But the pace of growth in global seatrade volumes has been volatile.

It was relatively easy for the international maritime transport industry to respond to the steeply growing demand for ocean transport during the first three decades after World War II. As the seatrade volumes increased from year to year, practically in all corners of the world, carriers added new tonnage to their fleets, and the returns on investments in ships and ancillary facilities were usually very attractive. The merchant fleet grew very fast, by more than 400 percent in collective carrying capacity between 1950 and 1980, when the aggregate peaked at 700 million deadweight tons. However, starting with the first oil shock in 1973, the scenario has changed drastically. Since then the international seatrade markets have been anything but stable. As it turned out, it took on average six months until recessionary trends in the world economy started to have an impact on the seatrade markets, and it took another 12 to 15 months for the maritime transport industry to react.

In the wake of declining seatrade volumes severe tonnage overhangs developed in almost all segments of the international maritime transport industry. But most shipowners were hesitant to withdraw tonnage from the market because of the prevailing belief that trade contractions would be short-lived, which was not always the case. As essentially the same number of ships remained available for less cargo intense price competition set in, and freight rates have generally declined real terms during the last 12 years, barring a brief rise in the late 1980s. The distorted demand-supply relation in ocean transport was aggravated by uncontrolled new market entries of tonnage which was encouraged through subsidy and cargo reservation schemes adopted by many governments. The declared objective behind such schemes were improving invisible trade performance and employment generation. However market realities demonstrated that such objectives were rarely met, and countries choosing to maintain such policies usually experienced negative impacts on their trade performance. They missed the point that competitive maritime transport services had become available in all corners of the world, and that buying shipping services in the international market would be most beneficial for national trade.

In today's market there are many instances were vessels' freight earnings barely cover operating cost. Because of deteriorating financial performance shipowners were compelled to cut cost which quite frequently led to curtailing maintenance expenditures. Tighter finance also meant that vessel replacements and fleet expansion were postponed. As a result, the international merchant fleet has not only become critically overaged but its safety record is worsening as well. Ship casualties are on the rise, and structural failure is one of the most commonly identified causes. Such casualties often entailed environmental damage of major proportions which provoked public outrage and induced many governments to pass legislation to ensure effective policing of safety standards. The U.S. Oil Pollution Act of 1990 is the most stringent legislation in this respect, as under its provisions polluters will be held fully liable for all environmental damage caused.

A key factor perceived to be associated with the increasing number of sub-standard ships and the deteriorating safety record of the international merchant fleet is the apparent failure of classification societies to secure maintenance of accepted seaworthiness norms. Furthermore, the international organizations which were established to oversee the conduct of ocean transport have not been able to effectively enforce globally adopted maritime rules and regulations.

Reacting to these developments, the insurers of the maritime transport industry were compelled to increase premiums by substantial margins, so that in many cases the insurance cost now represent more than 20 percent of vessel operating expenditures. Further increases are likely, if the increasingly poor safety performance of the international merchant fleet cannot be contained.

In view of all these developments, the international maritime transport industry has drifted into a deeply rooted crisis. Too many adverse developments in the trade, financial, and insurance markets, as well as in international legislation have materialized during recent years. Their combined effects on the industry are far-reaching. The industry endured precarious situations in the past but the makings and scale of the current situation have no precedent. It is now just a question as to when the bubble will burst. At that point a large portion of the international merchant fleet will be unfit for transport. The implications for world trade will be devastating.

It will be costly to correct fleet deficiencies and to arrange for limited fleet expansion in light of modest growth prospects for seatrade. Replacing critically overaged tonnage, and addressing the requirement of additions to the current fleet are estimated to entail a newbuilding program of 330 million deadweight tons between 1993 and 2000, for which more than US$ 300 billion financing, in constant 1992 cost terms, will have to be mobilized. The expenditures required to make up for deferred vessel maintenance and to institute appropriate repair arrangements are likely to exceed US$ 50 billion during the next eight years. Finally, there is a need to mobilize US$ 10.5 billion in order to acquire more than 260 million deadweight tons of tonnage that will have to be scrapped. Altogether, the price tag of this massive intervention program may well exceed US$ 400 billion, if cost inflation would be included in the calculations.

The obvious question is whether the international maritime transport industry will be able to mobilize such considerable sums. Ever since moving away from total self-financing in the 1960s, the maritime transport industry has overwhelmingly relied on mortgage loans from commercial banks for the finance of ship acquisitions. However over the past three years the bank's appetite for ship finance has been tempered by fears of debt-financed expansion. Several of these banks had to internalize huge ship loan losses and are therefore reluctant to further engage in asset-secured financing.

Most financial institutions that are willing to further engage in maritime transport industry related business consider cashflow-based lending as the henceforth only acceptable form of funding. Cashflow-based lending is deemed to be the potentially most effective instrument to hedge against the cyclical pattern of demand for ocean transport. The level of such type of lending is tailored around the projected earning capacity of a vessel. In order to gain access to the capital markets for both investment and long-term debt, the maritime industry will need to establish more lasting relationships between owners, operators, and cargo interests. Cargo owners should be prepared to work in cooperation with shipowners and operators in establishing long-term stability in the seatrade markets' demand-supply relations, and thereby the cost of seaborne transport. In practice, however, there does not seem to be any rush on the part of most cargo owners to make such arrangements. Freight markets remain dominated by short-term

charters and decision-making which is essentially based on the cheapest transport cost, regardless of quality. But it is precisely this situation which has generated such much deterioration in the quality of service, the safety record, and the financial performance of the maritime transport industry.

The lack of effective financing arrangements for the acquisition of tonnage to be scrapped is equally disconcerting. At the same time there are at present no indications that sufficient funds will be available in the immediate future for required investments in modern demolition facilities which will ensure high productivity rates. While shipbreaking will remain a labor-intensive activity, the sheer extent of volume increases in the tonnage to be scrapped, which is expected to reach levels four times higher than at present, will necessitate the introduction of more mechanized and also automated processes. If the achievement of such prerequisites is left to the few fledgling demolition yards that presently exist in a limited number of developing countries, there is little hope for major improvements in shipbreaking capacities and output. The fact that the governments of these countries have shown little inclination to provide the funds for required investments in breaking facilities, not to mention foreign exchange which is needed to acquire tonnage to be scrapped, aggravates this situation.

In summary, the aggregate capital requirements of the international maritime transport industry during the next eight years are presently far from secured. There are at the moment no effective arrangements to correct this situation. In fact, there are more doubts than assurances hanging over the industry and the markets it serves. ***Therefore the crisis has become real.***

I. Introduction

In the course of the World Bank's assistance programs for developing countries fundamental and continuously ongoing changes in the structure of trade markets and the organization of the related service industries have been identified. Particularly the seatrade markets and the international maritime transport industry seemed to undergo substantial change. Freight origins and destinations shifted much more rapidly than in the past, and the types of cargo and their forms of packaging kept changing. These trends became more and more pronounced since the beginning of the 1980s. The Bank's first assessment of the causes and effects of such developments[2] concluded that considerable changes in international manufacturing and product marketing practices have tended to alter the profile of demand for ocean transport in significant ways. A further conclusion was that technological progress had enabled shipowners and operators to drastically revamp their service offerings and networks in response to changing ocean transport demand. As a result, the organization of the international maritime transport industry has been--and remains--in a constant state of flux.

During the intervening years, however, there were many manifestations which seemed to suggest that this industry was increasingly afflicted by developments that undermined its ability to serve the seatrade markets efficiently. The international merchant fleet has become critically overaged, and its safety record is deteriorating. There are frequent reports that freight earnings are below the cost of operating ships, which is ascribed to substantial tonnage overhangs that have developed in many segments of the industry. Because of inadequate revenue incomes, neglect of maintenance appears to be widespread. The decline in overall vessel productivity and service reliability is said to be largely due to tonnage in poor condition. There are indications that financial resources for fleet renewal and tonnage overhaul are becoming more limited. All in all, the status and appearance of the industry in the early 1990s could be interpreted as signals that ***the maritime transport sector has drifted into a deeply rooted crisis***.

This report reflects the findings of a research effort within the Bank's Transport, Water, and Urban Development Department which was aimed at developing a clearer understanding of the crisis in the international maritime transport industry. The intention was to identify and analyze the root causes, to assess the attributable effects on the industry's performance, and to establish a basis for projecting the future course of international maritime transport.

In Chapter II an overview is given of the status of the international maritime transport industry in early 1993 in terms of fleet composition, tonnage volumes, ownership patterns, and vessel registration practices, together with indications of the current level of newbuilding orders. Chapter III describes the international seatrade markets, by analyzing developments in these markets since the mid-1970s, their status in the early 1990s, and projecting expected trends during the remainder of the current decade. The response behavior within the international maritime transport industry to volatile changes in global demand for sea transport is portrayed in Chapter IV, which also recounts trends in freight rates and projects likely fleet utilization until the year 2000.

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[2] Peters, Hans J. 1989. *"Seatrade, Logistics, and Transport"*. Policy and Research Series 6. World Bank, Washington, D.C.

The key impediments to the present and future organization and performance of the international merchant fleet are discussed in Chapter V, and indications are given of the diverse impacts of these impediments on the maritime transport industry and the environment in which it operates. Chapter VI provides an overview of what would be required to equip the international merchant fleet with sufficient and safe tonnage to meet current and expected global demand for sea transport in the medium term. This overview is supplemented by assessments of the capabilities in the world's shipbuilding and repair industries to effectively address such requirements. Further details are elaborated in the annex to this report. Chapter VII describes the financial dimensions of actions which would have to be taken to ensure that the international merchant fleet can be brought up to acceptable safety and performance standards, and to expand in line with expected growth in global seatrade. At the same time observed constraints in financing maritime transport assets are discussed, and indications are given of potential options to overcome these constraints.

For the reader who is less familiar with the maritime transport industry and the terms and concepts used in its operation and management a glossary of maritime terms has been included at the end of the report.

II. The International Maritime Transport Industry at Present

At the outset of 1993 the world merchant fleet had a total carrying capacity of about 657 million deadweight tons (dwt), and almost 65 million dwt were on order with shipyards in 40 different countries (see Table 1 below). During 1992 an estimated total of 4.1 billion tons of seaborne cargo was carried by the world's merchant fleet which produced about 17.5 trillion ton-miles in the process. About 40 percent of the ocean transport activities were in the oil trades, including crude and petroleum products; another 40 percent was serving the key dry bulk trades, including iron ore, coal, and grain, as well as the minor bulks, such as agricultural and forestry products. Only one-fifth of the registered tonnage was engaged in the general cargo trades, which also comprises the sea carriage of containers.

Table 1: **THE WORLD MERCHANT FLEET AND NEWBUILDINGS ON ORDER**
Status in early 1993

Category	Order Book		Existing Fleet	
	dwt (mn)	# of units	dwt (mn)	# of units
General Cargo Ships (incl. Reefer tonnage)	2,656	428	92,982	16,094
Container Vessels (all kind)	5,502	197	29,994	1,281
Tankers (Oil, Chemical, Gas, and Product categories)	37,672	620	285,380	7,977
Dry Bulk Ships (incl. Combination Carriers)	18,176	252	240,161	5,027
RoRo Vessels	0,523	76	8,146	1,024
WORLD TOTAL	***64,529***	***1,573***	***656,663***	***31,403***

Source: Fairplay. "*Newbuilding Supplement*". January 1993. London
Institute of Shipping Economics and Logistics. "*Statistical Tables*". Various issues. Bremen

The consequence of this market structure with its preponderance of liquid and dry bulk cargoes was that the majority of vessels deployed during 1992 was operating either on a charter or tramp basis, which is common practice in the bulk trades. In the general cargo trades the conference-based liner segment was much reduced in comparison with previous years. This phenomenon confirms the earlier recognizable trend towards *independent action* which has been increasingly adopted by different carriers, particularly in the container sector. Under this type of arrangement carriers negotiate (freight) service contracts directly with shippers. By doing so, they by-pass existing conference rules for specific trade routes. Such service contracts often span longer periods, i.e. they are usually not limited to one shipment, and are widely considered to be more advantageous to shipper and carrier alike than conference regulated maritime transport.

Continuing a trend that could already be observed during the 1980s, 1992 saw a further concentration of fleet ownership. Shipowners in five countries --Greece, Japan, the U.S.A., Norway, and Hong Kong--controlled over 50 percent of the world merchant fleet. But the present pattern of ship registration and 'flags flown' does not reflect the true state of ownership. Almost half of all merchant ships which were registered in 1992 flew so-called 'Flags of Convenience' (FOCs) of countries which provide shipowners with substantial benefits. These benefits entail tax allowances or holidays, freedom to crew ships with low-wage labor, regardless of nationality, and without the involvement of labor unions, and frequently also less stringent vessel classification and inspection rules. Table 2 on page 5 provides details.

The principal countries that offered FOCs in 1992 were Liberia, Panama, Cyprus, and the Bahamas, a situation which remained largely unchanged from earlier years. Some European countries--notably Germany and Norway--have established 'second national flags' which provide for essentially the same benefits as FOCs, but they are primarily chosen by shipowners who are resident in these countries. On the other hand, there was some new development during 1992 which led to a growing importance of formerly less visible FOCs, like Malta. One factor behind these occurrences was the rapid outflagging of vessels from the republics of the former Soviet Union (FSU).

Developing countries, as a group, could double their share of the world fleet during the ten years preceding 1992, and now account for roughly 25 percent of ownership. However the majority of this share--almost two-third--represents ships owned by parties in Asia. In addition, it is important to note that in those developing countries which have instituted liberal maritime regulations, shipowners in growing numbers resorted to FOCs. China, Indonesia, and South Korea are examples. Industry statistics for the first three years of the 1990s indicate that this trend continues unabatedly.

While outflagging is one phenomenon that points to a fundamental change in the organization of international ocean transport, another one relates to ship management. Developments during 1992 demonstrate that more shipowners have passed the responsibility for asset marketing and operations to professional ship management organizations. These are usually private companies that are not involved in ownership but engage in managing vessels on a contractual basis to secure the best rates of return on their clients'--the shipowners--investments. A very substantial portion of the international tanker and dry bulk fleets were managed under such arrangements, basically continuing a trend which has set in during the 1980s. But these arrangements are not limited to the bulk sector. As in preceding years, also in 1992 there was a growing number of general cargo and container vessel owners who resorted to asset management by professional organizations. Most of these organizations are located in the world's principal shipping centers, like London, Hong Kong, New York, and Singapore. The users of these vessel management services come from all country groups, which also include developing nations and--as the latest development--the FSU republics.

It has thus become difficult to identify the true ownership of, and for that matter the accountability for many vessels engaged in seatrading. The flag flown and the port of registration do not any longer reveal conclusively. In addition to management by third parties, there are usually mortgage banks involved that have proprietary rights, and ships' officers and ratings may be citizen of a variety of countries. It is therefore not unusual to identify several parties of different nationalities that are associated with one ship. If anything, maritime transport in the 1990s has become a very complex industry.

Table 2: **THE WORLD MERCHANT FLEET**
Ownership and Registration Patterns
(vessels exceeding 300 grt)
Status: December 31, 1991

Country of Domicile	National Flag dwt	Foreign Flag dwt	Total dwt	Foreign Flag as percentage of Total	Total as percentage of World Total
Greece	41 859 998	52 549 313	94 409 311	55.7	14.8
Japan	32 951 196	49 836 719	82 787 915	60.2	13.0
U.S.A.	18 307 576	43 108 154	61 415 730	70.2	9.7
Norway	37 838 056	18 934 850	56 772 906	33.4	8.9
Hong Kong	3 887 664	28 258 783	32 146 447	87.9	5.1
FSU	27 233 783	2 579 203	29 812 986	8.7	4.7
China	19 855 948	6 058 735	25 914 683	23.4	4.1
United Kingdom	5 870 529	17 570 273	23 440 802	75.0	3.7
South Korea	11 414 224	6 361 036	17 775 260	35.8	2.8
Germany	6 555 611	8 967 829	15 523 440	57.8	2.4
Denmark	7 763 652	4 927 169	12 690 821	38.8	2.0
Italy	9 900 320	1 663 541	11 563 861	14.4	1.8
Taiwan	7 368 914	4 108 553	11 477 467	35.8	1.8
India	10 203 623	610 144	10 813 767	5.6	1.7
Brazil	9 356 082	443 112	9 799 194	4.5	1.5
Sweden	3 342 995	5 717 387	9 060 382	63.1	1.4
Iran	8 274 363	18 863	8 293 226	0.2	1.3
Turkey	7 017 974	561 281	7 579 255	7.4	1.2
Singapore	4 972 367	2 066 801	7 039 168	29.4	1.1
France	2 971 030	3 201 033	6 172 063	51.9	1.0
TOTAL	***276,945,905***	***257,542,779***	***534,488,684***	***48.2***	***84.0***

Source: Lloyd's Maritime Information Services. London

III. Developments in the International Seatrade Markets

In 1960 the annual volume of international seatrade had reached a level of one billion tons, with equal shares of dry and liquid cargo. During the following years the average annual growth rate of liquid cargo--essentially crude oil and its derivatives--was 11.5 percent. The yearly increments of dry cargo were considerably lower. In the early 1970s the share of liquid cargo in the annual seatrade volumes had increased to about 60 percent. It peaked with 1.87 billion tons (versus 1.35 billion tons for dry cargo) in 1973. During that year the first international oil crisis materialized and had an immediate effect on the volume of liquid cargo trades, which declined to 1.5 billion tons in 1975. Meanwhile the annual volumes of dry cargo continued to increase, caught up with the liquid cargo trades in the mid 1970s, and exceeded the growth of liquid cargo by considerable margins until 1980 (see Figure 1 below).

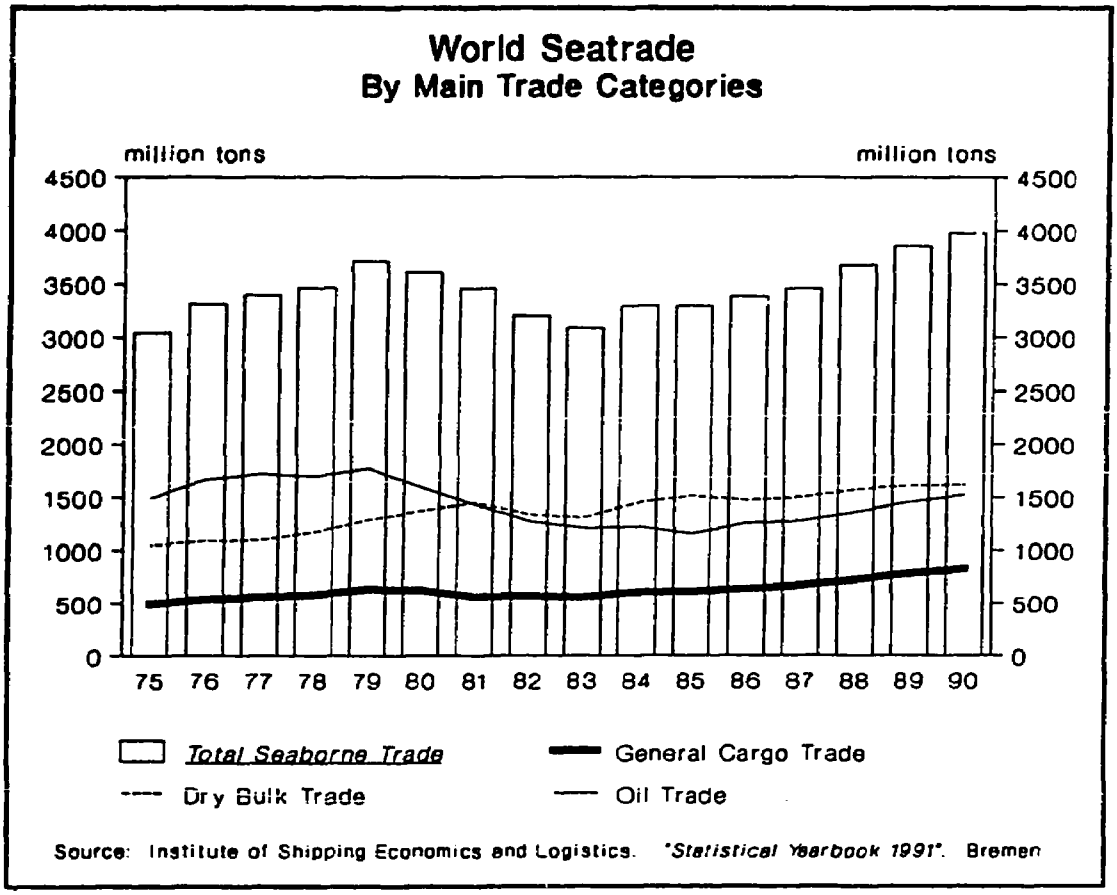

Figure 1

At the beginning of the 1980s the second oil shock occurred. Unlike in 1973, however, the effects of this crisis impacted on both trades, and their volumes declined for several years. By 1983 the total volume of international seatrade had fallen below the level of 1974. But the consolidation phase for dry cargo was relatively short and growth resumed after 1983, whereas the decline in annual liquid cargo

volumes continued until 1985. The mild recession in the world economy of the mid 1980s had a temporary dampening effect on both trades. Following a brief respite each segment continued to grow after 1987, if at different annual rates. The average yearly growth rate for each trade category and their main sub-divisions between 1985 and 1990 are shown in Table 3 on page 8. By 1990 the total annual seatrade volume reached four billion tons, including about 2.5 billion tons of dry cargo and 1.5 billion tons of liquid cargo. The dry cargo category of seatrade includes dry bulk and general cargo. Subsumed under the latter are the containerized and other forms of unitized trades. The share of general cargo in total annual seatrade volumes has increased from 12-14 percent in the early 1960s to about 20 percent in 1990.

All three phenomena--reduced liquid cargo, steeper proportional increases in dry cargo volumes, and a steady growth in the share of general cargo--point to fundamental changes that have taken place in the organization and management of international seatrade. As it turned out, the liquid cargo segment was the most vulnerable with regard to downturns in the world economy. Crisis situations had an immediate negative impact on traded volumes which lingered much longer than in the case of dry cargo. On the other hand, once recovered the ensuing annual growth rates of liquid cargo trades were higher than those displayed by the other trades. Noteworthy is the fact that the general cargo trades were the least affected by economic crises and maintained steady growth trends during most of the period between 1970 and 1990.

During the years ahead the composition and proportional share of cargoes, as well as the growth rates in the international seatrade markets will be strongly influenced by a number of factors. These factors reflect predicted further changes in industrial practice, in the structure and management of global trading, and in economic and social policies adopted by individual countries. Developments along these lines during the 1980s suggest that the principal drivers behind the predicted changes are likely to include further globalization of manufacturing processes, ongoing adjustments to production techniques and organization, more relocation of industries, continued integration of key regional markets, substantial growth in value-adding at source, an increasingly forceful drive towards conservation, and the growing importance of environmental concern.

The *globalization of manufacturing processes* has been sparked by the search among Organization for Economic Cooperation and Development (OECD) industries for countries which afford lower factor cost and offer other conditions of comparative advantage. These corporate objectives have already induced substantial outsourcing of intermediate manufacturing and assembly tasks to a variety of developing countries during the 1980s. A recent Bank survey[3] not only confirmed these developments but projected much further expansion of such industrial practices. Owing to such trends the demand for long-haul ocean transport of many primary commodities from developing to industrialized countries can be expected to diminish. On the other hand, however, there will be an increasing need for small high-value shipments in short time intervals.

The last observation reflects *changes in production techniques and organization* which have evolved for a number of reasons. Firstly, growing integration of the acquisition, production, and marketing processes through cost-minimizing supply chain management techniques has induced a trend towards inventory reduction. These developments have already led to very specific demand for speedy

[3] Peters, Hans J. 1992. *"Service - The New Focus in International Manufacturing and Trade"*. Policy Research Working Paper No. 950. World Bank, Washington, D.C.

Table 3: THE RISE AND FALL OF SEATRADE

Category	Volume Changes (average annual percentages) 1985 - 1990 ACTUALS	1990 - 2000 PROJECTIONS
KEY DRY BULK COMMODITIES (of which)	**2.8**	**1.6**
Iron Ore	2.1	1.2
Steam Coal	4.3	6.5
Coking Coal	2.6	2.2
Grain	3.3	- 1.7
Bauxite	5.0	0.7
Phosphate Rock	- 2.4	- 2.0
Fertilizers	4.3	2.3
PETROLEUM (of which)	**5.6**	**1.7**
Crude Oil	6.1	1.2
Products	3.1	3.5
MINOR BULKS (of which)	**1.5**	**1.6**
Agricultural Products	2.0	1.3
Forestry Products	2.6	2.1
Ores and Minerals	1.9	1.6
Steel Products, including Scrap	0.7	1.8
ALL DRY BULKS	**2.4**	**1.7**
ALL LIQUID BULKS	**5.7**	**1.7**
ALL BULKS COMBINED	**4.0**	**1.7**
GENERAL CARGO	**4.7**	**5.5**
TOTAL SEABORNE CARGO	***3.9***	***2.6***

Source: **For Actuals:** Drewry. "*Trade and Shipping Statistics*". Various issues. London
For Projections: Peters, Hans J. 1991. "*The Prospects of Seaborne Bulk Trades - A Reassessment*". Mimeo. World Bank, Washington, D.C.

and highly reliable maritime transport services, which are fully integrated with land transport systems to enable streamlined door-to-door delivery arrangements. Secondly, many industries are seeking out and have started to use alternative, more cost-effective materials. For instance, modern car manufacturing incorporates 40 percent less steel than only ten years ago. The value of goods shipped continues to increase, but they need far less raw materials to be produced and less space for transportation. Thus many of the customary cargoes in ocean transport are losing importance and are replaced by others, requiring very different types of packaging and transport.

The *relocation of industries* phenomenon is demonstrated by the fact that in some OECD economies industrial enterprises move entire production complexes to other countries in order to by-pass quota restrictions and other regulatory market constraints. Japanese car manufacturing in the U.S.A. and Europe is an example. The demand for sea transport of presumably a growing number of finished industrial products--particularly automotive--will thus diminish.

The *integration of regional markets* has become a universal trend. There is increasing evidence of growing trade shares confined to clusters of countries. In particular, this will be the case for geographic zones where inter-regional trade is promoted through special multilateral arrangements. Examples are the North American Free Trade Agreement (NAFTA) covering Canada, Mexico, and the U.S.A., the Association of Southeast Asian Nations (ASEAN), and the European Community (EC). Close to 65 percent of West Europe's trade is within the EC. As a result of these developments, each region's volume of seaborne trade with the outside world can be expected to decline.

The *value-adding at source* represents growing efforts by many developing countries to obtain better income from indigenous products which were once shipped in their raw state but are now increasingly processed prior to shipment. For instance, several economies within the Organization of Petroleum Exporting Countries (OPEC) group have started to build up their own petrochemical industries close to the source of crude oil. The obvious implication of these trends is reduced demand for bulk transport of crude, and increased volumes of petroleum derivatives which are carried in product and chemical tankers. Similar observations apply to other raw materials in the mining and agricultural sectors, and the related effects on long-term demand for ocean transport.

Conservation has been identified as another factor which will influence future demand for ocean transport. For instance, previous energy crises have induced major reductions in oil consumption. As a case in point, Japan could reduce its oil consumption by 50 percent during the years following the oil crisis of the mid-seventies. There is also growing interest in recycling which tends to suppress the demand for original raw materials. In several OECD countries up to one-third of national steel production is derived from recycled scrap. Similar conservation measures can be observed with other primary inputs to production. The effect of such practices has already been such that the demand for ocean transport for a number of raw materials has declined within several trade regions.

Finally there is the point of *environmental concern*. The main impact of such concern is related to the energy sector where the demand for alternative 'clean fuel' is growing, particularly in Western Europe and Japan. Coal and oil as energy source are widely seen as major sources of avoidable pollution. The outcome of new energy policies adopted in a number of industrialized countries translates into more transport of Liquified Natural Gas (LNG) and reduced demand for transport of oil and coal in some segments of the seatrade market. Another example of environmental concern and its influence on ocean transport are government policies restricting the expansion of national oil refining capacities--as is the case in Japan. There will be reduced flow of crude into these countries, which will be offset by

increasing import of pre-processed petroleum derivatives from overseas. Both phenomena will influence the future composition and scale of seatrade.

The medium-term outlook for the growth of seatrade is modest. Average annual growth projections until 1995 are given in Table 3 on page 8. Trade volumes per year for almost all commodities are expected to be lower than the annual averages of the late 1980s. A notable exception are the general cargo trades which are likely to continue their path of solid growth. The industrial restructuring and the new approaches to manufacturing and marketing will contribute to even steeper annual increases of the general cargo trades. These projections are based on the assumption that the current recession in Japan, North America, and Western Europe will bottom out in the mid 1990s, and that from 1996 onwards annual economic growth rates will attain levels which were common during the second half of the 1980s.

Such scenario can be expected to create a situation whereby the yearly volume of seatrade will be of the order of five billion tons at the end of the 1990s. The share of dry cargo will increase further to about 65 percent of total seaborne trade. In the liquid cargo segment petroleum products will have reached a more prominent stance vis-a-vis crude oil. The annual incidence of general cargo is forecast to reach 1.3 billion tons, which would mean a further expansion of this segment of the seatrade markets from 20 percent in 1990 to a share between 26 and 28 percent of all cargo transactions in the international maritime transport industry.

IV. How the Maritime Transport Industry Copes with Volatile Seatrade

> *Experience suggests that it takes about six months until recessionary trends in the world economy start to have an impact on the seatrade markets, and that it takes another 12 to 15 months for the maritime transport industry to react.*

During the first years after the end of World War II the international seatrade market grew at unprecedented rates. These developments lasted for almost thirty years and provided shipowners with attractive earning opportunities. The returns on investments in shipping assets were substantial. Consequently the international merchant fleet grew very fast, more than doubling its collective carrying capacity between 1950 and 1970. In view of the continuous rapid expansion of seatrade and their derived steady stream of freight revenues--which usually far exceeded the cost of providing ocean transport--shipowners became so complacent that many did not recognize the potential effects of the oil crisis in the mid-seventies on the performance of the world economy, and hence on trading activities. In fact, the few cautioning voices were silenced when seatrade picked up again around 1975, and more ships were ordered in anticipation of continued steep growth trends in the seatrade markets. And so the world merchant fleet increased to 700 million dwt in 1982. In the process the collective carrying capacity of the fleet doubled again, but this time in less than ten years. However there is no market in which expectations of future profitability do not sooner or later stimulate the introduction of excess capacity.

When the resumed growth of annual seatrade volumes came to a sudden end in the late 1970s, the previous expansion pattern of the world merchant fleet changed considerably. The collective carrying capacity of the fleet remained within a limited band between 640 and 700 million dwt during the following nine years. In view of the fact that the annual growth rates of seatrade turned negative and continued that way for several years, many maritime transport operators adopted for the first time a more cautious approach to fleet development and managing their assets. But there were differences of opinion and in approach among shipowners serving the different trade segments (see Figure 2 on page 12).

After the global recession of the 1980s bottomed out in 1986 international trade intensified again, and when the annual seatrade volumes started to grow at rates which had been characteristic for the heydays during the years before the first oil crisis, shipowners took this as indications of a future bullish seatrade market. A common belief was that this trend would continue unabatedly. The number of orders placed for newbuildings rose again. The accumulated tonnage on order in 1990 exceeded 60 million dwt and thus reached the highest level since 1977.

When the annual volumes of seatrade declined and there was hardly any reduction in the combined carrying capacity of the world merchant fleet, severe tonnage overhangs developed. In 1983, almost one-third of the fleet was unemployed. Tonnage utilization in the bulk shipping sector was much more affected by the cyclical swings in the international seatrade markets than the liner trades with general cargo. The tanker sector suffered the most pronounced effects (42 percent of the fleet unemployed in 1983), followed by the dry bulk fleet (26 percent), and the general cargo fleet (ten

percent). Thanks to the revival of the seatrade markets during the second half of the 1980s, the supply overhang came down and has, since 1989, stabilized around ten percent of the world merchant fleet's capacity, as a whole. But there are differences. In the tanker sector, excess tonnage represented 16 percent of the fleet during the final weeks of 1992. It was 12 percent in the case of the dry bulk fleet, but only 4.7 percent for the general cargo segment, and it looked as if the container fleet continued to be almost fully employed.

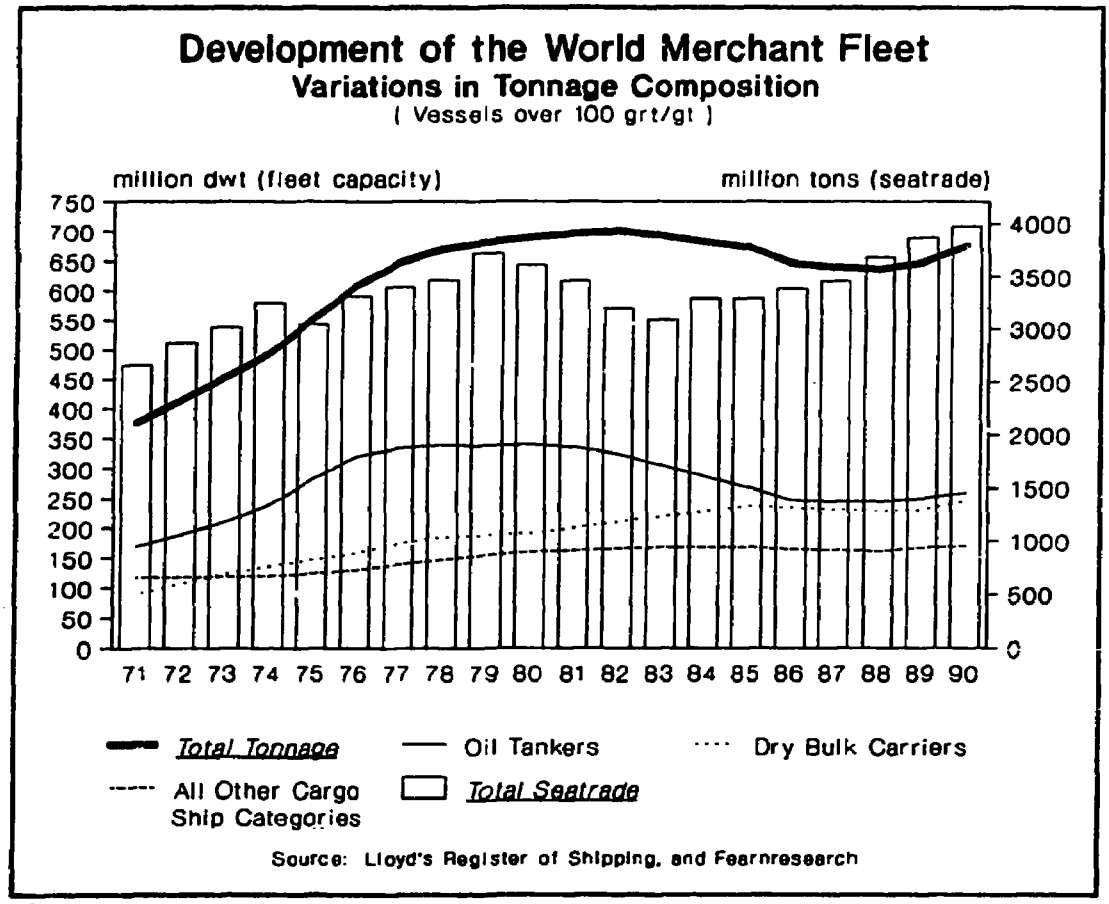

Figure 2

Most shipowners appeared unable to accept the fact that during the 1980s trends had started which were leading to fundamental changes in the structure of the international seatrade markets and in annual volume growth rates of the different cargo categories. Thus they were hesitant to eliminate underutilized assets in the hope that a renewed market upturn would generate increasing demand for ocean transport, and hence provide for improved capacity utilization for their fleets. As a result, a majority of owners opted for temporary withdrawal of their ships from the market by laying them up. This behavior was most pronounced in the tanker sector (see Figure 3 on page 13). Statistics relating to changes in fleet composition and growth rates–as in Figure 2–disguise the fact that only active tonnage is registered. Adding laid-up vessels would result in different indicators.

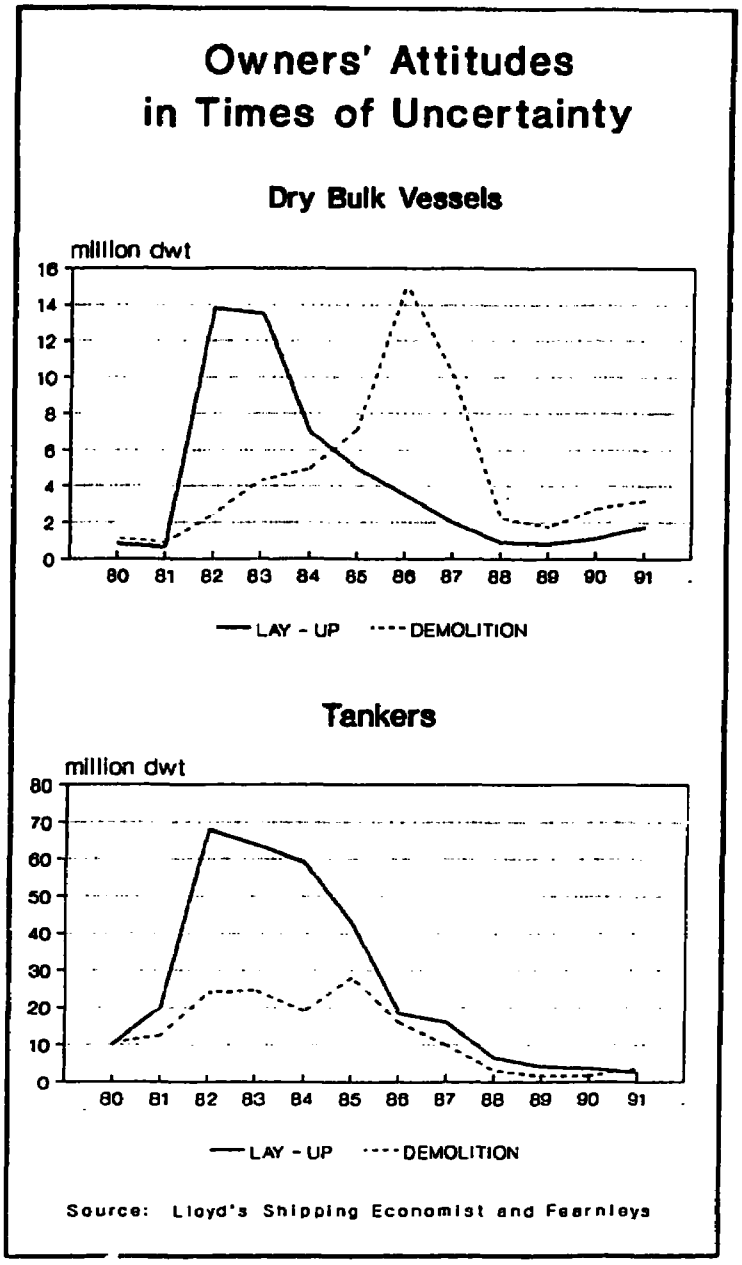

Figure 3

As the decline of seatrade volumes continued in the mid 1980s, a number of owners came around to realize that eliminating some of their shipping assets through demolition would be commercially prudent. Thus the tonnage sold for scrapping increased to over 30 million dwt between 1985 and 1986. But as soon as the market seemed to give positive indications through impressive advances in the Baltic Freight Index--which reflects developments in the freight futures market--during 1987, the number of demolition sales shrank. At the same time the number of newbuilding contracts increased sharply (see Figure 4 on page 14). These attitudes and practices point to the fact that the maritime transport industry distinguishes itself from other industries through very speculative behavior. But the high level of periodic investments in shipping, the value of existing assets, and its debt servicing obligations make maritime transport one of the most capital-intensive of all industries. Substantial freight revenues are needed to keep the maritime transport industry viable and thus in a position to provide the type of services which are required by the changing level and structure of international demand for the sea carriage of goods.

However freight rates have been highly volatile since the early 1980s. When seatrade declined and essentially the same number of ships remained available for lower overall volumes of cargo, both phenomena combined to spark intense competition which provoked freight rates to contract substantially. And while these effects could be deemed favorable for trade, they sent many carriers into a tailspin. In growing numbers shipowners were forced to reduce freight rates to defend their share in the seatrade markets. But in the wake of such pricing practices actual rate levels barely covered operating cost. With the renewed slowdown in the seatrade markets during the early 1990s, the freight earnings in most segments of the international maritime transport industry were considerably below the break-even levels which reflect the minimum charter rates or freight tariffs to cover all cost of financing, managing, and operating a cargo vessel--and which would yield a modest return on investment (see Figure 5 on page 15). Between 1989 and 1992 the average internal rates of return on investments in shipping assets shrank from 9.5 percent to almost zero. In real terms the freight rates in most segments of the seatrade markets

have been on a declining trend during most of the time since the beginning of the 1980s (see Table 4 below and Table 5 on page 15).

Table 4: GENERAL FREIGHT INDEX
annual averages; 1972 = 100

1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
369	321	232	220	217	208	172	203	261	284	261	250	228

Source: Institute of Shipping Economics and Logistics. *"Statistical Yearbook 1992"*. Bremen

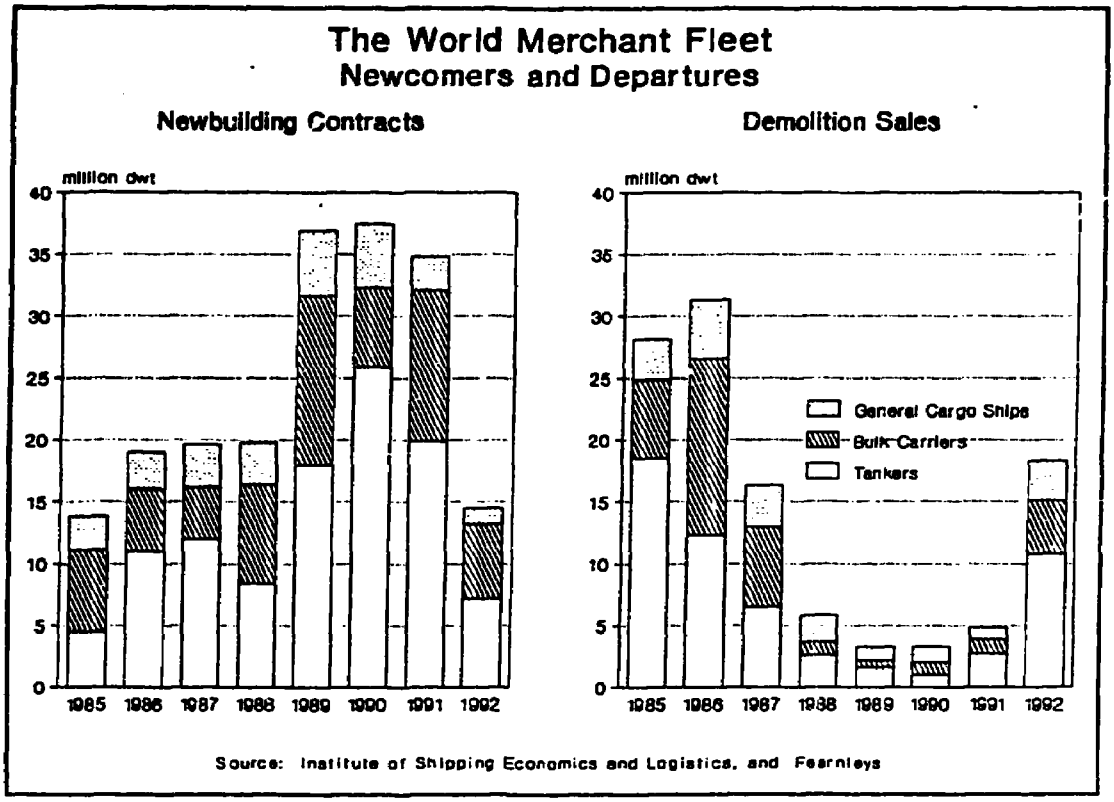

Figure 4

The outlook for improved commercial performance of shipping assets is not encouraging. In some specialized market segments, such as the container trades, unchecked ordering of newbuildings has led to such severe tonnage overhangs that the medium-term prospects for high load factors are modest (see Table 6 on page 16). The indicators in this table point to another important fact. International statistics on the degree of tonnage utilization do not reflect load factors, which is particularly critical in the case of liner trades. Thus, the reported high utilization rates for the general cargo and container fleets should be interpreted with caution. The *actual* tonnage utilization--appropriately adjusted for load factors--is therefore usually lower than the statistics suggest.

Table 5: **OCEAN TRANSPORT RATE INDICATORS**
Gyrations in Response to Changing Market Conditions

Trade Category	Service Specification	Service Rates (annual averages)				
		1984	1986	1988	1990	1992
Container Trades	Trade Routes:					
(Major Conference Rates;	Europe-Far East	2,317	2,309	3,263	3,266	2,778
in US$/TEU)	Atlantic westbound	--	2,485	2,841	3,121	3,248
	Pacific westbound	--	650	1,157	1,498	1,629
	Europe-Australia	4,884	5,325	6,942	7,884	6,386
General Cargo Trades	Vessel Capacity:					
(Tramp Trip Charter;	12,000-20,000 dwt	7.4	6.0	12.2	11.9	10.0
in US$/dwt/month)	20,000-35,000 dwt	4.9	3.7	8.4	7.9	7.4
Dry Bulk Trades	Vessel Capacity:					
(Single Voyage Rates;	25,000 dwt	18.1	19.2	35.1	32.8	30.9
in US$/ton of cargo)	120,000 dwt	6.0	3.7	6.8	6.9	4.6
Tanker Trades	Vessel Capacity:					
(Period Market;	30,000 dwt	6.6	6.8	7.9	11.6	9.6
in US$/dwt/month)	250,000 dwt	0.8	1.4	1.6	2.7	1.8

Source: Lloyd's "*Shipping Economist*". Various issues. London

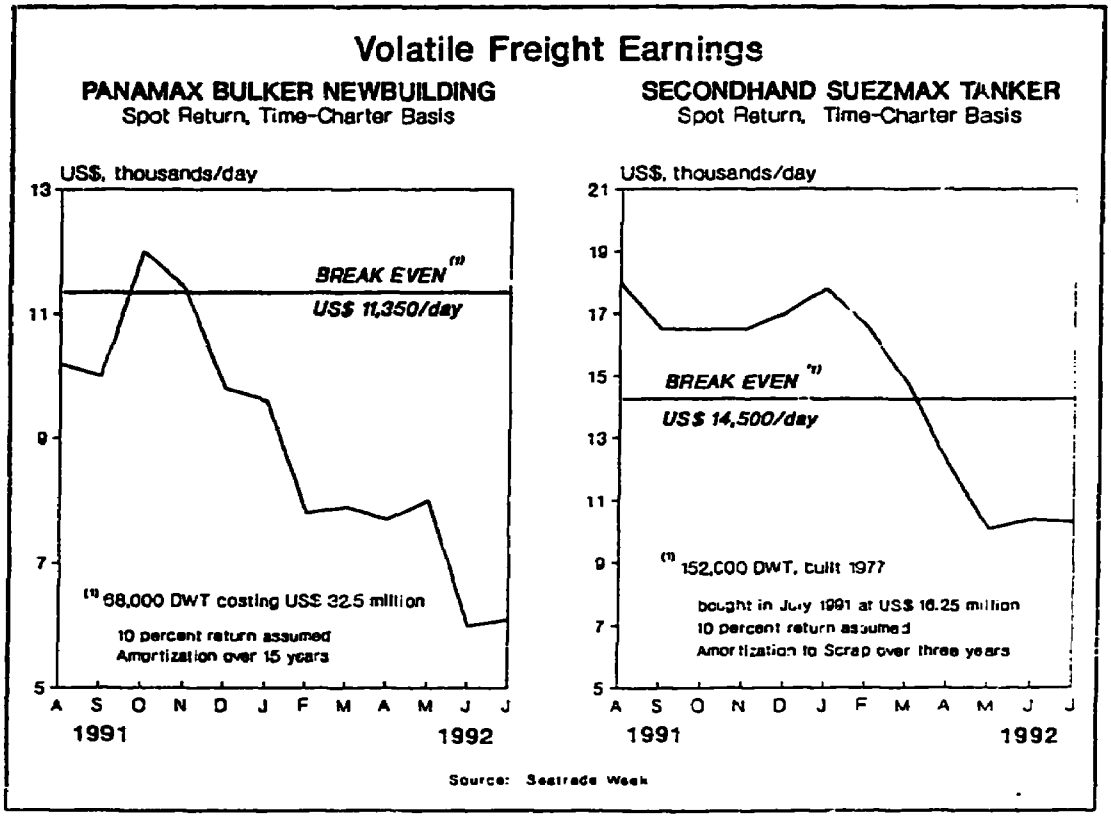

Figure 5

Table 6: **INTERNATIONAL CONTAINER TRAFFIC**
Vessel Capacity Utilization
observed and expected load factors in percent

Year	Transatlantic		Transpacific		Europe - Far East	
	eastbound	westbound	eastbound	westbound	eastbound	westbound
1991	62.2	54.4	71.7	60.7	53.1	85.7
1992	62.8	56.4	76.1	63.8	51.3	84.2
1993	*62.6*	*56.3*	*77.9*	*64.9*	*50.2*	*82.1*
1994	*62.7*	*56.4*	*78.5*	*65.1*	*50.0*	*81.4*
1995	*64.7*	*58.5*	*79.1*	*65.5*	*49.0*	*77.6*
1996	*66.8*	*60.8*	*79.3*	*65.5*	*51.1*	*78.7*

Source: **For observed indicators:** "*Containerization International*". Various issues. London
For expected load factors: "*International Transport Journal*". Issue 49, 1992. Basle

Since the trend in container shipping on the main trade routes has been such that the ten key carriers now effectively control more than 70 percent of the market--with further concentration of their market shares predicted--it has become possible for these carriers to 'rationalize' freight rates and the level of tonnage deployed. For example, in the trans-Atlantic and trans-Pacific trades the dominating carriers have combined to establish so-called *rate agreements* through which they collectively pledged to reduce their active tonnage on such trade routes and to abide by commonly agreed freight tariffs. These rate agreements have all the makings of a cartel. Owing to these arrangements, the container freight rates in the cross-Atlantic and Pacific trades are the only instances in the entire seatrade market where nominal increases have occurred since 1990. However it remains to be seen for how long this will continue because there are now moves--particularly by the EC--to prohibit such forms of cartellization.

The vast majority of carriers in the international maritime transport industry is reeling under the effects of reduced freight earnings. What makes their lot not easier is the fact that the prices paid for second-hand vessels or tonnage sold for demolition have gyrated in ways which turned out to be unfavorable for them. When freight markets were solid and shipowners showed little predilection to sell tonnage in order to improve their cashflow situation, second-hand and demolition prices were relatively high, but in times of market decline both prices dropped (see Table 7 on page 17). Due to the long lead times in shipbuilding, which may extend over three years between ordering and delivery, the movements in vessel unit prices were less volatile. The actual cost of new ships have steadily increased since 1986 in the wake of speculative ordering which has characterized the market during most of the intervening years. The new and costly ships are being successively delivered until about 1995 and will burden their owners with high cost at a time when they are facing only modest prospects for growth in seatrade--and thus improved freight earnings.

Because of continued poor revenue earnings, shipowners had to cut cost wherever possible. In growing numbers they opted for outflagging their tonnage to FOC countries which reduced their tax burden and enabled them to hire low-wage personnel. Unfortunately, however, cost cutting also meant in many cases neglect or deference of maintenance which caused accelerated physical deterioration of shipping assets and has to be seen as a main cause for increasing ship casualties. Commercial pressures

on masters to improve the revenue earning performance of their ships have induced reckless loading practices in ports and the operation of ships at speeds beyond design limits with deleterious effects on hull structures. Low-wage personnel often implied unqualified seafarers. Human error has been identified as a principal reason for accidents at sea and in ports.

Table 7: TONNAGE PRICE FLUCTUATIONS
Cost indicators reflect annual averages

Tonnage Category	1985	1986	1988	1990	1991	1992
NEWBUILDINGS - Prices in current US$ (million)						
Tankers (80,000 dwt)	22.0	18.8	31.5	41.4	43.0	42.0
Dry Bulk Carriers (30,000 dwt)	11.3	11.7	18.5	23.8	24.1	24.5
General Cargo Ships (15,000 dwt)	12.8	14.2	17.3	24.0	24.1	24.2
Container Vessels (2,500 TEU)	26.0	27.9	32.0	51.0	55.8	59.9
SECOND-HAND TONNAGE - Prices in current US$ (million)						
Tankers (80,000 dwt, 8-10 years old)	6.5	10.8	17.4	28.7	24.8	16.3
Dry Bulk Carriers (30,000 dwt, 5-6 years old)	4.7	3.6	10.8	12.7	12.7	14.0
General Cargo Ships (15,000 dwt, 5-6 years old)	3.2	3.3	5.2	10.2	10.2	11.2
Container Vessels (1,600 TEU, 5-6 years old)	14.1	14.0	14.2	22.2	21.3	22.6
DEMOLITION - Tonnage Acquisition Cost in current US$ (million)						
Tankers (80,000 dwt)	1.8	1.9	3.8	4.0	3.0	2.5
Dry Bulk Carriers (30,000 dwt)	0.7	0.7	1.3	1.5	1.0	1.0
General Cargo Ships (15,000 dwt)	0.9	0.8	1.7	1.8	1.3	1.3
Container Vessels	No demolition sales reported					

Source: Lloyd's *"Shipping Economist"*. Various Issues. London

Another defensive strategy which has been increasingly adopted by many owners is to keep existing shipping assets beyond commonly accepted economic life spans, which are typically between 15 and 20 years. Considering current prices of newbuildings and the freight rates the market is willing to pay, a decision to continue with aged tonnage was more than ever deemed superior--from a corporate management point of view--to a combination of scrapping and acquisition of new tonnage. But for much of this kind of aged tonnage major repairs would be required before such vessels could continue to operate safely and profitably.

Ship upgrading or conversion have become other attractive propositions through which older ships are either technologically improved, e.g. refitted with more powerful and fuel efficient engines, or physically transformed to serve other trades than the ones for which they were originally designed and built. The upgrading of vessels leads to better operational performance--by permitting faster steaming and shorter cargo handling times--and thus to enhanced revenue earnings. Shifting of converted tonnage to other trades, for which the growth prospects are more promising, has already enabled many operators to contain further deterioration of their cashflows. On the whole, however, conversion usually entails heavy outlays, and proper market analyses would be necessary before committing funds. During 1990 the average cost of vessel conversion was US$ 10.6 million.

By looking ahead to the end of the current decade, and considering the expected future trends in the international seatrade markets, several inferences can be drawn with respect to managing the development and the organization of the different fleet segments. Clearly, the tanker sector remains the most vulnerable. Growth prospects for the liquid cargo trades are modest, yet the fleet remains oversized, and newbuilding contracts for tankers represent the highest share in the current order books of the international shipbuilding industry. The outlook is more promising for the dry bulk trades. However the fleet is critically overaged, many vessels are technologically outmoded, and in a poor state of repair. Arguably the brightest growth prospects relate to the general cargo, and in particular to the container trades. High employment indicators for the container fleet seem to suggest the need for a substantial newbuilding program. But, as demonstrated, these indicators are potentially misleading in view of the actual and projected load factors. Thus container vessel owners and operators need to adopt a cautious approach when it comes to considering fleet expansion through the acquisition of new tonnage. The situation is different with the multi-purpose general cargo fleet. There is likely to be continued--if not growing--demand for vessels with built-in flexibility to serve different trades and types of cargo. The expected integration of regional markets will imply a steady increase of *shortsea* trading for which this type of vessel will be in demand.

The future status and performance of the world merchant fleet will be largely determined by the shipowner and operator communities' response behavior. The international maritime transport industry is very heterogenous, and distinguishes itself in this respect from all other transport industries. Diverse interests and business objectives, complicated multiple and often cross-national ownership and organizational arrangements, and ill-devised policies which are maintained by several governments to promote national fleets at any cost can be expected to impede attempts which would be aimed at rationalizing tonnage utilization and fleet management.

V. The Principal Issues in International Maritime Transport

Continuing substantial tonnage overhangs in the world's merchant fleet seem to suggest *a priori* that market forces could be expected to induce a 'correcting mechanism' through which a balance between demand (for ocean transport) and supply (of diverse categories of tonnage) would ultimately be brought about. Inefficient operators would be crowded out of the market, sub-standard ships would be eliminated, and freight rates would consolidate at levels which would turn out to be beneficial for cargo owners and carriers alike. Unfortunately, the global realities are quite different. New ships enter the market with questionable justification, inefficient operators continue to operate with government protection, and the share of poorly maintained and unsafe ships in the international maritime transport industry is growing incessantly. ***All these circumstances can be regarded as harbingers of an emerging crisis of arguably unprecedented proportions.***

A. Regulatory Interventions

The international maritime transport industry has, in a way, become anonymous. Successful shipowners finance, register, crew, market, and manage their assets without regard of loyalty to any specific nation or interest group. They have become true *internationalists*. Their only concern is to ensure that they capture major market shares and achieve the highest possible return on their investments. In pursuit of these objectives they compete vigorously and gain market superiority through differentials in freight rates and service offerings, and by establishing a track record of reliability and consistent quality of service[4]. If left alone, their competitive behavior would create a situation whereby shippers in all markets of the world would benefit by being able to choose and obtain the most advantageous service arrangements for their ocean transport needs. The fact that this is still widely not feasible can be considered as possibly the most serious issue in maritime transport.

Many governments maintain policies which are aimed at protecting their national fleets. This situation applies to industrialized and developing countries alike. Cargo reservation for national flag carriers is the most common regulatory instrument. National flag carriers of countries that have adopted this policy are shielded against competitive pressures in the international ocean transport market. As a result, their performance is usually far below comparable indicators which are characteristic of the international carriers--and the cost of their services are higher. In the process, domestic importers and exporters receive lower quality of service and are faced with higher than necessary freight rates. All of this would not be necessary in view of the large international fleet that competes and operates without regulatory constraints. But the ill-guided concern about perceived *avoidable losses* in invisible trade keeps a large number of governments from accepting the fact that buying shipping services in the international market would be a most beneficial decision, and in the best interest of national trade.

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[4] The concept of '*Total Quality Management*', embedded in the International Standards Organization's (ISO) 9000 norm series, is attaining importance in international maritime transport. This series is the most widely recognized standard which is being applied by many thousands of manufacturing, trade, and service enterprises to implement quality management. The EC has through various directives made the use of recognized quality standards a basic prerequisite for doing business with member countries. This requirement became effective in early 1993. In response, the commercial communities in a number of developing countries--India is an example--have initiated coordinated efforts to introduce ISO 9000 quality criteria and related control arrangements.

In most instances national flag carriers have to be heavily subsidized so that their freight charges can be made compatible with rates which are offered by carriers operating in free market environments. In several developing countries governments are also encouraging national flag carriers to compete in cross-trades which have neither an origin nor a destination in the home country. The declared objective is foreign exchange earning. But to ensure a share for their carriers in these markets, governments are usually again compelled to provide substantial subsidies. In the majority of developing countries the policy to preserve transport rights for national flag carriers--in order the improve the invisible trade account--is ill-guided in the sense that the maintenance and operation of a national fleet are very foreign exchange-intensive. Without domestic oil resources, steel making, and an efficient shipbuilding industry, the only savings that materialize are the cost of crewing and vessel management--assuming that these functions would be fulfilled by nationals. A stringent cost-benefit analysis of such maritime sector policies and the implied subsidies would produce appalling results in most, if not all countries whose governments maintain such regulatory attitudes[5]. In addition, their subsidized fleets inflate the already over-stocked international shipping market and contribute to further distortions in the market's supply-demand relations.

These developments have been encouraged to a considerable extent by the *Code of Conduct for Liner Conferences* which was conceptualized in the 1960s under the auspices of the United Nations Conference on Trade and Development (UNCTAD) organization. The Code became effective in the early 1980s after 50 countries had acceded, as was required by its statutes. In essence, the Code provides for a 40-40 split in the right for ocean transport of cargo by the respective national flag carriers between two trading countries. The remaining 20 percent of the trade was to be left to carriers who are involved in cross trading, regardless of their nationality. These provision were to be embedded in bilateral agreements which would constitute the legal framework under which freight conferences were to be established. A number of industrial nations--such as the U.S.A.--decided against joining this regulated conference system, as it was rightfully feared that such arrangements would induce inefficiencies, and would ultimately be harmful to their trades.

When the Code was conceptualized in the 1960s, the situation in the international seatrade markets, and the organization and service provisions of the world merchant fleet where such that there was a legitimate concern to ensure that all countries--regardless of their location and status--and their trades received a fair allocation of tonnage for ocean transport. In the meantime, however, the size, organization, and service offerings in the international maritime transport industry have changed completely. Competitive services and ample tonnage supply are available in all corners of the world. Regulating the supply and operation of cargo vessels has therefore become redundant. Those countries who adhere to the Code now usually pay a heavy and *intrinsically avoidable* price in terms of increasing the cost and undermining the competitiveness of their own trades. In many trading areas ocean transport services are competitively provided by international carriers who operate outside conference rules and organizations. The benefits for countries who have opened their seatrade to international competition are usually substantial. Chile is a prime example[6]. Other countries that have followed this route include Indonesia where an 'open sea' policy was adopted in the late 1980s, and Thailand whose government abolished all cargo reservation schemes in ocean transport in early 1993. However, the fact that still a

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[5] Such analysis for 15 developing countries resulted in substantive negative findings. For details see: Messerlin, P. et al. 1990. *"The Uruguay Round - Services in the World Economy"*. World Bank, Washington, D.C.

[6] For a full description of Chile's experience with deregulation of the maritime industries see: Bennathan, Esra et al. 1989. *"Deregulation of Shipping - What is to be learned from Chile?"* Discussion Paper Series 67. World Bank, Washington, D.C.

considerable number of developing countries--particularly in Sub-Saharan Africa--find it difficult to disengage from the Code and its rules gives cause for concern.

Another factor which has tended to affect the market balance is subsidized shipbuilding. Most nations with a tradition in shipbuilding want to keep their yards employed. The reasons are diverse; employment generation appears to rank highest. But significant differentials in factor cost and productivity parameters among yards in different countries have created situations whereby several of the traditional shipbuilding nations have become uncompetitive. Their yards should thus be closed. The fact is that they are not. Instead, the governments of countries with 'disadvantaged' yards have resorted to subsidizing their shipbuilding industries. The forms of such subsidies are manifold, often they are concealed, and their incidence is usually heavy. There are many cases where state subsidies have enabled shipyards to offer newbuildings at prices which are below the actual cost of vessel construction. In other situations potential purchasers were enticed to buy new tonnage through financing arrangements that were made attractive by interest rates which were substantially below current cost of capital in the international markets. Extended grace periods and amortization schedules increased the attractiveness of such financing packages even further. The cost of all these direct or indirect subsidies burden national budgets extraordinarily, and the usually high opportunity cost of public capital call in question whether a continuation of such shipbuilding support policies is justifiable.

The OECD has tried for many years to get its members to agree to limiting shipbuilding subsidies within specified ceilings, and while broad concurrence could be established, the implicit 'rules' were often broken by member countries under pressure from lobbyist groups. Also the EC is now making efforts to persuade governments of the countries within its jurisdiction to dismantle shipbuilding subsidy schemes. There has been little positive response yet, and all indications are that most EC member states will continue subsidizing their yard industries. While many market observers have come to accept these tendencies as 'political realities', there are signs that some nations whose yard industry have endured heavy losses in market share are intent on taking up retaliatory measures against 'unfair' competitors. Under pressure from its underemployed shipbuilding industry the U.S. Government has started to take the firmest stance as regards subsidies to the maritime transport industry. Rightly or wrongly, the view is taken that U.S. yards are disadvantaged through unfair competition from foreign shipbuilders who enjoy financial support from their governments and are thus able to undercut prices. A conflict appears inevitable in view of the fact that the U.S. Government is contemplating legislation--the Gibbons Bill--that would, among other things, provide for substantial penalties to be levied on ships built with subsidies, when calling on American ports.

Subsidized shipbuilding and the abundance of offers to sell newbuildings below construction cost have been additional factors that influence the supply-demand relations in international maritime transport. Shipping service providers whose corporate practices are usually characterized by speculative attitudes acquired below-cost newbuildings even at times of sluggish seatrade markets. They captured such opportunities to be prepared when seatrade would grow again. But their expectations were rarely fulfilled, and the speculatively acquired tonnage caused further supply-side inflation in the ocean transport market.

B. The Aging International Fleet

In the years before 1980 the average age of tankers was 15 years at the time when they were withdrawn from the market to be scrapped; for dry bulk carriers it was 18 years. Both indicators seemed

to confirm the generally perceived life span of 15 to 20 years during which a shipping asset could perform economically. When developments in the seatrade markets after 1980 suggested that fundamental changes in the structure of demand for ocean transport and volume growth rates were taking place, many shipowners became more cautious. They started to order fewer newbuildings and relied on their existing shipping assets. As the market contracted further, they resorted to tonnage lay-up, rather than sending their ships for scrapping. Even when the seatrade markets revived in 1986 they kept most of their existing tonnage, addressing growing demand more through re-commissioning previously laid-up vessels than through the acquisition of newbuildings.

As a result of these practices, the average age of the world merchant fleet increased continuously. The proportion of vessels older than 15 years grew from 27.5 percent in the mid-1980s to 56.8 percent in 1992. The average vessel age in 1992 was 16.6 years and is expected to increase by five percent per annum, if no corrective measures are taken. The tanker segment is most overaged with almost 65 percent of all vessels older than 15 years, followed by general cargo ships with about 60 percent. The dry bulk fleet is on average younger--with only 42 percent of the fleet older than 15 years--, but in some of its specialized categories, such as OBO carriers, more than 70 percent of all units have been trading for more than 15 years. Only the fleet of dedicated container vessels is young, with 72.5 percent less than 15 years of age. See Figure 6 below.

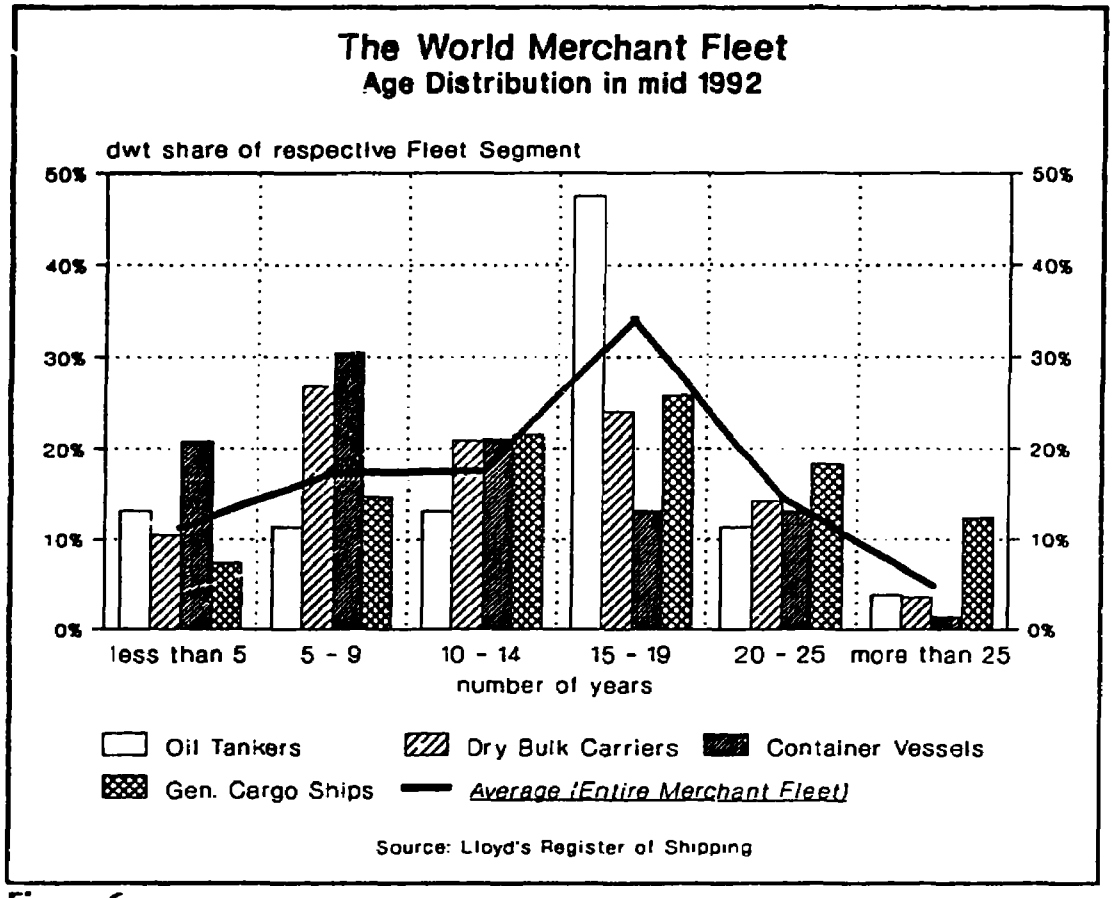

Figure 6

As any physical asset, ships deteriorate over time. The rate of deterioration accelerates in the absence of proper maintenance. This observation gains special importance in the case of ships built after 1974 for which high tensile steel was used instead of mild steel, as was common practice before. The use of high tensile steel resulted in lower light weight tonnage by allowing thinner steel plating. As it turned out, high tensile steel does not cope as well with corrosion and stress fatigue--phenomena which call for strict maintenance rules to be followed. But when their freight earnings shrank many shipowners severely curtailed maintenance expenditures, and the maintenance intervals were extended. A random survey of 100 trading ships by the British Joint Hull Committee in 1991 found that only 18 were in full compliance with the rules that govern seaworthiness classification. Of the vessels with deficiencies 40 percent were so badly damaged that immediate repairs were required before they could be allowed to accept cargo again.

Resulting from the continuous deterioration of the world merchant fleet, there has been a growing incidence of ship casualties. But unlike the dramatic media reports may suggest, the tanker segment was not the most afflicted. The highest casualty rate occurred in the dry bulk sector (43 percent of all casualties in 1991), followed by tankers (29 percent) and all other vessel categories (28 percent). Between 1988 and 1991 the loss ratio--dwt of lost ships as a percentage of total world tonnage--doubled from 0.2 to 0.4. Since 1990 more than 100 dry bulk carriers were lost with 381 lives and 2.6 million tons of cargo. More than 80 percent of these casualties were due to structural failure, and over 90 percent of the vessels concerned were older than 15 years. The Institute of London Underwriters reported that 1991 was the worst year in total losses, with 1.71 million grt, since the late 1970s. The number of ships lost increased to 182 from 139 during the previous year. The estimated cost of cargo losses in the dry bulk sector reached almost US$ 800 million, whereas the replacement cost of lost ships exceeded US$ five billion.

The fleets with flags of four countries--Panama, Cyprus, Greece, and Liberia--accounted for almost 50 percent of all casualties. More than three-quarter of all ships lost in 1991 were registered in developing countries. The West European economies continue to have the lowest ship loss record. Exemplary is also the low casualty rate among FSU carriers, which can largely be ascribed to very effective vessel condition control by the Soviet Register of Shipping.

Given the steadily increasing age profile of the world merchant fleet and modest prospects of improved freight earnings--which are likely to induce many shipowners to keep maintenance expenditures limited--it is foreseeable that the casualty rate will increase. This expectation is also reflected in the risk calculations by the Protection & Indemnity Clubs which cover the insurance of 90 percent of the world fleet. Vessel insurance premiums have doubled since 1991. As a consequence, insurance is now in many cases exceeding 20 percent share in ship operating cost, which has greatly increased owners' annual expenditures. If the condition of the fleet does not improve significantly, insurance cost can be expected to increase further which would make many vessels uneconomical to operate. Such cost increase may even bankrupt several financially distraught shipowners.

The insurers have started to take a close look at vessel manning and operating practices. Poorly trained crews have been identified as one of the key causes of the escalating number of claims. In addition to hiring low-wage personnel, many vessel operators have also reduced crew sizes in order to cut cost. In support of this objective several shipyards have developed vessel designs which allow operators to decrease personnel on board, essentially by automating many functions which are associated with ship operations. The average crew size was 30 during the early 1970s and is now around 16. But insurance companies have realized that reduced crew sizes are among the main reasons for accidents and

also of inadequate preventive maintenance, much of which is carried out while a vessel is on voyage. It is therefore to be expected that the insurers will introduce a requirement for minimum levels of crewing which will be higher than the current number of personnel on board of most vessels. It is also likely that they will in future insist on higher personnel qualification standards and more rigorous periodic testing of seafarers' skills.

About 1.2 million seafarers are presently employed in the international maritime transport industry. A previously unimaginable situation has developed whereby the global supply of seafaring personnel has contracted sharply. The annual number of new job entrants in the traditional maritime nations has declined. A study commissioned by the International Chamber of Shipping in 1991 found that the gap between demand for and supply of seafaring personnel may widen significantly before the end of the current decade. Major efforts will be required to correct this situation because even in the populous developing countries with substantial unemployment there has been little interest in seafaring as a source of income. Governments in these countries have usually given little attention to the employment potential of international ocean transport, in spite of prospective considerable foreign exchange income through remittances. If developing countries are to be counted on as the principal source of future supply of seafaring personnel, then there will have to be much more emphasis on improving training arrangements. The Philippines are currently providing 16 percent of the crews in the world merchant fleet, but a recent investigation revealed that a very high portion of Filipino seafarers did not possess required qualifications.

C. Maritime Transport as a Threat to the Environment

The grounding of the tanker 'Exxon Valdez' in Alaskan coastal waters caused a substantial oil spill with devastating impacts on flora and fauna. Tanker accidents happen all the time, and the total of the associated oil spills worldwide exceeds that of the accident in Alaska manifold. But extensive media coverage and the ensuing public outrage caused the 'Exxon Valdez' case to become the starting point for new standards that apply to tanker design, operation, and their owners' liability. Following this event, the U.S. Government passed a law--the Oil Pollution Act (OPA) of 1990--which holds tanker operators fully liable for any damage their vessels may cause. OPA also requires that any tanker which will operate in U.S. territorial waters from the mid-1990s onwards has to be double-hulled. In the meantime, Canada has adopted similar legislation in mid 1993, and other countries are expected to follow. A recent assessment by Australian authorities[7] mirrors the growing international concern about environmental damage caused by tanker accidents by concluding that "extrapolating from global experience and Australian exposure, the probability of one or more major oil spills occurring in national waters are as much as 48 percent in five years, and 93 percent in the next twenty years".

The oil tanker accidents off-shore northern Spain and the Shetlands in late 1992 can be expected to generate more reaction. However, much of the debate over these issues lacks objectivity. Double hulls are no guarantee for preventing oil spills. It is rather vessel condition and operating practices. The Shetland accident was essentially due to error of judgement, poorly trained crew, and unjustifiably premature abandoning the tanker 'Braer'. Even if this tanker would have been double-hulled, the massive oil spill would have happened under the given circumstances.

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[7] Bureau of Transportation and Communication Economics. 1991. *"Major Marine Oil Spills - Risk and Response"*. Report No. 70. Canberra

The EC is taking steps to regulate technical standards and to rigorously police the operation of tankers in European coastal waters. In the wake of the recent accidents in European waters the Commission adopted a *Common Policy on Safe Seas* in January 1993 which urges the Community and its member states to introduce 'a coherent package of measures' that are aimed at improving maritime safety and prevention of pollution. In the European context the principle of 'Port State Control'--based on the 1982 Paris Memorandum of Understanding (MOU)--has gained special importance. MOU is an international agreement among 14 European countries to harmonize their efforts with regard to inspecting foreign ships visiting their ports. The actual bearing of the Memorandum on environmental protection and sustainable development is that Port State Control has proved to be an effective means of policing marine pollution from ships and ensuring the enforcement of pertinent legal instruments, like the International Convention for the Prevention of Pollution from Ships (MARPOL). Port State Control can be seen as a potent counter-measure to the apparent inability of many 'Flag States' to enforce safety rules and pollution control of ships registered under their jurisdiction. Initiatives are now under way to establish regional port state control arrangements in Asia, the Pacific, and in Latin America.

The present international tanker fleet includes very few units with double hulls or which are built according to an equally acceptable standard, the mid-deck design. Tankers built to this design standard are equipped with a horizontal separator of cargo holds that extends from bow to stern. In the case of hull damage the ambient water pressure exceeds the pressure of oil in the tanks and thus prevents spillage to occur. Since the U.S. market is the principal attractor of world oil trades, a shortage of OPA-standard tankers will curtail the movement of oil, and thus render many non-conforming tankers with henceforth limited trading prospects.

Mandating the double hull design for all tankers will necessarily result in the introduction of void spaces on a massive scale. Double hull configurations will require almost triple the steel surface to be coated to protect against corrosion. Routine inspection by crew members to guard against coating breakdown and corrosion, and related maintenance will be infinitely more complex and time consuming. It is ironic that while the outlook for future supply of seafaring personnel has actually induced vessel designs that simplify and reduce labor intensive maintenance, the double hull design structures will demand vastly increased maintenance to be performed by higher numbers of personnel and by a more skilled labor force. If this challenge for the industry is not positively addressed and resolved, the safety risks become not only obvious but ominous. A case in point is the tanker accident off-shore northern Spain. The vessel was double-bottomed but suffered fatal damage after hydrocarbon vapor exploded that had accumulated in hull spaces, without having been detected by the crew.

Since tanker accidents and related oil spills have been on the rise during recent years the question of vessel condition and maintenance neglect has been brought up again. In many instances of casualties vessels with pre-existing severe structural and mechanical deficiencies have been encountered. Cargo owners and the maritime community are therefore pressing for stricter inspection standards to be applied by the international classification societies, and for shorter intervals between such inspections. Until the mid-1980s there were principally a dozen members of the International Association of Classification Societies that controlled vessel inspection and the issuance of seaworthiness certificates. They were based in Western Europe, the U.S.A., and Japan but had extensive networks of representation all over the world. But since then the number of such societies has mushroomed and now totals more than 50, of which the majority have their base in developing countries. The rules and enforcement standards of many of the new societies are lenient, and shipowners can easily switch to those societies which have a record of willingness to let questionable tonnage pass. The proliferation of classification societies and the intense commercial competition among them have been blamed as key reasons for the loss in confidence in

classification as a reliable indicator of a vessel's condition. Too many incidents were reported of ships found to be in a poor condition with the classification certificates in order.

A precarious tanker fleet and the requirements of unlimited liability under OPA and similar legislation have induced the insurers another time to review their practices and rates. The U.K. Protection & Indemnity Association increased its premiums by 150 percent in mid 1992, and advised that another similar increase may have to be applied within the foreseeable future. But in view of heavy cash outlays to cover the cost of accidents, like that of the 'Exxon Valdez', and potential future claims that may go into the billions of dollars many insurers have become weary of continued involvement in the shipping market. ***A crisis is building up.***

VI. Correcting World Merchant Fleet Deficiencies

During 1992, the average annual revenue earning performance of all ships in the world's merchant fleet was about 6.2 tons/dwt. Considering a further growth in annual seatrade volumes to about five billion tons by the end of the 1990s and a gradual increase to 6.8 tons/dwt per year in the average revenue earning performance of all vessels in the international maritime transport market, the fleet would have to expand from 657 million dwt in late 1992 to about 735 million dwt in aggregate carrying capacity in the year 2000. It is unlikely that greater productivity gains could be achieved because the proportion of older vessels in the world fleet can be expected to remain relatively high during the current decade. Older ships operate with comparatively low speeds and are also prone to be out of commission during times of required frequent repairs. Thus their revenue earning potential is limited. In addition, there will be no quick end to the pervasive problem of port congestion, particularly in developing countries. Ships' downtime in ports reduces their commercial performance.

On the other hand, the repair and insurance cost of a substantial portion of the older tonnage can be expected to increase so much that further trading will become commercially prohibitive. More rigorous inspection arrangements and seaworthiness certification standards by the international classification societies--in response to growing pressure by cargo owners and the maritime community--are bound to exacerbate such developments. This observation applies to about 40 percent of the current world fleet, particularly to pre-1975 built vessels. It is estimated that during the next eight years about 260 million dwt of overaged and deficient tonnage will have to be withdrawn from the market for good. A high percentage of this tonnage will represent tankers which do not comply with the environmental protection requirements under OPA and similar rules.

A. The Demand for Newbuildings

In view of the projected net increase in carrying capacity of the world's merchant fleet, and the need to replace decommissioned vessels, roughly 330 million dwt of new tonnage will have to be built between 1993 and 2000. A review of changes in the composition of the international merchant fleet during the last eight years provides indications about differences in the demand pattern for the various categories of cargo ships (see Table 8 on page 28). In line with their preponderance in the world's fleet and the anticipated massive withdrawal of overaged and deficient vessels, the highest demand for newbuildings will be in the oil tanker and dry bulk carrier sectors. However, it can be expected that the average size of new oil tankers and dry bulk carriers to be ordered will differ from the carrying capacities which were typical of newbuildings during the 1970s and 80s. The new vessels will be smaller and with built-in versatility to be able to carry different types of bulk cargo. Both phenomena will ensure more operational flexibility and enhanced commercial performance.

In conformity with the projected growth of gas, chemicals and oil product trades, a substantial demand for specialized tankers is expected to materialize. Since the market is already relatively saturated with purpose-built cellular container vessels, and given the fact that the majority of these vessels is less than ten years old, it is likely that the demand for newbuildings in this vessel category will be modest--provided operators adopt a realistic market assessment. On the other hand, there has been a renewed interest in general cargo ships whose share in the world merchant has declined during recent years. The new type of general cargo ship will, however, be different from a traditional vessel in this category. The

perceived need for more operational flexibility and the implied capacity to carry different types of cargo, such as breakbulk and containers, on the same voyage will lead to modern multi-purpose vessels. Port limitations in many developing countries will induce a trend whereby many of these vessels will be equipped with highly efficient cargo handling gear, or be designed to RoRo configuration which allows cargo loading and discharge over ship-integrated ramps. Table 9 on page 29 provides further details on expected demand for newbuildings in the different vessel categories.

A market analysis by the Association of West European Shipbuilders suggests that the presently installed yard capacities for shipbuilding, worldwide, are of the order of 18 million compensated gross tons (cgt), which translates roughly into the ability to build 27 million dwt of new tonnage per year. Considering the projected pattern of demand for newbuildings (see the annex on page 41), there is sufficient capacity supply to meet such requirements in the near future. After 1995, however, the demand-supply relations in the newbuilding market can be expected to deteriorate, if no corrective measures are taken.

Table 8: **THE INTERNATIONAL COMMERCIALLY OPERATED FLEET**
Changes in Fleet Composition

Vessel Category	Status in the mid 80s			Status in the early 90s			Change (in dwt)
	Number	dwt (mill.)	Share in Total dwt (%)	Number	dwt (mill.)	Share in Total dwt (%)	
Oil Tankers	5,723	240.7	39.3	5,962	256.1	39.8	6.4 %
Chemical Tankers	874	6.2	1.0	968	6.2	1.0	0
LNG/LPG Tankers	755	10.3	1.7	802	11.0	1.7	6.8 %
Dry Bulk Carriers	4,595	183.9	30.0	4,660	199.7	31.1	8.6 %
OBO Carriers	372	39.3	6.4	352	36.8	5.7	- 6.3 %
Container Vessels	1,027	21.1	3.4	1,189	27.0	4.2	27.9 %
General Cargo Ships (Single Deck)	7,166	25.3	4.1	6,757	24.5	3.8	- 3.2 %
General Cargo Ships (Multi Deck)	7,266	56.9	9.3	6,274	48.2	7.5	- 15.3 %
Reefer Ships	1,273	6.7	1.1	1,386	7.6	1.2	13.4 %
RoRo Vessels	960	7.7	1.3	1,022	8.2	1.3	6.5 %
Combined Cargo/ Passenger Ships	370	0.8	0.1	311	0.6	0.1	- 25 %

Source: Institute of Shipping Economics and Logistics. *"Statistical Yearbook"*. Various issues. Bremen

As can be inferred from Table 10 on page 30, the bulk of shipbuilding activities in recent years took place in a limited number of countries. The twelve leading shipbuilding nations presently control over 90 percent of the market. For many years now, the Far Eastern yards had the lion's share in these activities, with Japan and South Korea in the lead. The composition of the leading shipbuilding nations

has remained essentially unchanged since the early 1980s. To maintain the market shares of their shipyards in newbuilding activities, the different countries pursued a variety of strategies. In addition to subsidy schemes these strategies focused on yard industry restructuring. Such restructuring led to improved productivity. The most notable result of the restructuring measures was the reduction in labor involved in shipbuilding. Since 1975 the related work forces were reduced by 62 percent in West European shipyards, and a staggering 73 percent in Japanese yards. Increased automation of building activities, reinforced by computer-aided techniques, allowed the yards to cut cost and thus to maintain their market shares. But during the intervening years of slackening demand for newbuildings, the cost pressures continued, particularly in the Far Eastern and West European yards.

Table 9: **THE WORLD MERCHANT FLEET**
Newbuilding Requirements for Principal Tonnage Categories
(in million dwt)

Category	1992 - 1995	1996 - 2000
Oil Tankers	22	6
Specialized Tankers (Gas, Chemical, and Product categories)	7	23
Dry Bulk Carriers (incl. Combination Carriers)	44	86
Container Vessels	8	7
General Cargo Ships (incl. RoRo tonnage)	5	24
Reefer Ships	2	3

Source: Author's estimate

In the meantime several countries in the former socialist block of Eastern Europe have been able to establish firm market niches. Low wages and comparative advantages in other factor inputs have enabled yards in these countries to offer newbuilding tonnage at attractive prices. China has been another country that has been able to penetrate the shipbuilding markets. Chinese-built vessels have a consistent record of high quality and reliability, and are thus in demand. But many Chinese yards are still antiquated and are in need of major improvements. Notwithstanding the subsidy issue, for many of these developing nations, engaging in shipbuilding activities has been beneficial. Since shipbuilding is an assembly industry, there are many forward and backward linkages with other parts of the national economies. A recent Bank survey[8] which was addressing options for the shipbuilding industries in the FSU republics concluded that for each one million currency units of shipbuilding contracts, 40 percent would accrue to a yard and that the balance of 60 percent would benefit national steel manufacturers, equipment suppliers, and others.

[8] Peters, Hans J. 1993. *"Russia's Waterborne Trade and Transport - Issues in Market Transformation"*. Mimeo. World Bank, Washington, D.C.

During the remainder of the 1990s, several changes in shipbuilding and individual countries' shares are likely to materialize. The number of large and medium-size shipyards will increase. There are presently over 80 countries engaged in shipbuilding, and yards in more than 60 percent of these countries are capable of building vessels with carrying capacities above 5,000 dwt. The Far Eastern yards will maintain their market dominance, with Japan continuing in the lead, if not with market shares sustained during the 1970s and 1980s. China can be expected to expand its shares. South Korea's shipbuilding industry will enter a stage of stabilization, but is likely to defend a market share above 20 percent. The West and Northern European shipyards with their superiority in the development and building of sophisticated and specialized tonnage will remain a market force. Recent initiatives by major shipbuilders in the region to jointly design and market standardized high quality tonnage, like the E3 tanker[9], demonstrate their determinedness to stay in the market.

Table 10: **THE WORLD'S LEADING SHIPBUILDING NATIONS**
Ranking by Percentage Share in Tonnage on Order

1985		1988		1992	
Japan	43.3 %	South Korea	32.5 %	Japan	39.0 %
South Korea	19.0 %	Japan	25.8 %	South Korea	21.1 %
Brazil	6.1 %	Yugoslavia	5.0 %	Denmark	5.4 %
Taiwan	3.5 %	Taiwan	3.9 %	China	5.1 %
China	3.4 %	Brazil	3.5 %	Taiwan	3.3 %
Germany	2.1 %	China	3.3 %	Romania	2.9 %
Poland	2.0 %	Germany	3.2 %	Brazil	2.7 %
Spain	2.0 %	Poland	3.1 %	Germany	2.4 %
Yugoslavia	1.9 %	Spain	3.1 %	Great Britain	2.4 %
Romania	1.7 %	Italy	2.7 %	Poland	2.3 %
Denmark	1.7 %	Romania	2.3 %	Spain	2.3 %
U.S.A.	1.5 %	Denmark	1.9 %	Croatia	2.1 %
All Others	11.8 %	All Others	9.7 %	All Others	9.0 %

Total Tonnage on Order
year-end records

1985: 46,696,555 dwt	1988: 38,536,093 dwt	1992: 68,672,316 dwt

Source: Fairplay. "*Newbuilding Supplement*". Various issues. London

[9] The E3 designation stands for European, Environmental, and Economical.

The yard industries in the FSU and East European countries, and their ability to attract orders will remain an important factor in the shipbuilding market during the remainder of the 1990s. Yet, while Poland and Romania have been able to establish their yards firmly in the international market, there is much doubt regarding yards in the different maritime republics of the FSU. Many of these yards have been and remain engaged in the construction of naval vessels. The extent and pace in which such naval yards can be converted to build merchant tonnage will determine these countries' prospects to partake in international shipbuilding activities. The most cumbersome obstacle to overcome are centralized and archaic management organizations which stand in the way towards required reforms.

In the Americas, the formerly important Brazilian shipbuilding industry is expected to be unable to make much headway during the next ten years. With its present limitations as a shipbuilding nation, Brazil is likely to engage in building various types of vessels of less sophisticated design for the home market, and to a lesser extent for foreign customers. The U.S. plans for streamlining the construction of merchant ships is slow in coming, and the national yards are so burdened with the excessive cost of factor inputs that it is very unlikely for a competitive shipbuilding industry to emerge in the foreseeable future. Oceania and Africa are still backward shipbuilding regions. No major advances can be expected to materialize there. On the other hand, countries like India, Indonesia, Malaysia, and Turkey are considered to become contenders in the international shipbuilding market.

B. The Demand for Repair, Upgrading, and Conversion

While no more than 2,000 newbuildings are likely to be delivered from the world's shipyards in any one year, in excess of 20,000 vessels will probably undergo some type of formal repair. Ship repair and shipbuilding are closely related industries, drawing on many of the same facilities, skills, and resources. There are three basic divisions to ship repair classification. Firstly, there is scheduled repair, which is centered around the main event--dry docking--and accounts for about 75 percent of the total workload. Secondly, there is unscheduled repair work, which is often damage related, or necessitated by deteriorating vessel performance. And thirdly, there is ship conversion which is the most specialized and costly segment of the market.

Due to the downturn in the international seatrade markets during the first half of the 1980s and the concomitant reduction in newbuilding orders, only a limited number of new ships entered the market, and the world merchant fleet was aging rapidly. At the same time expenditures on vessel maintenance have been at minimal levels. But as the market picked up again and freight rates started to rise, there were not only positive indicators for repair demand but there was also a substantial accumulation of workload arising from years of neglect. Such demand is estimated to have risen by seven percent in 1987, and a further ten percent in 1988. Since then the level of demand has remained high, with the exception of a brief downturn in 1991.

Several developments during the 1980s have had their influence on ship repair activities and reduced the need for fixed installations, such as dry docks. New technology has enabled far more work to be undertaken on vessels while they remain afloat, which has led to the growth of a whole new industry of underwater repair, often located away from traditional yard centers. At the same time there has been an increase of repair on vessels while they remain in service. In addition, advanced hull coatings have enabled shipowners to move to a five year dry docking cycle.

The ship repair industry had to internalize financial problems in the early 1980s in the same way in which shipowners had to cope with the consequences of sluggish seatrade markets. During the 1980s a considerable portion of repair activities migrated from Northern Europe and Japan to the lower cost areas of Singapore, Southern Europe, the Far East, and the Middle East, which caused major changes in the structure of the repair market. Between 1985 and 1990 the volume of repair work carried out in Southeast Asia, for instance, is estimated to have nearly tripled. Conversely, Northern Europe saw its share in global repair activities fall from nearly 35 percent to just above 20 percent. Those yards that have been able to attract repair business benefitted essentially from two circumstances: low wage labor and location. Repair facilities which are situated within the key seatrade lanes, like in Singapore, have a major locational advantage. But as the patterns of trade change yards may lose such advantage. The most critical issues in ship repair pricing are the cost of labor, which generally represent about 70 percent of a yard's total expenditure, and the productivity of that labor. Developing countries which consider entering the ship repair business--in the expectation that rising labor cost in yards of the industrialized countries may induce further shifts towards low wage countries--will succeed only if high productivity levels can be assured.

If the 1990s are to be the decade in which quality is to be restored to a position of pre-eminence in shipping, then price will play a lesser role in determining repair workload distribution, whereas technical standards assume increasing significance. All major ship repair regions can expect an increase in their total workload during the next five years, with the largest rises forecast for the countries of Southeast Asia. But the extent to which this will materialize will depend on the availability of sufficient capacity and labor. Furthermore, the yards around the Arabian Gulf can expect to gain further market shares. The regions which are forecast to experience more erosion of their market share are Southern Europe and the Far East.

In contrast to ship repair, ship upgrading and conversion are concentrated in a few leading yards which have developed expertise and reputation in particular market niches. Contract values are usually high. Unlike repair, much of the cost in upgrading and conversion activities is accounted for by equipment, like a new main propulsion unit in re-engi.ng, and materials, such as steel for vessel lengthening. With newbuilding prices remaining high and sh owners seeking to take advantage of improved trading prospects, the trend towards life extension of existing tonnage is likely to continue, which adds further impetus to ship upgrading and conversion demand. A sobering dimension of this demand is the fact that a total of some 3,500 high volume bulk carriers and tankers will face the third or fourth special surveys by the classification societies during the period 1993-96. There are indications that many of these vessels may undergo some sort of modification during this process. On the basis of a nominal refurbishing time of two months per vessel, this would imply an average requirement of 120 berth per year. Taking the approximately 80 yards worldwide, capable of upgrading and conversion work on vessels of this size, with an average of 2.5 berths per yard, the maximum capacity is around 200 berths. By implication, such type of vessel conversion and classification repair work alone could occupy on average almost 60 percent of total available yard capacity for this market segment.

C. The Demand for Tonnage Demolition

Shipbreaking was attractive during periods when steel prices were high and scrap could be used for quick conversion into material for a variety of purposes, such as concrete reinforcing bars. A very large crude carrier of about 200,000 dwt yields around 33,000 to 35,000 tons of steel scrap. Countries with limited or no indigenous iron ore sources found scrapping attractive during times of rapid growth

and expanding construction activities. South Korea and Taiwan were prime examples. Both countries are dynamic steel exporters but poorly endowed with domestic iron ore and coal deposits. Hence, the foreign exchange cost of purchasing ships for scrapping could be directly offset by reduced feedstock imports and steel export earnings. But shipbreaking is very labor intensive, and as wages increased and the price of steel in the world market started to decline, these countries withdrew from shipbreaking.

Current shipbreaking activities are primarily concentrated in South Asia, although China has entered the market and holds prospects to expand into these activities much more rapidly than the other countries (see Table 11 below). While presently not involved in shipbreaking activities, there are indications that Vietnam has much potential to become an active player in this field. But in contrast to South Korea and Taiwan, in most of the present shipbreaking regions there are sizeable domestic ore or coal deposits, and the countries involved typically do not export steel. Vessels purchased for scrapping are therefore a net drain on already slim foreign exchange reserves.

Table 11: **ANALYSIS OF VESSELS BROKEN UP IN 1992**
Developing Countries are in the Lead

	Total		Tankers		Dry Bulkers		Gen. Cargo Ships	
	No.	dwt ('000)	No.	dwt ('000)	No.	dwt ('000)	No.	dwt ('000)
China	36	3,187	15	2,442	12	666	9	79
India	109	2,733	32	1,528	13	420	64	785
Bangladesh	34	1,727	12	1,370	3	113	19	243
Pakistan	20	1,715	13	1,472	4	214	3	29
Turkey	7	185	2	106	2	41	3	38
Thailand	1	15	--	--	--	--	1	15
Mexico	1	13	--	--	--	--	1	13
Spain	2	5	--	--	--	--	2	5
Peru	1	3	--	--	--	--	1	3
Greece	1	3	--	--	--	--	1	3
Portugal	1	2	--	--	--	--	1	2
Denmark	2	2	--	--	--	--	2	2
Japan	2	1	--	--	--	--	2	1
Netherlands	1	1	--	--	--	--	1	1
Germany	1	1	--	--	--	--	1	1
United Kingdom	1	1	--	--	--	--	1	1
TOTAL	*220*	*9,593*	*74*	*6,919*	*34*	*1,453*	*112*	*1,221*

Source: Lloyd's *"Shipping Economist"*. Research files. London

The projected annual demand for tonnage demolition is expected to amount to 26 million dwt in 1993 and to increase to 38 million dwt annually towards the end of the current decade. The actually scrapped tonnage was barely ten million dwt in 1992 and much less during the preceding three years. There are two factors accounting for this discrepancy. One is low productivity in those countries were ship scrapping currently takes place. At the extreme was a West African nation where it took 26 months to break a medium-size bulk carrier. Taiwanese breakers used to accomplish the same task in under four weeks. But the productivity rates in all other countries are also three to four times lower than those that were achieved in South Korea and Taiwan when yards in both nations were still active in this field. At present only shipbreaking yards in Turkey operate at comparable levels of efficiency.

Most disruptive, however, is the shortage of capital. Breakers in developing countries have to buy the tonnage to be scrapped from international shipowners. And they have to pay in hard currency. Their access to foreign exchange is curtailed because the national governments have other priorities for their limited capital resources and commercial banks have usually considered these activities as too risky. *And thus a dilemma has developed:* there is much need for shipbreaking but no cash to do it. In the absence of efficient and reliable scrapping arrangements, tonnage supply in the international ocean transport market will remain heavily inflated. The financial performance of carriers will deteriorate further, and deficient vessels will continue to trade with the result that the annual incidence of accidents is likely to increase dramatically. If no remedy can be found, ***the crisis in the international maritime transport industry will intensify.***

VII. The Financing Dilemma

Addressing the projected demand for newbuildings, ship maintenance, repair, and conversion, and tonnage demolition will be costly. It is estimated that the cumulative cost of these three activities during the next eight years will amount to almost US$ 400 billion in constant 1992 prices, increasing from US$ 43.5 billion in 1993 to US$ 63.7 billion in 2000. Shipbuilding will require the lion's share, representing about US$ 330 billion, followed by maintenance, repair, and conversion (US$ 51.7 billion), and then demolition (US$ 10.5 billion). Details about the underlying assumptions and of the expected annual cost streams are given in the annex on page 41.

As regards newbuilding, maintenance, repair, and conversion, the key question is whether the international maritime transport industry will be able to mobilize such considerable sums. The first point to note is that the scale of collapse in freight earnings and vessel asset prices in the space of a few months during 1992--and as experienced during numerous preceding market cycles--represents a degree of volatility which is hard to imagine in any other industry. The effects of the 1992 market downturn on maritime transport companies' profitability underline just how important it is for shipowners to be able to read the tendency of cycles and de-gear, either through building up cash balances or reducing debt, when entering a downward phase. But it continues to be surprising how few carriers appeared to be able to achieve this.

All too often shipowners have fallen into the trap of increasing their capital expenditure when freight markets where expanding, on the assumption that the net proceeds of ship sales would ensure the maintenance of adequate liquid balances. In practice, however, falling second-hand prices generally result in such owners becoming dangerously overstretched during subsequent downcycles. The current phase of the cycle, in which the squeeze on operating margins is exacerbated by sharply rising repair and insurance cost, is proving most punishing for owners who made this mistake. As a result, the liquidity of many carriers is very poor.

Ever since moving away from total self-financing in the 1960s, the maritime transport industry has overwhelmingly relied on mortgage loans from commercial banks for the financing of ship acquisitions. However, over the past three years, the banks' appetite for ship finance has been tempered by fears of debt-financed expansion. There are relatively few commercial banks which specialize in ship finance, probably not exceeding one hundred. Their present portfolio to shipping is estimated to be of the order of US$ 75 billion. Several of these banks had to internalize huge ship loan losses and are therefore reluctant to further engage in asset-secured lending for vessel acquisition.

Capital adequacy is another factor which will influence the extent to which banks will be able to provide funds for ship financing. Reference is made to the Basle Convergence Ratio which will be applied to all international banks from 1993 onwards, and will as such have substantial implications for the way in which banks will conduct their lending business in future. The Basle regulations reduce the gearing ability of banks which means that the margins on loans will need to increase. Shipping will have to compete for resources which will become scarcer in the medium term. Capital adequacy is a problem and will result in banks having to be more discerning in the amounts they lend. For maritime transport industry borrowers it also means that their equity contributions will have to increase substantially.

There are differences between liner business and bulk shipping that are significant for the way in which the two segments of the industry are financed. Tankers and dry bulk ships are appraised as individual units, whereas in liner shipping a vessel is considered as part of an international transport structure. Bank lending for ships to be used in liner trades therefore tends to be corporate finance which is based on earning multiples and the overall worth of the business. From a banking perspective a good liner company represents a strong corporate profile with a prospect of steady vessel revenues. The emphasis is on fleet continuity, so that the ship is essentially a unit of transport, and not primarily bought and sold for *asset play* profits, which characterizes the investment behavior of many bulk operators.

Lending for individual bulk carriers is more risky because their asset values and earning performance are very vulnerable to cyclical market swings. The fact that many of such vessels serve only one cargo owner increases their vulnerability. With soft markets likely to persist in the short term and operating cost pressure unlikely to ease, the squeeze on the profitability of bulk shipping companies will intensify. All these circumstances have led banks to take a much more cautious view when it comes to asset-secured lending for tanker or dry bulk vessel acquisition. Since most of the projected demand for newbuildings relates to these ship types, this development is cause for particular concern in that the availability of traditional funding can be expected to become very limited.

Aggravating this situation is the fact that the provisions under OPA and similar regulations regarding pollution liability have become major deterrents for banks to be further involved in the financing of tanker acquisitions. At issue are the rapidly increasing cost of securing ship mortgages under the Mortgage Additional Perils Insurance which was established to cover financiers' risks resulting from the U.S. oil pollution legislation. Owing to these circumstances, ship loans may become unprofitable for banks if the cost of insuring ship mortgages rise much more. The worst case scenario for bankers is a vessel which had an accident in U.S. waters and was then arrested because the operator could not meet damage claims through insurance or other sources. The mortgagee could thus lose the security on the loan: *the ship*.

In order to meet their financial needs, shipowners have tested possible alternatives to mortgage-type lending by commercial banks. In some countries, like Denmark, Germany, and Norway, considerable amounts of private capital have been mobilized since the 1960s through the tax-driven limited partnership markets. But these sources have contracted as the commercial performance and prospects for ocean transport deteriorated. In a number of cases, owners have also benefitted handsomely from different forms of financial assistance to the maritime transport industry through construction, operating, and credit subsidies which were provided by several governments. However, there are now the concerted efforts which are spearheaded by the OECD and the EC to gradually dismantle such subsidy schemes. The retaliatory legislation being considered by several governments--notably the U.S. Administration--can be expected to exert further pressure. In summary, the current background to the provision of newbuilding credit and subsidies suggests that conditions will become tighter during the coming years.

Most financial institutions that are willing to further engage in maritime transport industry related business consider cashflow-based lending as the most stable--and secure--form of funding and as the potentially most effective instrument to hedge against the cyclical pattern of demand for ocean transport. The level of such type of lending is tailored to the projected earning capacity of a vessel, which is conditioned by the need that shipping revenues cover operating expenses and capital cost. Banks which have adopted such lending policy now require that the financial package be carefully structured to suit vessel employment, so that debt can be serviced without causing undue stress to either borrower or

lender. To ensure this, lenders increasingly insist on secure long-term charters as a guarantee of regular vessel earnings to meet the debt service.

In a way, these developments might be considered as harbinger of a new order in ocean transport. At the core of this observation are the shipper-carrier relations. In order to gain access to the capital markets for both investment and long-term debt, the maritime transport industry will need to establish more lasting relationships between owners, operators, and cargo interests. It will not be the spot charter market or second-hand ship values that support the investments in new ships, but renewed long-term contractual relationships between the owners of cargo, i.e. the shippers, and tomorrow's shipowners. Cargo owners should be prepared to work in cooperation with shipowners and operators in establishing long-term stability in the demand-supply relationships, and thereby the cost of seaborne transport. In practice, however, there does not seem to be any rush on the part of most cargo owners to make such arrangements. Freight markets remain dominated by short-term charters and decision-making which is essentially based on the cheapest transportation cost, regardless of quality. But it is precisely this situation which has generated so much deterioration in the quality of service, the safety record, and the financial performance of the maritime transport industry.

The cargo owners' hesitance can be explained by a number of factors. Firstly, many of them sustained heavy losses in the 1980s on long-term charters contracted in the 1970s. Secondly, there remains the readiness of many independent owners to order ships speculatively, and they are willing to contract cargo for ocean transport under any circumstances. Thirdly, there is the inability of most shippers to plan for their long-term requirements in a way that they used to do in the 1960s and early 1970s. The structure and composition of the international seatrade markets, and related development trends have become very different from the situation that characterized these markets during the first decades after World War II. The high degree of volatility that characterizes contemporary seatrade markets makes longer term cargo flow projections difficult.

Notwithstanding their hesitance, the cargo owners' need for reliable, flexible, and cost-effective transportation could best be matched with the shipowners' requirement for sufficient remuneration to compensate for the risk they are taking through a readiness by both sides to enter into longer term transportation contracts. Such contracts should be based on mutually agreed freight levels and extend over a substantial period, with a duration in some cases of up to eight or ten years. Only within such a stable framework, in which operating flexibility can still be maintained, one can see a possibility to establish orderly ship replacement programs and develop consistent relationships with financing institutions.

One promising area in which new tonnage financing might progress further in the next few years is that of leasing. Lease financing has been employed by the maritime transport industry for decades, but it has so far failed to dislodge the ship mortgage loan as the principal mode of finance. This situation is somewhat surprising in view of the fact that leasing is quite prevalent in the multi-billion dollar aviation sector and the potential for leasing structures to channel long-term funds into the financing of ships. During the heydays of aircraft financing, shipowners looked with envy on the amounts of capital which were raised without apparent difficulties to finance the construction of new aircraft. The most striking feature during this period was the massive growth which took place in aircraft leasing, and the rapid expansion of the specialist aircraft leasing companies. Why was it not possible for the maritime transport industry to attract this type of financing on the same scale? The answer is fairly straightforward. Shipping is much more heterogenous, with much less standardization of asset design and employment. Aviation is dominated by a finite number of national carriers and by a relatively small number of large

manufacturing companies, whereas maritime transport is not. Passenger growth projections for the aviation industry were buoyant but forecasts of consistent growth in the seatrade markets lacked credibility. The operating lease, as opposed to the finance or capital lease, has been the vehicle through which enormous amounts of money have been mobilized for aircraft financing, and it is the form of leasing which has the most obvious application to shipping. The bareboat charter of vessels incorporates the basic characteristics of an operating lease.

Given the history of the maritime transport industry over the past two decades, it is hardly surprising that a tension has built up between shipowners' requirements--essentially consisting of longer loan periods and easy start terms--and those of their bankers, who want to recover as much principal as they can as quickly as possible. Lease financing, offering level rental payments over an extended period, would seem to give shipowners exactly what they need, while requiring no technical innovation on the part of the financing institutions. It is therefore perplexing that it has not become more widely used.

There are in fact a number of obstacles which have prevented the increased use of leasing in ship finance, some of which may now be losing importance, while others are more fundamental. From the shipowner's standpoint, by far the most serious objection has been the loss of flexibility when it comes to selling a leased vessel. This objection has gained in force as operating earnings have steadily formed a smaller and smaller proportion of the total investment return which shipowners expect when buying a vessel. Particularly during more recent years, the prevalence of the *asset play* approach to ship investment, in which high internal rates of return were sought and frequently obtained from the highly geared acquisition and quick resale of second-hand ships, made the thought of being locked into a long-term lease contract an anathema to many ship operators. However, now that the potential for realizing high capital profits from ship investment has abated, and the risk of realizing substantial capital losses has once again become a material consideration, one can assume that many owners will be much more prepared to consider the advantages of leasing. This may take the form of selling their vessels to other owners and bareboat charter them back, or through entering into operating leases with financing institutions.

Should leasing become more prevalent in the maritime transport industry, it would imply that the ownership of vessel assets would be increasingly in the hands of financing institutions, and ocean carriers would no more than operate these assets. However it is as yet unclear where such amassing of ownership would take place. One can assume that the traditional ship mortgage banks would show little predilection to get involved on a major scale. Some first indications seem to point more into the direction of long-term investment institutions, such as pension funds and insurance companies. Japanese trading houses have also shown interest. And there are some financial organizations of the large international industry groupings, like the General Electric Capital Corporation, which have started to look into ship leasing. But overall there is not yet a dependable network of leasing organizations available to ship operators at a scale that is comparable with the aviation industry.

The lack of effective financing arrangements for the acquisition of tonnage to be scrapped is equally disconcerting. At the same time there are at present no indications that sufficient funds will be available in the immediate future for required investments in modern demolition facilities which will ensure high productivity rates. While shipbreaking will remain a labor-intensive activity, the sheer extent of volume increases in the tonnage to be scrapped--which is expected to reach levels four times higher than at present--will necessitate the introduction of more mechanized and also automated processes. If the achievement of such prerequisites is left to the few fledgling demolition yards that presently exist in a limited number of developing countries, there is little hope for major improvements in shipbreaking

capacities and output. The fact that the governments of these countries have shown little inclination to provide the funds for required investments in breaking facilities, not to mention foreign exchange which is needed to acquire tonnage to be scrapped, aggravates this situation.

Since the prospects for steel prices during the next few years are rather bleak, the financial justification of investments in shipbreaking facilities is by implication questionable. Thus it is highly unlikely that commercial banks could be enticed to provide the required funds. But in some of the OECD maritime nations the aggregate number of obsolete vessels has reached such proportions that resident shipowners have started to seek out collective options for scrapping. Japan is a case in point. Japanese shipowners have combined to negotiate vessel demolition in South Asian countries--especially India--, and in the Philippines. Under such arrangements the Japanese clients would pre-finance the cost of breaking facility development in these countries, and provide technical assistance during the start-up phase. While this approach--if it materializes--will help to mitigate the financing dilemma in ship breaking, it will not be enough to overcome the discrepancy between demand and supply. A concerted international effort is required to tackle the issue. The London-based International Maritime Industries Forum has tried to rally support from diverse industry-related groupings, but so far without notable success.

Finally there is the issue of required capacity expansions in the shipbuilding industry. As regards ship maintenance and repair there is not much need for major investments in new facilities. The issue here is to improve productivity of existing yards, especially in developing countries. Since the key shipbuilders and conversion yards are located in the industrialized economies, it can be safely assumed that their expansion requirements could be met through resource mobilization in the domestic capital markets. The scale of projected demand for newbuildings can be expected to attract venture capital, and even investments in aspiring yards in some developing countries are likely to be justifiable, provided that convincing corporate management strategies are adopted.

Overall, however, the aggregate capital requirements of the international maritime transport industry during the next eight years are presently far from secured. There are at the moment no effective arrangements to correct this situation. In fact, there are more doubts than assurances hanging over the industry and the markets it serves. ***Therefore the crisis has become real.***

VIII. Concluding Observations

The international maritime transport industry has drifted into a serious crisis. The industry endured precarious situations in the past but the makings and scale of the current situation have no precedent. Too many adverse developments--in the trade, financial, and insurance markets, as well as in international legislation--have materialized during recent years. Their combined effects on the industry are far-reaching. If it can be fairly admitted that some of these developments were beyond the control of the industry, the point has nevertheless to be made that much of what has led to the crisis was self-afflicted. It is now just a question as to when the bubble will burst. At that point a large portion of the international merchant fleet will be unfit for transport. The implications for world trade will be devastating.

If such development is to be averted the international maritime transport industry will have to undergo a major realignment. Such process will not come easy as so many parties with different commercial objectives and practices are involved. State intervention will complicate this situation even further. Ways have to be found which will be conducive to instituting required adjustments. Despite the proliferation of diverse industry associations, these have not been able to develop consensus about necessary actions. The international bodies that have been set up to enforce industry standards and safety regulations--like the International Maritime Organization--have not been successful in fulfilling their mandates satisfactorily. Their standing and enforcement capabilities will have to be enhanced through coercive measures to be agreed upon by appropriate international fora.

There can be no doubt that ocean transport will become more costly, once the required technical standards and safety rules are fully enforced. The short-term gains to cargo owners which materialized through uncontrolled competition among shipowners are becoming largely offset by increasing freight losses, the growing unreliability of services, and rising insurance cost. The tragedy of many lives lost at sea aggravates these circumstances only further. In the end everybody will suffer from the crisis in international maritime transport, if no corrective measures are taken.

For the required industry realignment to succeed there has to be full cooperation between ship operators and cargo owners. Both parties have to show willingness to form alliances under which cargo volumes and transport capacities are teamed up for long periods and under predictable conditions. While such arrangements may deprive cargo owners from the short-term benefits of the spot market, they will gain in the longer run through reliable and safe maritime transport. If both parties can find ways to achieve such cooperation, it can be expected that the cost of maritime transport will ultimately decline again after the questionable tonnage has been eliminated from the market and thus the risk of insuring and financing industry assets has abated.

EXPECTED DEMAND FOR SHIPBUILDING, TONNAGE DEMOLITION, AND VESSEL REPAIR AND CONVERSION DURING THE PERIOD 1993 - 2000

Underlying Assumptions

A. WORLD MERCHANT FLEET CAPACITY REQUIREMENTS

Year	Seatrade Volume (in billion tons)	Revenue Earning Performance (tons/dwt, on average)	Total Tonnage Required (in million dwt)
Actual			
1990	4.00	6.08	658
1991	4.05	6.02	673
1992	4.10	6.24	657
Projected			
1993	4.17	6.25	667
1994	4.25	6.32	672
1995	4.33	6.40	677
1996	4.42	6.50	680
1997	4.52	6.62	683
1998	4.66	6.75	690
1999	4.81	6.80	707
2000	5.00	6.80	735

The required Net Addition to the World Merchant Fleet between 1993 and 2000 is 68 million dwt.

Note: The projected improvements in average revenue earning performance are expected to materialize due to (a) a gradual reduction in the number of slow steaming and repair-intensive vessels which will be scrapped, (b) the conversion and technological upgrading of another substantial portion of existing tonnage which will lead to improved operating performance, and (c) the gradual introduction of newbuildings, which are expected to represent over 40 percent of the world merchant fleet by the year 2000. Finally, the port reform programs which are being instituted in a growing number of countries worldwide are likely to lead to reductions in the number of days that vessels have to spend to load and unload cargo in ports, thus increasing their commercial performance.

B. EXPECTED ANNUAL VESSEL SALES FOR DEMOLITION

Year	Tonnage Sold (in million dwt)
Actual	
1992	18.0
Projected	
1993	26.0
1994	28.0
1995	30.0
1996	32.0
1997	34.0
1998	36.0
1999	38.0
2000	38.0

The Total Tonnage expected to be sold for Demolition between 1993 and 2000 is 262 million dwt.

Note: (1) The total annual volume of tonnage actually scrapped--as opposed to tonnage sold for scrapping--was 4.1 million dwt in 1989, 2.6 million dwt in 1990, 4.8 million dwt in 1991, and 9.6 million dwt in 1992. (2) The forecast increase in annual tonnage sold for scrapping is expected to materialize because of growing incidence of structural/mechanical deficiencies at the level of the individual overaged ship. The cost to remedy these deficiencies, limited earning prospects for such vessels during their remaining life cycle, higher insurance premia, and more rigorous stances by the classification societies, can all be expected to combine as forceful inducements to scrap.

C. NEWBUILDING REQUIREMENTS DURING THE PERIOD 1993 TO 2000

Two factors apply: (1) net addition and (2) replacement of scrapped tonnage. The expected net addition is 68 million dwt, and the projected vessel retirement is 262 million dwt. Thus, the estimated volume of newbuildings will be of the order of 330 million dwt.

The required Average Annual Output of Newbuildings between 1993 and 2000 will be 41.25 million dwt.

Note: Actual newbuilding deliveries worldwide were 19.9 million dwt in 1989, 24.3 million dwt in 1990, and 24.7 million dwt in 1991. The estimated existing international newbuilding yard capacity is 17.7 million compensated gross tons (cgt), which translates roughly into an equivalent of 27 million dwt.

D. EXPECTED DEMAND FOR VESSEL REPAIR AND CONVERSION

The industry measures ship repair/conversion demand and output through a workload index, which is referred to as 'standard man-years' (SMY). In 1989, the estimated global labor input to ship repair and conversion work was 137,850 SMY, up from 117,140 SMY in 1985. The projected workload in the international conversion/repair industry is as follows:

1985	1992	1993	1994	1995	1996	1997	1998	1999	2000
100	118	123	124	128	125	122	118	117	116

(1985 = 100)

Note: It is assumed that the level of demand for repair and conversion work will taper off towards the end of the current decade, as the world merchant fleet is gradually rejuvenating, and older tonnage with high maintenance intensity is successively withdrawn from the market.

E. THE ESTIMATED COST OF PROJECTED SHIPBUILDING, TONNAGE DEMOLITION, AND VESSEL REPAIR & CONVERSION

I. Shipbuilding

Average newbuilding prices in late 1992 were as follows:

Container Vessels	US$ 1,750/dwt
Dry Bulk Ships	US$ 500/dwt
Gas Carriers	US$ 1,500/dwt
Oil Tankers	US$ 600/dwt
General Cargo Ships	US$ 1,600/dwt
RoRo Vessels	US$ 2,500/dwt

Note: (1) Considering the composition of new tonnage that was delivered, it has been assumed that the *weighted average unit price* for a newbuilding in 1992 was *US$ 1,000/dwt*. (2) A total of 330 million dwt of new tonnage is forecast to be ordered during the period between 1993 and 2000.

The estimated Total Cost (in constant 1992 prices) of the implied Shipbuilding Program will be US$ 330 billion.

II. Tonnage Demolition

The average price paid in late 1992 for vessels to be scrapped was US$ 140/ldt. This indicator was roughly equivalent to US$ 32/dwt in the case of tankers and dry bulk carriers, and US$ 35/dwt for general cargo ships.

Note: (1) Considering the composition of tonnage that was scrapped (in which dry bulkers and tankers represented the main portion), it has been assumed that the *weighted average unit price* paid during 1992 for the acquisition of tonnage to be scrapped was *US$ 40/dwt*. (2) A total of 262 million dwt of existing tonnage is forecast to be sold to demolition yards during the period between 1993 and 2000.

The estimated Total Cost (in constant 1992 prices) of the implied Demolition Program will be US$ 10.48 billion.

III. Vessel Repair & Conversion

At the beginning of the 1990s, the average value of conversion work was US$ 10.6 million/ship. The average annual ship repair and maintenance cost were:

Reefer Ships	US$ 515,000
Oil Tankers	US$ 487,000
Container Vessels	US$ 338,000
Dry Bulk Carriers	US$ 297,000
RoRo Vessels	US$ 280,000
General Cargo Ships	US$ 174,000

Note: (1) In 1989 the actual global ship repair and conversion revenues were US$ 6.108 billion, which are estimated to have increased to US$ 6.270 billion in 1992. (2) The progression in annual revenues (as a proxy for estimated cost) is expected to develop in tandem with the projected workload indices, which implies that

the estimated Total Cost (in constant 1992 prices) of Vessel Repair & Conversion during the period between 1993 and 2000 will be US$ 51.70 billion.

F. SUMMARY OF FORECAST CASHFLOWS FOR SHIPBUILDING, TONNAGE DEMOLITION, VESSEL REPAIR AND CONVERSION

(all indications are in billion US$, in constant 1992 prices)

Year	Shipbuilding	Tonnage Demolition	Repair and Conversion	*ANNUAL TOTALS*
1993	36.000	1.040	6.536	*43.576*
1994	33.000	1.120	6.587	*40.707*
1995	35.000	1.200	6.801	*43.001*
1996	35.000	1.280	6.642	*42.922*
1997	37.000	1.360	6.483	*44.843*
1998	43.000	1.440	6.270	*50.710*
1999	55.000	1.520	6.217	*62.737*
2000	56.000	1.520	6.164	*63.684*
GRAND TOTAL	**330.000**	**10.480**	**51.700**	**392.180**

Baltic Freight Index (BFI) - The BFI shows the weighted average freight rate level and weighted average trip time charter hire level on a specific day of the dry bulk cargo shipping market. It is centered on thirteen frequently fixed and settled worldwide voyages on selected routes. The BFI is traded on the Baltic International Freight Futures Market (BIFFEX) for specified future settlement months--up to two years ahead--by open negotiation. The price being quoted for each contract month will constantly change in line with supply and demand in the market. Hence the (price) indicators will reflect the views of investors in the market as to what the settlement price for the futures contract will be and, thereby, what the level of the physical shipping market will be at the time.

Bareboat Charter - A contract under which a shipowner provides a vessel to a charter party. Under this form of chartering the shipowner virtually relinquishes all responsibilities and rights in respect of his vessel for a specified period of time, in return for a pre-arranged, regular payment of hire. The charterer becomes a dieponent owner, operating, crewing, and chartering the ship as though he were the owner.

Bulk Carriers/Bulker/Dry Bulk Ships/Dry Bulkers - All these references denote vessels that range in size from small coastal craft to ships of over 150,000 deadweight capacity which are designed for the carriage of bulk commodities, like grain, ores, or fertilizers.

Bunker - Vessel propulsion fuel

Classification Societies - Independent, non-profit making bodies which are directed by committees of persons representing shipowners, shipbuilders, engine manufacturers, and underwriters. They exist for the purpose of ensuring that ships are properly constructed and maintained in a seaworthy and safe condition. To fulfill this function, the more established societies make rules governing vessel construction, arrange and carry out surveys during the construction of a vessel and throughout its subsequent trading life. They also conduct research covering construction, efficiency and safety of sea-going vessels.

Combination Carriers - Ships designed to carry either oil or other cargo, normally not concurrently. They include Ore/Oilers (O/O), Ore/Bulk/Oilers (OBO), Oil Products/Bulk/Crude Oil carriers (PROBO), and tankers which can also load a limited number of containers.

Compensated Gross Tons (cgt) - This unit of measurement was developed for the purpose of measuring the level of shipbuilding output, as output measured in dwt or grt could be misleading because some ships have a much higher work content per gross ton than others. For example, a passenger ferry of 5,000 grt may involve the shipbuilder in as much work as a bulk carrier of 15,000 grt. To overcome this problem the new standard unit cgt was established. The ctg of a vessel is calculated by multiplying its grt by a conversion factor for that ship type, which is differentiated by ship size. The factors were agreed by OECD members. In the case of tankers these factors range between 1.15 for a vessel of 10,000 grt and 0.30 for a vessel of 250,000 grt. Similar factor variations apply to other vessel categories.

Conferences - Organizations whereby a number of shipowners, often of different nationality, offer their services on given sea routes on conditions agreed by the members.

Container Ships - Vessels designed to carry full loads of containers in fixed cell guides. Containers are frequently carried on deck where they require to be lashed and secured. The carrying capacity of these

ships is specified in TEU, and may range from 300 to 500 TEU for feederships to 4,500 TEU for the most modern deep-sea linehaul units.

Cross Trade - A shipping service operated between two seaboard countries by an ocean carrier whose fleet does not fly either of the national flags and therefore is a foreign or third party operator.

Deadweight Tonnage (dwt) - The weight of cargo, water, bunkers, and constant-weights (a fixed allowance for stores, spare parts, and the crew's effects) that may be carried when a vessel is down to its load-line mark. Since the load-line varies, depending whether the ship is in a winter, summer, or tropical zone, it is important to specify to which condition the figure applies, although it is normal practice to utilize summer deadweight when describing deadweight tonnage.

General Cargo Ships - Most vessels under this category in today's market are tweendeckers, i.e. ships with two or more decks because of the number of ports served and the range of products carried. With the main engine located in the aft and thus avoiding the necessity of a shaft tunnel, the cargo spaces tend to be box-shaped to assist the stowing of containers, boxed and palletized cargo, whilst on deck most designs allow for storage of containers. This vessel category is the most versatile in the merchant fleet as individual units can also carry bulk cargo.

Gross Registered Tons/Tonnage (grt/gt) - The total of all the enclosed spaces within a ship, expressed in tons, each basis unit of which equals 100 cubic feet (2.831 cu.m). The term grt is progressively being replaced by 'gross tonnage (gt)', as defined by the 1969 Convention on Tonnage Measurement of Ships which came into force in 1982.

Hull - A ship's body which is enclosed by the main or weather deck of frames, beams, and plates, below which may be one or more decks depending on the type of the vessel and the purpose for which it has been built.

Light Displacement Tonnage (ldt) - The actual weight of an empty ship. It is this particular tonnage figure that is used by sale and purchase brokers when negotiating the disposal of a vessel for demolition.

OBO Carriers - Vessels of the combination carrier group, which have common cargo compartments that may be used for oil or for low-density dry bulk commodities, such as coal and ore.

Panamax - Referenced to vessels with certain dimensional limitations to be able to transit the Panama Canal.

Protection & Indemnity Clubs - Mutual insurance associations representing mainly shipowners, insuring them against expenses and legal liabilities in respect of ships and their crews.

Rating - Seaman

Reefer Vessels - Ships specifically designed for cargoes which deteriorate in ordinary hold temperatures and conditions, such as meat, fish, vegetables, fruit, and dairy products. They are fitted with numerous insulated tweendecks and can, if necessary also be used for the carriage of non-refrigerated goods, like cars, and bagged, baled, or palletized cargo. But they are not equipped to carry bulk cargoes.

RoRo Vessels - Unit-load vessels where the cargo is moved on and off using trailers normally carrying containers. A common characteristic of these vessels is their intermodal capability, which means that their cargo can go directly into the highway system.

Special Survey - Every four years vessels must undergo a special survey of hull and another of machinery, although both may be postponed for up to a further twelve months if the classification society agrees, following a general examination which proves the vessel to be in a satisfactory condition. All sea-going vessels have to be maintained in accordance with the rules and regulations of the class to which they were assigned.

Suezmax - Referenced to vessels with certain dimensional limitations to be able to transit the Suez Canal.

Tankers (Oil and Product) - These vessels are principally involved in the carriage of crude oil and its derivatives. The oil tanker category essentially comprises three types: (1) the Ultra Large Crude Carriers (ULCCs) which are used in long hauls; (2) the Very Large Crude Carriers which are used on the same routes as the ULCCs but with greater flexibilities in discharging port options, owing to their size; (3) the medium size Crude Carriers of 70,000 to 130,000 tons deadweight are mainly used on short hauls from Mediterranean, West African, Indonesian, and North Sea loading terminals to major nearby consuming areas. Product tankers with 26,000 to 40,000 tons deadweight are used primarily for the distribution of oil products from refinery to consumer.

Tankers (Chemical) - Class of vessel specifically designed to cater for the liquid chemicals market, capable of transporting various grades of chemicals, solvents, and acids in a variety of cargo compartments ranging from mild steel-lined, through tanks provided with different coatings, such as rubber-lined tanks for phosphoric acid.

Tankers (Gas) - There are two categories: (1) Liquid Natural Gas (LNG) Tankers, and (2) Liquid Petroleum Gas (LPG) Tankers. The first category includes vessels designed to carry LNG, mostly methane, which is held in a liquid state by pressure and refrigeration. The cargo spaces consist of special tanks whose upper sections often protrude above deck height in domed or cylindrical form. The second category are vessels designed to carry LPG, such as butane or propane. These are also carried in special tanks under pressure and at very low temperatures. The tanks are often rectangular in section and may be flanked by wing tanks used to carry ballast water. The carrying capacity of both tanker categories is specified in cubic meters; typical tanker sizes range between 25,000 and 75,000 cubic meters.

Time Charter - Under such contract a third party hires a ship for a fixed period of time. The shipowner is required to operate his ship but instead of freight payments he receives previously agreed sums of hire money, in advance and at regular intervals.

Trip Charter - This type of chartering signifies a situation where a ship is hired for a single voyage or a roundtrip under which the owner maintains the responsibility for operating the vessel. But the rate of hire applicable to trip charters is generally more related to current spot market freight rates and not to the somewhat lower freight levels that are normally associated with time charters.

Twenty-foot Equivalent Unit (TEU) - The basic unit for expressing the capacity to carry containers on cellular, part-container, or RoRo vessels. The purpose of this unit is to have a common denominator for

ships designed to move containers of 20, 35, or 40 feet in length, with a standard width and height of eight feet. Capacity is also expressed in FEU (= forty-foot equivalent units).

Ultra Large Crude Carriers - Large tankers of no official size but variously described as being one between 350,000 dwt and 550,000 dwt.

Very Large Crude Carriers - Large tankers of no official size but variously described as being one between 100,000 dwt and 350,000 dwt.

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