

Valuation of the Liner Shipping Industry

Economic Contribution and Liner Industry Operations



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Executive Summary

Liner shipping is the service of transporting goods by means of high capacity, oceangoing ships that transit regular routes on fixed schedules. The liner shipping industry is the primary conduit of world trade and an increasingly important part of the maritime industry. Liner shipping carries the majority of the world's ocean-borne trade in value terms and facilitates a significant portion of the merchandise trade of the world. The industry has contributed to advances in the standard of living of most of the world's population in the last 35 years, as the gains from trade through advancing global commerce were enabled by the reliable, efficient and relatively low-cost transportation provided by the industry.

Quantifying the significance of the liner shipping industry can be done using many metrics. Valuable perspectives on the liner industry include how much of world trade is handled by the liner industry; the employment, investment, and value added the industry contributes to the world economy, and the operational characteristics of the industry in providing services globally.

WHAT IS THE LINER SHIPPING INDUSTRY?

The liner shipping industry is the portion of the maritime industry that includes all operations and related infrastructure involved in scheduled ocean-borne shipping. It consists of liner vessels and the people working on-board these vessels, ports, shipbuilding operations, longshore dock workers, shipbuilders, and all other on-shore support staff. Liner shippers transport most of the high unit-value consumer and intermediate goods, including ocean containerized cargo, vehicles, and other mobile machinery. The industry operates on all oceans and many of the navigable inland waterways world-wide, benefitting consumers and exporters globally.

KEY FINDINGS

This report provides measures that describe the important role of the liner shipping industry in the world and for key world regions. Among the findings are:

- The value of the liner industry operations and shipbuilding in 2007 is estimated to be \$436.3 billion, generating 13.5 million direct and related jobs.
- The liner industry transported about 60% of the total value of global seaborne trade of US\$7.7 trillion in 2007.
- The industry has invested in more than 7,000 vessels to provide these services, with approximately another 1,400 on order.
- Over \$235 billion have been spent on new vessels by the industry.
- Throughput at the top 20 global ports reached almost 250 million TEU in 2008.
- In 2008, the global container fleet consisted of 17.8 million containers, which cost the industry over \$80 billion.
- In 2009, on average, liner ships made 10,000 port calls around the world each week.
- In mid-2007, the liner industry operated more than 400 scheduled services serving inter-continental route.

Introduction

The liner industry is a crucial segment of the global economy and contributes significantly to world economic output. The industry is broadly defined as the operations and underlying infrastructure involved in scheduled ocean-borne shipping. As such, it consists of a variety of components with significant economic impact, including:

- Liner operating companies
- Liner vessels
- Ports of Call
- Shipbuilding operations
- Liner industry operations

Liner operating companies generally transport high-value consumer and intermediate goods, including all seaborne containerized cargo, automobiles, and other machinery. As a result, the industry has a profound effect on consumers and exporters. In 2007, the industry carried almost 60% of the total value of the world's seaborne commodities on more than 7,000 registered vessels.¹

The industry is especially significant to the economies of the European Union and South Korea in terms of shipbuilding and to the European Union, China, United States, and the Americas in its economic contribution from transport operations. Globally, the industry was directly or indirectly responsible for over \$436.3 billion in output and 13.5 millions jobs in 2007.

PURPOSE OF REPORT

This report was commissioned by the World Shipping Council in order to better understand the value and size of the liner shipping industry and its contribution to global trade and national economies. The estimates presented in this report are an initial effort using readily available data from various IHS companies for valuing and sizing the industry. The majority of the data presented here is from 2007, the most recent year for which economic and trade data is complete. This year also presents the size and impact of the industry prior to the current global recession and is thus indicative of future operations.

METHODOLOGY AND DATA SOURCES

The primary information presented in this report is derived from three IHS data sources, described in greater detail in the body of this report:

1. **IHS Global Insight World Trade Service (WTS)**: used to estimate the trade impact of the liner industry.
2. **IHS Global Insight World Industry Service (WIS)**: used to estimate the economic and employment impact of the liner industry. A detailed explanation of the WIS methodology is available in Appendix B.

¹ IHS Lloyd's Register–Fairplay fleet database and IHS Global Insight World Trade Service.

- 3. IHS Lloyd's Register - Fairplay Research (LRF):** used for determining the size of the global liner fleet, its capacity and operating statistics. LRF maintains a comprehensive ongoing registry of all seagoing vessels of 100 gross tons or larger and tracks their operations on an ongoing basis.

Where enough geographic detail was available, economic, trade and operating metrics were aggregated by region. The WTS regional trade aggregations are presented in Appendix A.

These three databases were supplemented with data obtained from research of websites and annual reports of liner industry participants including liner vessel operators and service providers, ports and port authorities, terminal operators, and equipment manufacturers. Consulting and other research reports were also reviewed. For a full list of reviewed sources please see Appendix C.

Economic Valuation of the Liner Industry

The most common measures of the value of an industry in the economy are the value of output produced by the sector and the associated employment provided by this activity. These are commonly measured through the value of the output of the companies in the industry and the number of workers they employ. This section reviews available economic metrics for the liner industry and provides estimates of the economic value of the liner industry and its contribution to the global economy and regional economies.

An ideal measure of this value would include the value of liner vessels, their operations, and the value of on-shore assets that support the industry. In practice, however, because some on-shore assets and personnel are shared in their use with non-liner transportation services, such measures are very difficult to produce and would require a significant effort in summing up values using a "bottom-up" approach. This process faces limitations in the inconsistencies between national financial accounting standards and gaps in the data collected and published by different government agencies and facilities such as liner ports around the world.

The analysis of the industry included here have been produced using "top-down" economic measures of the liner industry derived from IHS Global Insight's World Industry Service databases. The detailed methodology and data sources used to derive the liner share portion of these measures are presented in Appendix A. The key indicators presented here are Capital Expenditures, Gross Output, Labor Compensation, and Number of Employees for both the liner industry and the portion of the shipbuilding industry devoted to building and maintaining liner vessels.

The liner industry produced over \$183 billion of direct output globally in 2007 from both operations and shipbuilding. Of this, more than a third was produced by companies in the European Union. The liner industry also accounts for more than 4 million direct jobs world-wide and investment in fixed assets of more than \$29 billion. This estimate of the value of the industry does not include related activities such as cargo handling and storage activities at ports, nor does it include the inland transportation of liner cargoes, unless moved inland by water.

In addition to the direct impacts of the liner industry measured in value and jobs, the spending by the industry creates additional indirect economic impact on other sectors of the economy. Furthermore, this spending induces additional economic activity and employment in the economy. Using estimates of the multipliers for indirect and induced effects that apply to the maritime sector for value and related employment, the full impact of the value of the liner sector operations and shipbuilding in 2007 is estimated to be \$436.3 billion in gross output, generating 13.5 million jobs.

Table 1: Direct Economic Contribution of Shipbuilding and Liner Industry Operations, 2007
(Million US Dollars)

| Region | Gross Output | Labor Compensation | Employees (Thousand) | Capital Expenditure |
|--------------|------------------|--------------------|----------------------|---------------------|
| Total | 183,305.0 | 27,177.9 | 4,146.8 | 29,406.0 |

Sources: IHS Global Insight World Industry Service and World Trade Service.

The direct global economic contribution generated from the operations of the liner industry produced over \$141 billion, or about 77 percent, of liner industry related direct output in 2007. With almost 4 million people directly employed world-wide and with investment in fixed assets of almost \$28 billion, liner industry operations also account for most of the jobs and capital investment related to the industry.

Table 2: Direct Economic Contribution of Liner Industry Operations, 2007
(Million US Dollars)

| Region | Gross Output | Labor Compensation | Employees (Thousand) | Capital Expenditure |
|--------------|------------------|--------------------|----------------------|---------------------|
| Total | 141,528.3 | 20,792.2 | 3,869.9 | 27,527.8 |

Sources: IHS Global Insight World Industry Service and World Trade Service.

In addition to the extensive global operations of the liner industry, the value and employment of the manufacturing required to supply the equipment for liner industry operations is also significant, especially for countries with advanced and sizable shipbuilding operations. The direct economic contribution of liner vessel manufacturing for countries that delivered at least one liner vessel in 2007 is shown in Table 3. The construction of liner vessels provided almost 277,000 jobs in shipbuilding countries and generated almost \$42 billion of gross output, more than \$6 billion of which was labor compensation. The liner shipbuilding industry also invested almost \$1.9 billion in fixed assets during the year 2007. The leader in liner vessel construction is South Korea, with almost \$16 billion worth of output, followed by Germany. Likewise, Japan has a large shipbuilding industry, although much of its output is of non-liner shipping vessels such as bulk carriers.

Table 3: Direct Economic Contribution of Shipbuilding for the Liner Industry, 2007
(Million US Dollars)

| Country | Gross Output | Labor Compensation | Employees (Thousand) | Capital Expenditures |
|-----------------------------|-----------------|--------------------|----------------------|----------------------|
| China | 4,726.2 | 97.5 | 88.4 | 279.3 |
| Germany | 8,694.8 | 1,531.4 | 24.5 | 166.8 |
| Japan | 4,089.4 | 573.1 | 13.7 | 95.6 |
| South Korea | 15,857.3 | 2,400.7 | 77.9 | 958.1 |
| United States | 52.4 | 17.9 | 0.3 | 2.2 |
| Rest of World | 8,356.7 | 1,765.1 | 72.0 | 376.2 |
| European Union Total | 13,804.7 | 2,665.5 | 48.4 | 419.2 |
| World Total | 41,776.7 | 6,385.8 | 276.9 | 1,878.2 |

Sources: IHS Global Insight World Industry Service and Lloyd's Register-Fairplay Research.

Liner Industry Operations and Expenditures

This section of the report examines the seaborne operations of the liner industry as well as its on-shore component, including port expenditures, where possible. The size and impact of the liner industry can be quantified by examining its expenditure on capital such as vessels, containers and equipment as well as the cost of its operations. In addition, non-monetary measures of the industry's operations also provide useful information on the industry's magnitude and scope. Where data was available, this report quantifies the dollars spent on capital and operations by the industry as well as the following operational statistics: port calls, port throughput, number of services provided, available liner capacity, and nautical-miles traveled. The size and geographic scope of the liner fleet is examined in greater detail. Lastly, the number of containers and other equipment utilized by the liner industry is quantified where possible.

In mid-2007, the global liner fleet consisted of 7,210 vessels with approximately 185 million deadweight tons (dwt) of capacity, including 12.5 million TEU of container capacity and 3.2 million CEU of automotive capacity. As of July 2009, approximately \$236 billion has been spent cumulatively on purchasing new liner vessels since the inception of the liner trade. This amount does not include the additional and potentially substantial amounts spent subsequently in the second-hand market, or for upgrades and maintenance. The liner fleet made more than 10,000 average weekly port calls in the first half of 2009 and the average liner ship travelled more than 1,100 nautical-miles in an average week.

Throughput at the top twenty busiest global ports reached almost 250 million TEU in 2008. The global container fleet reached 17.8 million units and cost \$80.1 billion. Investment in liner ports by port authorities and terminal operators are also substantial. Ports in the United States alone invested at least \$360 million² in their liner facilities in just 2006.

METHODOLOGY AND DATA SOURCES

Fleet statistics are derived from databases compiled and maintained by Lloyd's Register - Fairplay Research (LRF). LRF maintains registry information for all ships with International Maritime Organization (IMO) numbers, which includes all seagoing trading ships of 100 gross tonnes and above as well as vessels that are on order. The nationalities of the operator as well as the owner are recorded for most - though not all - vessels in this database. The fleet and order book databases are primary data sources and do not pose any major limitations.

The expenditures and operations of the liner industry are not possible to fully quantify on a global scale for a variety of reasons. Many liner companies, equipment manufacturers, and terminal operators are privately held companies which disclose only minimal details pertaining to their finances and operations. Accounting requirements differ across countries for publicly held companies. There are thus no global or regional organizations that have aggregated any comprehensive financial or operating data on the liner industry. Instead, only piecemeal information can be gleaned from company reports and government agencies.

² U.S. DOT Maritime Administration, *U.S. Public Port Development Expenditure Report (FYs 2006 & 2007-2011)*, February 2009. Major ports such as Los Angeles/Long Beach and New York/New Jersey were not respondents to this survey. The true investment by U.S. ports in liner facilities is thus very likely to be significantly larger than \$360 million.

Subject to such limitations, this report presents the best available data and examples as could be gathered from a review of company information as available from their websites, annual reports, government organizations and research and consulting companies. The sources and methodologies for the operating and financial measures and data that were quantified here are described in greater detail in each of the following sections.

THE LINER FLEET

For the purposes of this report, the liner fleet is defined as consisting of container, vehicle, and Ro-Ro vessels. Some of the Ro-Ro vessels identified in the database are used in short-sea, as opposed to liner, shipping. While it is difficult to identify and exclude Ro-Ro vessels utilized in short-sea shipping, their share of the overall Ro-Ro vessel count is small. In addition, certain vessels such as combination vessels that operate on a scheduled service but are not container, vehicle or Ro-Ro vessels are excluded from the vessel counts and capacity data.

It is important to note that the exact number of ships in the liner fleet changes frequently as ships are decommissioned or new ships enter service. Likewise, the order book is frequently updated with new orders and changes to current orders.

Fleet Size and Capacity

As of July 2009, the global liner fleet consisted of 7,210 vessels with almost 185 million dead-weight tons of capacity. The container fleet of 4,684 vessels has capacity of just over 12.5 million TEU, and the vehicle fleet of 773 vessels has the capacity of approximately 3.2 million car equivalent units (CEU). The Ro-Ro fleet provides an additional 1.2 million CEU of capacity.

Table 4: Global Liner Fleet, July 2009

| Vessel Type | Number of Vessels | Dwt |
|--------------|-------------------|--------------------|
| Container | 4,684 | 165,774,103 |
| Vehicle | 773 | 11,375,69 |
| Ro-Ro | 1,753 | 7,423,240 |
| Total | 7,210 | 184,573,034 |

Source: Lloyd's Register – Fairplay Research

The total order book for liner vessels in July 2009 contained another 1,381 vessel to be added to the fleet. These vessels will account for another 68.1 million dwt in liner tonnage. Container ships on-order will add 5.5 million TEU of capacity or roughly 40% additional capacity. The order book thus reflects the growing size of container vessels. The average container ship in the current fleet has the capacity of about 2,670 TEU where as the average container ship on-order will have the capacity of more than 5,000 TEU. A similar trend can be observed in vehicle vessels. The vehicle carrier vessels on-order will provide another 1.14 million CEU of capacity, or an average capacity of 5,300 CEU per vessel compared to an average capacity of 4,100 CEU per vessel in the current fleet.

Table 5: Global Liner Fleet on Order

| Vessel Type | Number of Vessels | Dwt |
|--------------|-------------------|-------------------|
| Container | 1,082 | 63,755,615 |
| Vehicle | 214 | 3,539,701 |
| Ro-Ro | 85 | 814,676 |
| Total | 1,381 | 68,109,992 |

Source: Lloyd's Register – Fairplay Research

Over the last five years, container shipping has been one of the fastest growing segments of seaborne shipping. The fleet has grown by an average annual of 13% over the last five years. This growth is driven primarily by vessels with a capacity of over 5,000 TEU, which added 3.1 million TEU of capacity between 2004 and 2008. In the next five years, the container fleet is expected to expand an average of 9.3% per year, with growth in vessels of more than 8,000 TEU topping 25% through 2013.

The growth in the vehicle carrier fleet has also been significant, averaging 9.3% per year between 2004 and 2008. This growth will slow to about five percent per year over the next five years.

Table 6 below presents the regional break-down of the current liner fleet as well as the liner fleet that is currently on-order. Regional fleet data are aggregated based on the nationality of the *operator* of each vessel and not the registry of the vessel as the operator is more in control of the operational deployment of vessels and therefore has a more important impact on the countries the vessels are used to serve than the owner of the vessel in cases where the owner and operator are different.

The regional break-down of the liner fleet demonstrates that with a total fleet of 2,112 vessels, or 29 percent of the global fleet, and an additional 654 vessels on order, the European Union dominates liner trade by this measure, especially for container vessels. Asia, particularly Greater China³ and Japan, also has a significant and expanding presence in container shipping. Japan, however, is the leading country in seaborne vehicle shipping, with almost 48 percent of the total global vehicle carrier fleet.

³ Greater China is a regional definition used in this report to represent all of China, including Taiwan, China and Hong Kong S.A.R.

Table 6: Current and On-Order Liner Fleet by Region, July 2009

| Vessel Type | Operator Region | Existing Fleet | | | On-Order | | |
|--------------------|---------------------------|----------------|--------------------|-------------------|--------------|-------------------|------------------|
| | | Vessels | Dwt | TEU/CEU | Vessels | Dwt | TEU/CEU |
| Container | European Union | 1,641 | 58,749,877 | 4,414,581 | 546 | 27,074,606 | 2,277,276 |
| | Other Europe | 508 | 21,191,551 | 1,568,753 | 68 | 7,335,173 | 648,447 |
| | Greater China | 857 | 32,271,290 | 2,498,311 | 131 | 9,843,666 | 866,764 |
| | Japan | 326 | 14,451,324 | 1,110,661 | 84 | 4,981,250 | 451,196 |
| | South Korea | 245 | 9,881,359 | 762,819 | 39 | 3,483,674 | 316,568 |
| | Other Asia | 529 | 13,084,849 | 961,141 | 45 | 2,060,360 | 184,538 |
| | United States | 89 | 1,977,114 | 145,363 | 1 | 63,300 | 4,860 |
| | Canada | 2 | 16,657 | 1,342 | 0 | 0 | 0 |
| | Latin America & Caribbean | 146 | 5,151,926 | 388,334 | 20 | 1,462,096 | 132,724 |
| | Middle East & Africa | 229 | 7,851,031 | 576,010 | 63 | 5,216,203 | 449,032 |
| | Unknown | 112 | 1,147,125 | 83,505 | 85 | 2,235,287 | 174,715 |
| | Total Container | 4,684 | 165,774,103 | 12,510,820 | 1,082 | 63,755,615 | 5,506,120 |
| Vehicle | European Union | 119 | 2,461,381 | 571,640 | 78 | 1,404,885 | 420,201 |
| | Other Europe | 164 | 2,653,173 | 764,238 | 29 | 399,520 | 153,827 |
| | Greater China | 49 | 484,134 | 143,341 | 33 | 537,726 | 162,924 |
| | Japan | 368 | 5,063,649 | 1,497,799 | 34 | 481,450 | 165,678 |
| | South Korea | 16 | 168,908 | 31,567 | 5 | 61,420 | 31,670 |
| | Other Asia | 10 | 52,466 | 10,531 | 1 | 17,250 | 5,309 |
| | United States | 10 | 183,887 | 49,788 | 2 | 42,400 | 12,000 |
| | Canada | 0 | 0 | 0 | 0 | 0 | 0 |
| | Latin America & Caribbean | 3 | 43,475 | 14,006 | 0 | 0 | 0 |
| | Middle East & Africa | 12 | 100,242 | 29,298 | 0 | 0 | 0 |
| | Unknown | 22 | 164,376 | 56,348 | 32 | 595,050 | 183,738 |
| | Total Vehicle | 773 | 11,375,691 | 3,168,556 | 214 | 3,539,701 | 1,135,347 |
| Ro-Ro | European Union | 352 | 3,429,781 | 595,003 | 30 | 450,528 | 98,274 |
| | Other Europe | 107 | 640,984 | 126,979 | 12 | 89,444 | 22,090 |
| | Greater China | 25 | 165,381 | 25,214 | 6 | 68,144 | 22,626 |
| | Japan | 94 | 610,843 | 90,298 | 0 | 0 | 0 |
| | South Korea | 11 | 74,909 | 10,227 | 0 | 0 | 0 |
| | Other Asia | 230 | 288,091 | 36,300 | 10 | 29,797 | 8,066 |
| | United States | 80 | 846,057 | 152,911 | 0 | 0 | 0 |
| | Canada | 8 | 62,693 | 9,226 | 0 | 0 | 0 |
| | Latin America & Caribbean | 33 | 104,264 | 20,106 | 5 | 26,325 | 10,780 |
| | Middle East & Africa | 169 | 499,640 | 75,966 | 3 | 13,270 | 2,159 |
| | Unknown | 644 | 700,597 | 93,452 | 19 | 137,168 | 13,004 |
| | Total Ro-Ro | 1,753 | 7,423,240 | 1,235,682 | 85 | 814,676 | 176,999 |
| Total Liner | European Union | 2,112 | 64,641,039 | | 654 | 28,930,019 | |
| | Other Europe | 779 | 24,485,708 | | 109 | 7,824,137 | |
| | Greater China | 931 | 32,920,805 | | 170 | 10,449,536 | |
| | Japan | 788 | 20,125,816 | | 118 | 5,462,700 | |
| | South Korea | 272 | 10,125,176 | | 44 | 3,545,094 | |
| | Other Asia | 769 | 13,425,406 | | 56 | 2,107,407 | |
| | United States | 179 | 3,007,058 | | 3 | 105,700 | |
| | Canada | 10 | 79,350 | | 0 | 0 | |
| | Latin America & Caribbean | 182 | 5,299,665 | | 25 | 1,488,421 | |
| | Middle East & Africa | 410 | 8,450,913 | | 66 | 5,229,473 | |
| | Unknown | 778 | 2,012,098 | | 136 | 2,967,505 | |
| | Total Liner | 7,210 | 184,573,034 | | 1,381 | 68,109,992 | |

Note: Unknown refers to liner vessels the nationality of whose operator is not recorded in the registry.

Source: Lloyd's Register – Fairplay Research

Table 7 (on the next page) provides an overview of the current fleet size for countries in the European Union – the largest regional participant in the liner industry. With almost 600 liner vessels each, Denmark and Germany are the leading participants in the European Union liner industry and account for 55 percent of the Union's liner fleet. France operates more than 300 liner vessels; where as all other member states operate less than 100 vessels. Sweden is the major operator of vehicle vessels, accounting for more than 55 percent of the total European Union vehicle fleet. However, the European Union operates much fewer vehicle vessels than Japan does alone. Ro-Ro operations are spread fairly evenly through out the European Union.

Table 7: European Union Liner Fleet, July 2009

| Operator Country | Container | | | Vehicle | | | Ro-Ro | | | Total | |
|------------------|--------------|-------------------|------------------|------------|------------------|----------------|------------|------------------|----------------|--------------|-------------------|
| | Vessels | Dwt | TEU | Vessels | Dwt | CEU | Vessels | Dwt | CEU | Vessels | Dwt |
| Austria | 1 | 12,167 | 754 | | | | | | | 1 | 12,167 |
| Belgium | 44 | 431,422 | 34,921 | | | | 28 | 245,588 | 56,775 | 72 | 677,010 |
| Bulgaria | 3 | 42,713 | 2,280 | | | | 2 | 20,871 | 2,178 | 5 | 63,584 |
| Cyprus | 37 | 738,066 | 53,088 | | | | 2 | 17,684 | 2,975 | 39 | 755,750 |
| Denmark | 529 | 25,873,255 | 1,902,981 | 1 | 15,880 | 6,545 | 39 | 375,452 | 86,856 | 569 | 26,264,587 |
| Estonia | 3 | 14,954 | 1,262 | | | | 3 | 6,565 | 925 | 6 | 21,519 |
| Finland | 11 | 112,803 | 8,748 | | | | 30 | 231,100 | 47,487 | 41 | 343,903 |
| France | 296 | 12,011,547 | 938,591 | | | | 17 | 213,155 | 33,732 | 313 | 12,224,702 |
| Germany | 553 | 17,177,137 | 1,302,190 | | | | 30 | 251,013 | 23,383 | 583 | 17,428,150 |
| Greece | 30 | 605,565 | 42,526 | 15 | 123,524 | 38,818 | 38 | 203,600 | 38,212 | 83 | 932,689 |
| Irish Republic | 9 | 52,801 | 4,491 | 1 | 1,275 | 568 | 2 | 13,511 | 2,925 | 12 | 67,587 |
| Italy | 18 | 359,898 | 23,385 | 28 | 587,341 | 109,594 | 41 | 749,663 | 90,630 | 87 | 1,696,902 |
| Latvia | | | | | | | 2 | 6,332 | 1,449 | 2 | 6,332 |
| Lithuania | 1 | 13,729 | 1,080 | | | | | | | 1 | 13,729 |
| Netherlands | 43 | 628,658 | 48,784 | 2 | 36,074 | 10,378 | 37 | 418,600 | 77,118 | 82 | 1,083,332 |
| Poland | 1 | 9,238 | 750 | | | | 6 | 44,766 | 8,127 | 7 | 54,004 |
| Portugal | 3 | 31,246 | 2,123 | | | | 1 | 3,570 | 870 | 4 | 34,816 |
| Romania | 4 | 21,740 | 1,133 | | | | 2 | 8,065 | 1,776 | 6 | 29,805 |
| Spain | 17 | 236,242 | 15,076 | 6 | 21,773 | 7,005 | 14 | 80,121 | 19,750 | 37 | 338,136 |
| Sweden | 2 | 19,071 | 1,618 | 66 | 1,675,514 | 398,732 | 28 | 345,762 | 59,052 | 96 | 2,040,347 |
| United Kingdom | 36 | 357,625 | 28,800 | | | | 30 | 194,363 | 40,783 | 66 | 551,988 |
| Total | 1,641 | 58,749,877 | 4,414,581 | 119 | 2,461,381 | 571,640 | 352 | 3,429,781 | 595,003 | 2,112 | 64,641,039 |

Source: Lloyd's Register – Fairplay Research

Table 8 ranks the top twenty countries by the size of their current liner fleet and by the number of vessels they have on order. China is currently the leading operator of liner vessels with 11 percent of the global liner fleet and 15 percent of its capacity. It is followed closely by Japan, with 788 liner vessels. Denmark, which ranks fifth by the fleet count, operates the second largest fleet by capacity. Germany is the largest European Union operator of liner vessels and the country with the most vessels on-order world-wide. By the current order-book, Germany will operate only two fewer vessels than China by the time the orders are completed.

Table 8: Top Twenty Countries by Existing Fleet and Vessels On-Order, July 2009

| Rank | Existing Fleet | | | On-Order | | |
|------|-------------------------|--------------|--------------------|-------------------------|--------------|-------------------|
| | Operator Country | Vessels | Dwt | Operator Country | Vessels | Dwt |
| 1 | China | 804 | 27,906,667 | Germany | 355 | 14,103,350 |
| 2 | Japan | 788 | 20,125,816 | Unknown* | 136 | 2,967,505 |
| 3 | Unknown* | 778 | 2,012,098 | China | 126 | 8,626,542 |
| 4 | Germany | 583 | 17,428,150 | Japan | 118 | 5,462,700 |
| 5 | Denmark | 569 | 26,264,587 | Denmark | 63 | 4,609,064 |
| 6 | Switzerland | 387 | 19,617,726 | France | 59 | 5,338,548 |
| 7 | France | 313 | 12,224,702 | Greece | 56 | 2,252,062 |
| 8 | Singapore | 291 | 9,409,744 | Switzerland | 46 | 6,780,960 |
| 9 | South Korea | 272 | 10,125,176 | Hong Kong S.A.R., China | 44 | 1,822,994 |
| 10 | Indonesia | 196 | 999,769 | South Korea | 44 | 3,545,094 |
| 11 | Norway | 186 | 2,783,435 | Netherlands | 37 | 564,490 |
| 12 | United States | 179 | 3,007,058 | Norway | 37 | 442,420 |
| 13 | Hong Kong S.A.R., China | 127 | 5,014,138 | Singapore | 37 | 1,887,087 |
| 14 | Chile | 119 | 4,515,680 | Israel | 30 | 2,873,349 |
| 15 | United Arab Emirates | 106 | 1,001,431 | Cyprus | 27 | 720,900 |
| 16 | Israel | 104 | 3,739,350 | Turkey | 22 | 452,144 |
| 17 | Sweden | 96 | 2,040,347 | Belgium | 18 | 550,771 |
| 18 | Turkey | 94 | 1,088,073 | Italy | 18 | 334,497 |
| 19 | Malaysia | 89 | 1,088,152 | Kuwait | 17 | 1,781,100 |
| 20 | Italy | 87 | 1,696,902 | Sweden | 12 | 289,120 |
| | Other | 1,042 | 12,484,033 | Other | 79 | 2,705,295 |
| | Total | 7,210 | 184,573,034 | | 1,381 | 68,109,992 |

Source: Lloyd's Register – Fairplay Research

* Note: The identity of an operator is unknown because the vessel is on the order book without an assigned operator or the vessel is not currently in service. In addition, operator data is incomplete on operators with small fleets of one or two ships and on some operators from select developing countries.

Shipbuilding

Many maritime nations participate in liner vessel operations, with larger nations tending to operate larger fleets. Shipbuilding, however, is more concentrated among a few countries - particularly South Korea and Japan - with highly developed shipyards. Shipbuilding is an important component of the liner industry, and it generates many skilled jobs and revenues.

A total of 532 container and Ro-Ro vessels were delivered in 2007. In Table 9 below are the details. South Korea delivered approximately 48 percent of new liner capacity in 2007 and Japan delivered another 18 percent. The table also demonstrates that South Korea's dominance in shipbuilding has slowly eroded over the last three years, as its market share declined from 54 percent to 43 percent between 2006 and 2008. The main beneficiary has been China, whose market share increased from less than 10 to more than 20 percent in the same time period. Indonesia and Malaysia deliver dozens of smaller vessels, with less than one thousand gross-tons of capacity.

Table 9: Deliveries of Container and Ro-Ro Vessels by Builder Country, 2006-2008

| Builder Country | 2006 | | | 2007 | | | 2008 | | |
|----------------------|------------|---------------|-------------|------------|---------------|-------------|------------|---------------|-------------|
| | No. | 1,000gt | % | No. | 1,000gt | % | No. | 1,000gt | % |
| South Korea | 149 | 9,378 | 54.3% | 151 | 8,314 | 47.5% | 148 | 8,794 | 43.4% |
| Japan | 63 | 2,776 | 16.1% | 72 | 3,179 | 18.2% | 86 | 4,137 | 20.4% |
| China | 95 | 1,690 | 9.8% | 124 | 2,262 | 12.9% | 164 | 3,676 | 18.1% |
| Germany | 47 | 991 | 5.7% | 53 | 1,085 | 6.2% | 52 | 1,015 | 5.0% |
| Denmark | 4 | 537 | 3.1% | 5 | 854 | 4.9% | 6 | 572 | 2.8% |
| Taiwan, China | 13 | 467 | 2.7% | 14 | 462 | 2.6% | 14 | 614 | 3.0% |
| Poland | 24 | 784 | 4.5% | 13 | 460 | 2.6% | 13 | 516 | 2.5% |
| Croatia | 5 | 138 | 0.8% | 6 | 273 | 1.6% | 5 | 211 | 1.0% |
| Romania | 7 | 181 | 1.0% | 7 | 203 | 1.2% | 7 | 307 | 1.5% |
| Philippines | 1 | 1 | 0.0% | 3 | 155 | 0.9% | 6 | 146 | 0.7% |
| Turkey | 4 | 41 | 0.2% | 7 | 70 | 0.4% | 9 | 120 | 0.6% |
| Singapore | 4 | 112 | 0.6% | 3 | 48 | 0.3% | 5 | 92 | 0.5% |
| Spain | | | | 3 | 36 | 0.2% | 4 | 54 | 0.3% |
| Netherlands | 6 | 47 | 0.3% | 3 | 32 | 0.2% | | | 0.0% |
| Indonesia | 36 | 18 | 0.1% | 33 | 18 | 0.1% | 21 | 11 | 0.1% |
| Malaysia | 10 | 7 | 0.0% | 11 | 10 | 0.1% | 7 | 7 | 0.0% |
| Iran | 7 | 4 | 0.0% | 13 | 7 | 0.0% | 3 | 1 | 0.0% |
| Egypt | | | | 1 | 7 | 0.0% | | | |
| Ukraine | 3 | 27 | 0.2% | 1 | 6 | 0.0% | | | |
| Thailand | | | | 1 | 3 | 0.0% | | | |
| United Arab Emirates | | | | 3 | 2 | 0.0% | | | |
| North Korea | 2 | 1 | 0.0% | 2 | 1 | 0.0% | | | |
| India | | | | 1 | 1 | 0.0% | 1 | 1 | 0.0% |
| United States | 4 | 31 | 0.2% | 2 | 1 | 0.0% | 1 | 0 | |
| Finland | 1 | 23 | 0.1% | | | | | | |
| Italy | 1 | 28 | 0.2% | | | | | | |
| Norway | | | | | | | 1 | 3 | 0.0% |
| United Kingdom | 1 | 2 | 0.0% | | | | | | |
| Total | 487 | 17,284 | 100% | 532 | 17,489 | 100% | 553 | 20,277 | 100% |

Source: Lloyd's Register – Fairplay Research

Vessel Purchase Prices

While it is not possible to determine the current book value of the liner fleet from available sources, one can measure the amount of capital originally invested in liner vessels. Cumulatively, more than \$236 billion has been spent on the purchase of new liner vessels through July of 2009. This number does not include the amount spent on second-hand sales and or on vessel upgrades or necessary maintenance and repair.

Cumulatively, European operators have spent the most on liner vessels, more than \$105 billion or 45 percent of total purchases of liner vessels, as shown in Table 10. This reflects the historical dominance and a continued strong presence of Europe in liner shipping. Greater China however is the second largest cumulative spender on liner vessels, with 15 percent of total spending, although most of its purchases have been more recent than Europe's.

Table 10: Cumulative Spending on Liner Vessels by Operating Region through 2009
(Million US Dollars)

| Operating Region | Container | Vehicle | Other Ro-Ro | Total |
|------------------|----------------|---------------|---------------|----------------|
| South Korea | 11,309 | 299 | 224 | 11,832 |
| Japan | 15,300 | 16,760 | 2,206 | 34,266 |
| Greater China | 33,981 | 2,351 | 334 | 36,665 |
| Other Asia | 648 | 0 | 164 | 812 |
| Middle East | 8,913 | 179 | 1,009 | 10,101 |
| South East Asia | 14,969 | 164 | 918 | 16,050 |
| Europe | 82,365 | 13,882 | 9,433 | 105,681 |
| Russia | 980 | 15 | 365 | 1,360 |
| Turkey | 1,165 | 14 | 1,295 | 2,474 |
| North America | 3,298 | 497 | 1,938 | 5,733 |
| South America | 5,591 | 203 | 59 | 5,854 |
| Rest of World | 68 | 8 | 309 | 386 |
| Unknown | 2,083 | 498 | 2,268 | 4,849 |
| Total | 180,671 | 34,869 | 20,523 | 236,062 |

Source: *Lloyd's Register – Fairplay Research*

Table 11 combines the cumulative recipients of spending on liner vessels. As expected, South Korea, the leading shipbuilding country, has received more than \$76 billion or 32 percent of the total. Europe is ranked next at 27 percent, reflecting its historic presence in shipbuilding, although many of its yards have been losing competitiveness and market share. Japan does not lag far behind Europe, with a cumulative market share of 25 percent. The United States no longer has a major international commercial liner vessel building industry.

Table 11: Cumulative Receipts from Sales of Liner Vessels by Region of Build as of July, 2009
(Million US Dollars)

| Building Region | Container | Vehicle | Other Ro-Ro | Total |
|-----------------|----------------|---------------|---------------|----------------|
| South Korea | 69,781 | 6,087 | 377 | 76,244 |
| Japan | 34,033 | 21,061 | 4,326 | 59,421 |
| Greater China | 26,513 | 996 | 974 | 28,483 |
| Other Asia | 10 | 0 | 80 | 90 |
| Middle East | 0 | 0 | 278 | 278 |
| South East Asia | 1,567 | 426 | 1,857 | 3,850 |
| Europe | 45,771 | 6,221 | 11,151 | 63,144 |
| Russia | 26 | 0 | 298 | 323 |
| Turkey | 1,124 | 0 | 79 | 1,203 |
| North America | 1,597 | 78 | 773 | 2,447 |
| South America | 202 | 0 | 223 | 425 |
| Rest of World | 46 | 0 | 107 | 153 |
| Total | 180,671 | 34,869 | 20,523 | 236,062 |

Source: *Lloyd's Register – Fairplay Research*

LINER FLEET OPERATIONS

This section of the report provides information on the operations of the liner industry. These statistics are useful for understanding the scope of liner operations. For example, container and vehicle vessels made an average of more than 10,100 port calls in a typical week in 2009, or about 2.1 port calls per vessel per week. The average vessel also travelled more than 1,100 nautical-miles in a typical week. Seventy four services with almost 15 million TEU of capacity were provided by the industry on the West Coast of North America and Asia route alone in the middle of 2007.

The liner industry offers transport between all major container ports world-wide. Inland countries in turn utilize the container ports of their maritime neighbors in order to participate in international trade.

Table 12 demonstrates the number of services, or unique ship schedules and routes, provided by the liner industry as of July 1, 2007. There were 409 services provided by the industry in mid-2007. It is important to note that the industry frequently modifies its services in order to respond to changing market forces and the needs of its customers. The route with the most services is between Asia and the west coast of North America, particularly reflecting the large volume of trade between the United States, China and other Asian countries. Together, the North Europe and the Mediterranean routes with Asia have 88 unique services.

Table 12: Number of Services and Annual Capacity Deployed by Route, as of July 1, 2007

| Route | Services |
|--|------------|
| West Coast of North America – Asia | 74 |
| East Coast of North America – Asia | 24 |
| North America - Northern Europe | 36 |
| North America – Mediterranean | 23 |
| Asia - North Europe | 35 |
| Asia – Mediterranean | 43 |
| North America - East Coast of South America | 11 |
| North America - West Coast of South America | 16 |
| North America - North Coast of South America | 22 |
| Europe - East Coast of South America | 14 |
| Europe - West Coast of South America | 6 |
| Europe - North Coast of South America | 13 |
| Asia - East Coast of South America | 6 |
| Asia - West Coast of South America | 7 |
| South Africa – Europe | 6 |
| South Africa - North America | 3 |
| South Africa – Asia | 21 |
| West Africa – Europe | 33 |
| West Africa - North America | 3 |
| West Africa – Asia | 13 |
| Total | 409 |

Notes: Services may be counted on more than one route.

"Asia" includes Australia and New Zealand.

Sources: ComPair Data, World Line Supply Report Summary, July 2007;

Drewry, Annual Container Market Review and Forecast - 2007/08.

Port Calls and Nautical-Miles Travelled

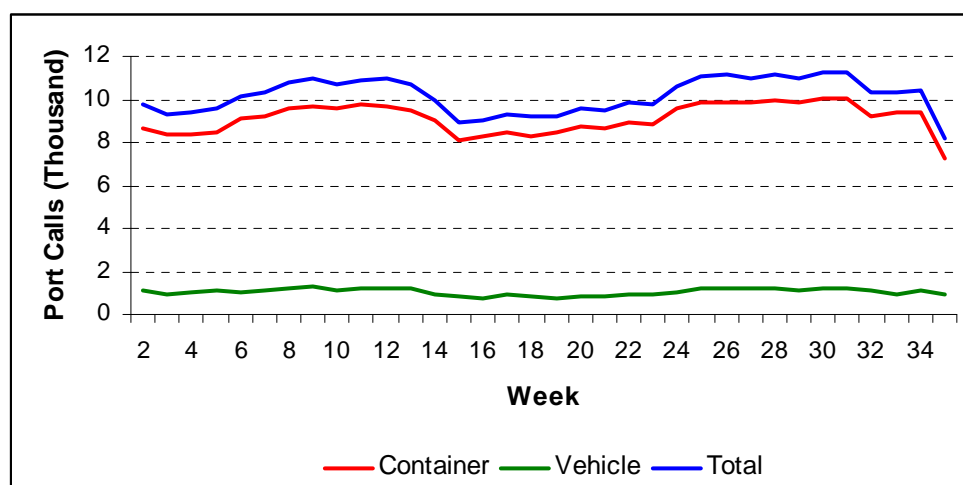
As an indication of the extensiveness of the physical activity of the liner industry, this section presents measures of port calls and distances travelled by container and vehicle ships during the first 35 weeks of 2009. These measures are derived from Lloyds Register-Fairplay (LRF) Automatic Identification System (AIS), which tracks the real-time movement of vessels. During this period, LRF's AIS system tracked a weekly average of 4,800 container and vehicle vessels, corresponding to about 88 percent of the total container and vehicle fleet. The AIS satellite system was not in operation prior to 2009, thus it is not possible to derive these measures for an earlier time period. However, one would expect a larger number of port calls and nautical-miles prior to the global recession.

Overall, these vessels made more than 10,100 port calls and travelled more than 5.4 million nautical-miles in an average week. An average container or vehicle vessel made 2.1 port calls per week and travelled more than 1,100 nautical-miles.

While measures of capacity and vessel counts demonstrate the overall size of the industry, such operating measures indicate the swings in its actual utilization and scope of operations as well as the seasonality inherent in the liner business.

Figure 1 shows the number of port calls made by container and vehicle vessels in the first 35 weeks of 2009. On average, container ships made more than 9,100 port calls and vehicle vessels just over 1,000 port calls per week. In other words, workers at ports world-wide loaded and unloaded more than 10,000 vessel-stops per week. The average vessel thus made 2.1 port calls per week.

Figure 1: Average Weekly Port Calls Made by Container and Vehicle Vessels, First 35 Weeks of 2009



Note: The first week of 2009 was a short week and is excluded.

Source: Lloyd's Register- Fairplay Research, AISLive.

Operators from the European Union made more than a third of these port calls and operators from Greater China and Other Asia made about 17 percent each.

Table 13: Average Weekly Number of Port Calls Made by Operator Region in 2009

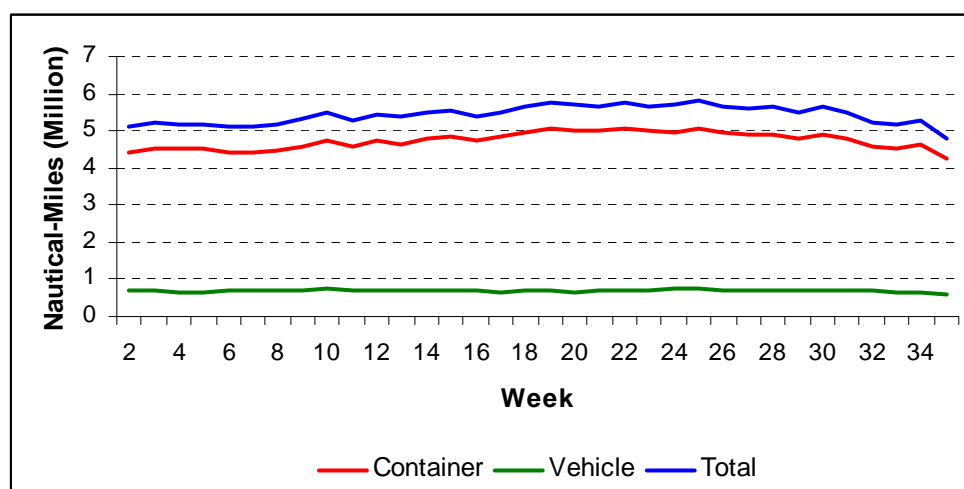
| Region | Container Vessels | Vehicle Vessels | Total |
|-----------------------|-------------------|-----------------|---------------|
| Americas | 388 | 15 | 403 |
| Greater China | 1,733 | 37 | 1,770 |
| European Union | 3,505 | 212 | 3,716 |
| Japan | 573 | 504 | 1,078 |
| Other Asia | 1,723 | 36 | 1,760 |
| Other Europe | 1,029 | 224 | 1,253 |
| Rest of World | 10 | 0 | 10 |
| Unknown | 156 | 15 | 171 |
| Global Average | 9,116 | 1,044 | 10,160 |

Note: Average is for the first 35 weeks of 2009, excluding the first short week.

Source: Lloyd's Register- Fairplay Research, AISLive.

On average, container ships travelled more than 4.7 million nautical miles and vehicle vessels travelled 0.7 million nautical miles per week in the first 35 weeks of 2009. Figure 2 demonstrates the weekly number of nautical-miles travelled by container and vehicle vessels during this period. The average vessel thus travelled 1,132 nautical-miles per week.

Figure 2: Average Weekly Nautical-Miles Travelled by Container and Vehicle Vessels, First 35 Weeks of 2009



Note: The first week of 2009 was a short week and is excluded.

Source: Lloyd's Register- Fairplay Research, AISLive.

Operators from the European Union travelled the most nautical-miles, or about 36 percent of the total, reflecting the higher number of port calls made by these vessels.

Table 14: Average Weekly Number of Nautical-Miles Travelled by Operator Region in 2009
(Thousands)

| Region | Container Vessels | Vehicle Vessels | Total |
|-----------------------|-------------------|-----------------|--------------|
| Americas | 280 | 14 | 294 |
| Greater China | 821 | 23 | 845 |
| European Union | 1,829 | 129 | 1,958 |
| Japan | 379 | 335 | 714 |
| Other Asia | 863 | 21 | 884 |
| Other Europe | 518 | 160 | 678 |
| Rest of World | 2 | 0 | 2 |
| Unknown | 49 | 10 | 59 |
| Global Average | 4,741 | 692 | 5,433 |

Note: Average is for the first 35 weeks of 2009, excluding the first short week.

Source: Lloyd's Register- Fairplay Research, AISLive.

PORT EXPENDITURES AND OPERATIONS

The on-shore portion of the liner industry includes container and Ro-Ro terminals, container handling equipment such as cranes and chassis, as well as all the workers needed to load and unload containers and vehicles and to deliver goods to their final destinations. All this equipment, as well as containers themselves, require constant expenditure to manufacture, maintain and operate. The liner industry thus generates economic activity and employment not just from vessel construction and operations but also from the thousands of companies that participate in equipping and operating ports and the inland portion of the distribution of liner goods.

This section of the report thus quantifies the available data on expenditures at ports and on liner industry equipment. Only limited data was available on an aggregated global or regional basis. Company and port annual reports were also reviewed in order to highlight activity for select ports, equipment types and companies.

Throughput at the top twenty global liner ports reached nearly 236 million TEU in 2007. Globally, there were more than 17.8 million containers in the world fleet in mid-2008, costing about \$80.1 billion.

Throughput at Liner Ports

Throughput at liner ports is another important indicator of liner industry activity. Though it was not practical for this study to estimate the throughput at every liner port, throughput at the top 20 global ports is presented in Table 15 below. By definition however, global port volumes must exceed the sum of import and export TEU, since both the exporting and importing port will count the containers.

Table 15 has the top 20 world container ports ranked by 2008 TEU. Throughput at the top 20 ports reached almost 250 million TEU in 2008. These rankings demonstrate the dominance of Asian ports in container trade. In particular, the throughput at the ports of Ningbo and Guangzhou in China has been growing rapidly. These ports now rank seventh and eighth and have overtaken Rotterdam. Kaohsiung

and the ports of Los Angeles and Long Beach in the United States were particularly affected by the global downturn that started in 2008.

Table 15: Top 20 World Ports by 2008 Throughput

| Rank | Port Name | Country | 2007 TEU | 2008 TEU |
|------|-----------------------|----------------------|------------|------------|
| 1 | Singapore | Singapore | 27,932,000 | 29,918,200 |
| 2 | Shanghai | China | 26,168,000 | 27,980,000 |
| 3 | Hong Kong | China | 23,881,000 | 24,248,000 |
| 4 | Shenzhen | China | 21,099,000 | 21,413,888 |
| 5 | Busan | South Korea | 13,270,000 | 13,425,000 |
| 6 | Dubai | United Arab Emirates | 10,653,026 | 11,827,299 |
| 7 | Ningbo | China | 9,349,000 | 11,226,000 |
| 8 | Guangzhou | China | 9,200,000 | 11,001,300 |
| 9 | Rotterdam | Netherlands | 10,790,604 | 10,783,825 |
| 10 | Qingdao | China | 9,462,000 | 10,320,000 |
| 11 | Hamburg | Germany | 9,889,792 | 9,737,110 |
| 12 | Kaohsiung | Taiwan, China | 10,256,829 | 9,676,554 |
| 13 | Antwerp | Belgium | 8,175,951 | 8,662,890 |
| 14 | Tianjin | China | 7,103,000 | 8,500,000 |
| 15 | Port Kelang | Malaysia | 7,120,000 | 7,970,000 |
| 16 | Los Angeles | United States | 8,355,039 | 7,849,985 |
| 17 | Long Beach | United States | 7,312,465 | 6,487,816 |
| 18 | Tanjung Pelepas | Malaysia | 5,500,000 | 5,600,000 |
| 19 | Bremerhaven | Germany | 4,912,177 | 5,529,159 |
| 20 | New York & New Jersey | United States | 5,299,105 | 5,265,053 |

Source: Lloyd Register-Fairplay Research

Table 16 presents data for container ports in the European Union that publicly report data. The port of Rotterdam is the largest container port in Europe, with more than 10 million TEU handled in 2008. It is closely followed by the ports of Hamburg and Antwerp.

Table 16: Throughput at Select Container Ports in the European Union, 2007- 2008

| Country | Port Name | 2007 TEU | 2008 TEU |
|---------|-------------|-----------|-----------|
| Belgium | Antwerp | 8,175,951 | 8,662,890 |
| Belgium | Zeebrugge | 2,020,723 | 2,209,665 |
| Denmark | Aarhus | 504,000 | 458,000 |
| Denmark | Copenhagen | 192,000 | n/a |
| Estonia | Tallinn | 180,911 | 180,927 |
| Finland | Helsinki | 435,000 | 428,000 |
| Finland | Kotka | 570,881 | 627,765 |
| Finland | Hamina | 195,292 | 178,804 |
| Finland | Rauma | 174,531 | 172,155 |
| Finland | Pori | 34,415 | n/a |
| Finland | Turku | 21,983 | 22,736 |
| France | Le Havre | 2,638,000 | 2,500,000 |
| France | Marseilles | 1,001,957 | 847,651 |
| France | Dunkirk | 197,000 | 215,000 |
| Germany | Hamburg | 9,889,792 | 9,737,110 |
| Germany | Bremerhaven | 4,912,177 | 5,529,159 |

| Country | Port Name | 2007 TEU | 2008 TEU |
|----------------|----------------------------|------------|------------|
| Germany | Lubeck | 205,338 | n/a |
| Germany | Cuxhaven | 63,808 | 63,271 |
| Germany | Kiel | 20,064 | 12,860 |
| Germany | Emden | 51 | n/a |
| Greece | Piraeus | 1,373,138 | 431,000 |
| Italy | Gioia Tauro | 3,445,337 | 3,467,772 |
| Italy | Genoa | 1,855,026 | 1,766,605 |
| Italy | La Spezia | 1,187,040 | 1,246,139 |
| Italy | Livorno | 745,557 | n/a |
| Italy | Naples | 460,812 | 481,521 |
| Italy | Taranto | 756,000 | 786,655 |
| Italy | Venice | 328,000 | 379,072 |
| Italy | Trieste | 267,854 | 335,943 |
| Latvia | Riga | 211,840 | 207,122 |
| Latvia | Ventspils | 16,846 | 14,148 |
| Latvia | Liepaja | 7,665 | 4,227 |
| Lithuania | Klaipeda | 321,432 | 373,263 |
| Malta | Marsaxlokk | 1,887,405 | 2,300,000 |
| Netherlands | Rotterdam | 10,790,604 | 10,783,825 |
| Netherlands | Amsterdam | 370,000 | 435,129 |
| Poland | Gdynia | 614,373 | 610,767 |
| Poland | Szczecin | 47,976 | 62,913 |
| Poland | Gdansk | 96,873 | 163,704 |
| Portugal | Lisbon | 554,774 | 556,062 |
| Romania | Constantza | 1,411,370 | 1,380,935 |
| Slovenia | Koper | 305,648 | 350,000 |
| Spain | Algeciras | 3,414,345 | 3,324,310 |
| Spain | Valencia | 2,771,851 | 3,593,000 |
| Spain | Barcelona | 2,610,099 | 2,569,547 |
| Sweden | Helsingborg | 300,000 | 240,000 |
| Sweden | Stockholm | 44,563 | 41,000 |
| United Kingdom | Felixstowe | 3,300,000 | 3,200,000 |
| United Kingdom | Southampton | 1,900,000 | 1,710,000 |
| United Kingdom | Tilbury | 843,808 | n/a |
| United Kingdom | Liverpool (United Kingdom) | 727,363 | n/a |
| United Kingdom | Thamesport | 800,000 | n/a |

Source: Lloyd's Register- Fairplay Research

Table 17 presents throughput levels for container ports in the United States that publicly report data. The ports of Los Angeles and Long Beach are the largest ports in the United States as measured by throughput, followed by the port of New York and New Jersey.

Table 17: Throughput at Select Container Ports in North America, 2007

| Port Name | 2007 TEU |
|-----------------------|-----------|
| Los Angeles | 8,355,039 |
| Long Beach | 7,312,465 |
| New York & New Jersey | 5,299,105 |
| Savannah | 2,604,401 |
| Oakland | 2,388,182 |
| Vancouver, B.C. | 2,307,289 |
| Hampton Roads | 2,128,366 |
| Seattle | 1,973,504 |
| Tacoma | 1,924,934 |
| Houston | 1,768,627 |
| Charleston | 1,754,377 |
| Baltimore | 624,462 |
| New Orleans | 315,375 |

Source: Lloyd's Register- Fairplay Research

Expenditures by Terminal Operators

Although it is not possible to determine the precise amount of the total investment in liner ports worldwide, we know that the investment levels are on the order of several billion dollars per year.

Example investment levels of the top private terminal operating companies have been over \$2.6 billion to almost \$4 billion per year for the last two years. In 2007, these terminal operators held a market share of about 37 percent so their investment of approximately \$2.6 billion in property, plant, equipment and other capital, if extended to the rest of the liner market would have been over \$7 billion in 2007 and over \$10.5 in 2008 alone. Although a portion of these investments are in non-liner terminal facilities, it is a conservative assumption that most of the billions of dollars are invested annually in liner port facilities worldwide.

Table 18: Investment by Terminal Operators, 2007-2008

(Million US Dollars)

| Operator | Cash Flow Use | 2007 Market Share | 2007 | 2008 |
|---------------|---------------------------------------|-------------------|--------------|--------------|
| APM Terminals | Capital Expenditures | 12.1% | 853 | 723 |
| PSA | Property, Plant, Equipment | 11.0% | 1,086 | 1,313 |
| DP World | Expansions, Maintenance, New Projects | 8.7% | N.A. | 1,397 |
| COSCO Pacific | Property, Plant, Equipment | 5.5% | 683 | 522 |
| Total | | 37.3% | 2,622 | 3,955 |

Sources: Company Annual Reports; Drewry Shipping Consultant Limited, 2008.

Container Fleet

Globally, in mid-2008 there were 17.8 million containers in the world fleet providing 27.3 million TEU of capacity, and which cost the industry almost \$81 billion. This was an increase from about 24.8 million TEU of capacity the previous year. Europe accounts for the largest container fleet at 6.9 million units or nearly 39 percent of the total fleet. North East Asian and North American owners account for nearly the rest of the global fleet, reflecting the location of company headquarters that own the containers, not the deployment of the containers which move throughout the world.

Table 19: Container Fleet by Region, Mid-2008

| Region | TEU | TEU Share | Units | Unit Share | Cost (US\$ million) | Cost Share |
|-------------------------------------|-------------------|---------------|-------------------|---------------|---------------------|---------------|
| Europe | 10,427,987 | 38.1% | 6,917,319 | 38.7% | 36,365 | 44.9% |
| North East Asia | 7,674,963 | 28.1% | 4,990,588 | 28.0% | 19,588 | 24.2% |
| North America | 7,648,952 | 28.0% | 4,823,997 | 27.0% | 20,698 | 25.6% |
| Middle-East & Indian Sub-Continent | 926,730 | 3.4% | 609,693 | 3.4% | 2,285 | 2.8% |
| South East Asia | 477,371 | 1.7% | 362,561 | 2.0% | 1,267 | 1.6% |
| Australia & New Zealand | 86,210 | 0.3% | 73,751 | 0.4% | 383 | 0.5% |
| Central & South America & Caribbean | 64,670 | 0.2% | 41,987 | 0.2% | 232 | 0.3% |
| Africa | 36,834 | 0.1% | 32,656 | 0.2% | 98 | 0.1% |
| Total | 27,343,717 | 100.0% | 17,852,552 | 100.0% | 80,916 | 100.0% |

Note: Includes containers specific to regional standards.

Source: Containerisation International Market Analysis: World Container Census 2009, Table 8.

The volume of container handling world-wide is measured from several perspectives. When all measures of container handling are combined, the total world container handling activity in 2007 was almost half a billion twenty-foot equivalent units (497 million TEU). This included movements of over 224 million loaded and empty TEU between the ports of the world, and 137 million TEU of transshipment activity.⁴ This type of container handling at ports can be considered essential to the efficient operations of the industry and it takes resources at the terminals to provide, so ports appropriately count this activity as well.

⁴ The three metrics each have their purpose for measurement of container handling activity. Most fundamentally is the port-to-port movement of loaded containers carrying goods that shippers are paying to have moved. This is from the perspective of a shipper or customs authorities who are concerned with the ultimate origin and destination for the delivery of the goods. Operational efficiency of the liner system is improved through the use of transshipment where containers are transferred during their journey between vessels at an intermediate port. The transshipment activity is valuable to the operators and ports that provide this service and counting this activity is another measure of container handling provided by the liner industry. At container port terminals there are often operational needs to move containers on and off ships and within terminals not just one time at the original port of loading or discharge for each leg of a container's journey. This can include when containers need to be unloaded temporarily from a ship in order for other containers to be accessible or for reloading of containers onboard vessels for stability or access at a subsequent port call. This can be thought of as additional port handling of containers.

Table 20: Container Handling and Transshipment, Million TEU, 2007

| | PORT TO PORT | TRANSHIPMENT | PORT HANDLING | TOTAL |
|---------------|--------------|--------------|---------------|-------|
| Loaded | 120.3 | 108.4 | 86.0 | 314.7 |
| Empty | 104.2 | 28.6 | 49.9 | 182.7 |
| Total | 224.5 | 137.0 | 135.9 | 497.4 |

Source: IHS Global Insight Analysis and the IHS Global Insight World Trade Service.

Other Liner Industry Equipment

Aside from containers, the industry relies on numerous types of on-board and port terminal equipment to handle liner cargo. One of the most complex and expensive types of equipment are the ship-to-shore gantry cranes. Comprehensive public data on the world inventory of port cranes and their associated costs is unavailable, but ports do invest millions of dollars in cranes in most years. The largest container port alone, the Port of Singapore, has 190 cranes. The port of Shanghai and the port of Rotterdam each have just over 100 cranes. The ports of Los Angeles and Long Beach each have about 70 cranes. A typical new state-of-the-art crane cost about \$10 million in 2007 to provide some perspective on the value of these equipment investments. As the containerization of cargo continues to spread world-wide, investment in such equipment is sure to accelerate.

Once a container is unloaded at the port, it is often loaded onto a specially designed truck-trailer or chassis for transport by motor carrier to its final destination.

Table 21 below demonstrates the chassis count in the United States along with the estimated annual cost of operating that fleet. The chassis fleet in the United States alone costs about \$869 million a year to operate.

Table 21: Chassis Fleet and Operating Costs in the United States, 2008

| Owner Type | Count (Thousand) | Average Annual Operating Cost (Million) |
|-----------------------|------------------|---|
| Ocean Carriers | 392.1 | 401 |
| Railroads | 96.2 | 98 |
| Common Pool Operators | 320.0 | 327 |
| Motor Carriers | 41.8 | 43 |
| Total | 850.0 | 869 |

Source: Requirements for Intermodal Equipment Providers and for Motor Carriers and Drivers Operating Intermodal Equipment; Final Rule 49 CFR Parts 385, 386, 390, et al. December 17, 2008.

Summary

The liner industry has been essential to the facilitation and expansion of world trade, contributing to global economic growth and improvements in the standard of living in both developed and developing countries. This report provides an overview of various economic, trade, and operating metrics that demonstrate the value of the liner industry to specific regional and individual country economies as well as the world as a whole.

This report confirms the industry's profound global economic impact, particularly in Europe, the United States, Asia, and the rest of the Americas. Globally, the full value of the liner industry operations and shipbuilding in 2007 is estimated to be \$436.3 billion, and generated 13.5 million direct and related jobs.

The liner industry is the largest sector of the maritime industry when measuring the value of world trade transported, moving about 60% of global seaborne trade. This was over US\$4.3 trillion of goods in 2007 alone. The liner industry draws significant investment in capacity, using over 7,000 vessels that cost the industry initially over US\$235 billion to acquire plus another US\$80 billion to equip the vessels with containers in which to move cargo. Landside terminals represent additional billions of capital investment from the industry. The liner industry incurs operating costs that produce output valued at \$142 billion annually which make the extensive capital investments available and useful to shippers worldwide for the transportation services they need.

Using the existing metrics available to economists, the estimates of the value of the industry to the world economy understate the importance of the liner industry to the daily lives of most of the world's population. Without the efficient facilitation of trade provided by the liner industry, the standard of living of most families and the financial health of most retail, wholesale, manufacturing and services businesses would be reduced.

Appendix A: World Industry Service Methodology

IHS Global Insight's World Industry Service (WIS) includes both historic and forecast economic data covering 95 industries in 75 countries.

DATA SOURCES

The basic data in World Industry Service is taken from public sources; but is then processed extensively and filled out using established techniques.

The initial set of industry-based data is drawn from complementary primary public sources:

- *Industrial Structure Statistics*, from the OECD-STAN database;
- *International Yearbook of Industrial Statistics*, from the United Nations Industrial Development Organization (UNIDO) ;
- *National Accounts Statistics: Main Aggregates and Detailed Tables*, from the United Nations System of National Accounts (UNSNA) ;
- *Yearbook of Labour Statistics*, from the International Labour Organization (ILO) ;
- *Structural Business Statistics*, from Eurostat database.

The number of countries whose industry data is included in the OECD database is restricted to members of the OECD organization. Fortunately, these countries are also the largest countries economically in the world and include the United States, Japan, Germany, France, and others. For those countries whose data is not included in the OECD database, and also for those industries whose coverage in STAN is not detailed enough, WIS uses a combination of UNSNA and UNIDO databases. The data from these organizations have the desirable attributes of fine detail, consistency, and comparability. ILO and Eurostat are also used as specific complementary sources of data. Finally, both the UN- and OECD-supplied data are supplemented by individual country sources.

Thus, the historical dataset in World Industry Service is built like a pyramid with three layers:

- The bottom layer is the UNSNA and UNIDO data, which provides the baseline for data for all countries and all sectors;
- The next layer up is the OECD data, which replaces UN data in those countries/industries where there is overlap ;
- Finally, the top layer represents data that comes from individual country sources, or from global trade associations and other specific data sources. These “specific-sourced” data are used to bring the OECD and UN data forward in time to provide a timely “now-cast” snapshot of the latest available measures of industry-level business activity.

Note that employment and labor compensation data is taken directly from UNIDO statistics, and is not processed or modified in any way.

WATER TRANSPORT AND SHIPBUILDING SECTORS

In order to determine appropriate economic values for the liner industry, this report concentrated on two industries within WIS: water transport and shipbuilding.

- **Water Transport:** defined as International Standard of Industrial Classification (ISIC) code 61 (Water Transport). This category includes sea, coastal and inland water transport. Included is transport of passengers or freight over water, whether in scheduled service or not. Also included are the operation of towing or pushing boats, excursion, cruise or sightseeing boats, ferries, and water taxis. The category requires transport service be provided to be included by definition. Therefore excluded are restaurant and bar activities on board ships, except when delivered as an integral part of transportation. Also excluded are landside cargo handling, storage of freight, plus harbor operation and other auxiliary maritime activities such as docking, lightage and vessel salvage that are not directly transportation services.
- **Shipbuilding:** defined as ISIC code 351 (Building and Repairing of Ships and Boats). This category includes the manufacturing, repairing, overhaul and the manufacturing of sections for the following type of commercial vessels and floating structures: vessels used in commerce, in pursuits related to commerce or in the carriage of passengers including multi-purpose vessels; vessels designed for ocean, coastal or inland waters; passenger vessels, fishing boats and fish processing factory vessels; tugs and pusher craft; non-motorized vessels such as barges, stationary vessels such as light-ships; non-navigational vessels such as dredgers, floating docks, and floating or submersible drilling platforms; hovercraft; boats with hulls resembling pleasure boats but specially equipped for commercial service or services related to commerce; warships and auxiliary naval vessels; vessels for scientific investigation; floating structures such as pontoons, non-recreational inflatable rafts; coffer-dams, landing stages, buoys, floating tanks and others.

Also included are the manufacturing, maintenance and repair of the following types of non-commercial vessels: yachts, rowing boats, canoes, dories, skiffs, oared life-boats, cutters, kayaks, racing shells, pedalos, rafts, inflatable boats and other pleasure and sporting vessels; pleasure boats designed to accept inboard or outboard motors or to be propelled by wind, paddles or oars; larger boats such as cabin cruisers and sport fisherman.

Excluded are: manufacture of parts of vessels such as iron or steel anchors and sails and other parts that are not major hull assemblies; navigational and other instruments used aboard ships; and amphibian motor vehicles.

LINER INDUSTRY SHARE

The following methodologies were used to extract the liner portion of these industries:

- **Water Transport:** A trade ratio was applied to each country with data in the WIS. The ratio for a given country is the value of liner trade relative to its total seaborne trade. This ratio does not account for passenger and inland water transport that is included in the WIS data, and thus somewhat overstating the liner portion of the water transport industry. At the same time, the water transport industry within WIS excludes important liner industry elements such as cargo handling, storage of freight, docking and other harbor and terminal operations. This means the estimate understates the liner industry because of the other operations it excludes. At this level of detail it

is not possible to tell which effect is larger, the inclusion of inland and passenger transport, or the exclusion of port and related land-side operations, though they clearly largely offset each other.

- **Shipbuilding:** Countries that have a shipyard that delivered a liner vessel (container, Ro-Ro or vehicle) in 2007 were identified first. Next, for each country we determined the ratio of the gross-ton capacity of the liner vessels relative to the gross-ton capacity of all shipping vessels delivered by the country in the same year. This ratio was then applied to estimate the liner portion of shipbuilding from the WIS data.

DEFINITION OF WIS METRICS

WIS was used to derive the amount of Capital Expenditures, Gross Output, Labor Compensation and the number of Employees attributable to the liner industry's shipping services as well as the liner portion of shipbuilding. The following are the definitions of these four metrics:

- **Capital Expenditures:** refers to investments made by establishments operating in the industry during the reference year (2007), net of fixed assets sales. The investments covered are those (whether new or used) with a productive life of one year or more. These assets are intended for the use of the establishments' own labor forces. Major additions, alterations, and improvements to existing assets that extend their normal economic life or raise their productivity are also included.

Capital Expenditures in the liner industry would thus include investment in any type of equipment and vessels used by liner operators. The category would also include machinery and equipment purchased by shipbuilders in order to construct liner vessels. Sales of any equipment are subtracted from the totals.

- **Gross Output:** also called *total sales* or *total production*. This measures the total revenue that is earned by a sector's operating activities. It includes the domestic production that is exported abroad, but excludes imports that are produced abroad. Gross output thus includes all operating expenditures, wages and benefits and company profits.
- **Labor Compensation:** includes both wages and fringe benefits.
- **Number of Employees:** the number of people directly employed by the sector. For this report, this includes employees in liner services and in the construction of liner vessels.

Appendix B: Data Sources

- AXS-Alphaliner, *Cellular Fleet Forecast*, September 2009.
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Port Crane Manufacturers and 2007 Annual Reports of Public Companies

Hyundai
IMPESA
Kalmar Industries
Konecranes
Liebherr Container Cranes
Mitsubishi Heavy Industries,
Mitsui
Paceco
Samsung
TCM Corporation
Zhenhua Port Machinery Company (ZPMC)

Liner Operator Websites

APL (NOL)
A.P. Møller-Maersk
Atlantic Container Line
COSCO (Cosco Container Lines)
China Shipping Group
CMA-CGM Group
Compania Chilena Navegacion Interoceanica
Compania Sud-Americana de Vapores
Crowley Maritime Corporation
Dole Ocean Cargo Express
Evergreen Maritime Corporation
Hamburg Süd
Hanjin Shipping Company
Hapag-Lloyd Container Line
Hoegh Autoliners, Inc.
Hyundai Merchant Marine Company
Independent Container Line
Kawasaki Kisen Kaisha Ltd. (K Line)
Malaysia International Shipping Corporation (MISC)
Mediterranean Shipping Company (MSC)
Mitsui O.S.K. Lines
NYK Line
Orient Overseas Container Line, Ltd. (OOCL)
Pacific International Lines, Ltd.
United Arab Shipping Company
Wan Hai Lines, Ltd.
Wallenius Wilhelmsen Logistics,
Yang Ming Marine Transport Corporation
Zim Integrated Shipping Services, Ltd.

Terminal Operator Websites and 2007 Annual Reports (if Public)

APM Terminals
COSCO Pacific, Limited
DP World
Eurogate
Hutchinson Whampoa, Limited
International Container Terminal Services, Inc.
Port America
PSA International
SSA Marine

Top 20 Port Websites

Port of Singapore, Singapore
Port of Shanghai, China
Port of Hong Kong, China
Port of Shenzhen, China
Port of Yingkou, China
Port of Busan, South Korea
Port of Rotterdam, Netherlands
Port of Dubai, United Arab Emirates
Port of Kaohsiung, Taiwan, China
Port of Hamburg, Germany
Port of Qingdao, China
Port of Ningbo, China
Port of Guangzhou, China
Port of Los Angeles, United States
Port of Antwerp, Belgium
Port of Long Beach, United States
Port of Kelang, Malaysia
Port of Tianjin, China
Port of Tanjung Pelepas, Malaysia
Port of New York/New Jersey, United States