Growth in the Shipping Industry: Future Projections and Impacts

Peter Noble
Noble Associates, Inc., Katy, Texas, United States

Introduction

Since earliest times, ships and shipping have shaped civilization. Ships have been used for discovery, war, and leisure, but most of all for cargo transport. In his poem ‘Cargoes’, the British poet laureate John Masefield describes such activities through the ages, from the “Quinquireme of Nineveh from distant Ophir, ... With a cargo of ivory, and apes and peacocks ...” through the “Statel Spanish galleon coming from the Isthmus ...” to the “Dirty British coaster with a salt-caked smoke stack, butting through the Channel in the mad March days, ....”\(^1\) While recognizing the past, this essay will focus on the potential growth in the shipping industry with a focus on commercial cargo shipping, and will exclude sectors such as cruise ships, ferries, offshore drilling and production units, tugs, barges, and related vessels.

Since the end of World War II, the world has seen an explosive growth in trade. Globally the sum of export and import values as a percentage of the total world gross domestic product (GDP) grew from around 20 percent in the late 1940s through early 1950s to close to 60 percent in 2011, with the shipping industry as the backbone of global trade.\(^2\) This growth is likely to continue. In its report, 2017 Outlook for Energy: A View to 2040, ExxonMobil projects a two billion increase in world population, a 130 percent increase in the global economy, and a 35 percent increase in energy demand.\(^3\) Further information developed by BP plc for its 2017 Energy Outlook report suggests a base case where world GDP almost doubles by 2035, driven by fast-growing emerging economies, as more than two billion people are lifted from low incomes.\(^4\)

\(^1\) J. Masefield, “Cargoes,” Ballads (Elkin Mathews, 1903).
\(^2\) R.C. Feenstra, R. Inklaar and M.P. Timmer, “The Next Generation of the Penn World Table,” American Economic Review 105(10) (2015): 3150–3182, available for download at http://www.ggdcl.net/pwt, Penn World Tables, version 8.1, University of Groningen, The Netherlands (release date 13 April 2015).
\(^3\) Available at http://cdn.exxonmobil.com/~media/global/files/outlook-for-energy/2017/2017-outlook-for-energy.pdf.
\(^4\) Available at https://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2017/bp-energy-outlook-2017.pdf.
Looking specifically at commercial marine transport, we have seen a steady increase over the past decade or more. Growth in cargoes transported by ship has risen from around 30.5 trillion ton-miles in 2000 to approximately 52.5 trillion ton-miles in 2014. The United Nations Conference on Trade and Development (UNCTAD) reported that in 2015 total cargoes transported by ship exceeded 10 billion tons for the first time, with a fleet size of over 50,000 ships, and that 62 percent of these cargoes were unloaded in developing countries as compared to only 41 percent in 2006.\(^5\)

All this suggests that marine transport will continue to be an important part of the global economy for many years into the future.

**Current Fleet**

Three main types of cargoes, dry bulk, liquid bulk and containerized, largely describe the commercial marine transport industry. Within these broad sectors there are a number of sub-divisions. The dry bulk trade is dominated by three types of cargo: iron ore, coal, and wheat; the liquid bulk cargoes also split into three main segments: crude oil, gas (liquefied natural gas (LNG) and liquefied petroleum gas), and refined hydrocarbon products. Containerized cargo is primarily manufactured or semi-manufactured goods and can be split into transoceanic liner trade and small regional feeder trade segments. Using figures for 2015, dry bulk cargoes accounted for 44 percent of the total global marine trade measured by tonnage, while oil and gas accounted for 30 percent and containers for 16 percent, with the remaining 10 percent being general cargoes of various types.

**Future Growth**

Looking to the future, it is likely that dry bulk cargoes will continue to rise, with steady growth in the wheat and iron ore segments, but with perhaps a smaller growth or even a decline in thermal coal for power generation. The demand for metallurgical coal for steel making is likely to remain strong over the longer term. Similarly, we may expect changes in the oil and gas sector where oil may see limited growth while natural gas in the form of LNG will continue to see the substantial growth we have witnessed in recent years.

\(^5\) United Nations Conference on Trade and Development (UNCTAD), *Review of Maritime Transport 2016* (New York and Geneva: UNCTAD, 2016), 6 and Figure 1.4(b).
Containerized cargoes have seen rapid growth over the last 25 years, growing from approximately 90 million twenty-foot equivalent units (TEUs) in 1990 to nearly 700 million TEUs in 2015. The container trade is likely to remain strong although we have seen occasional disruptions such as the financial crisis around 2008 and 2009.\(^6\)

**Factors Affecting Growth**

The future growth of shipping will be driven by the abovementioned growth in global trade, but will be impacted by a number of factors, which may put some limits on this growth or may lead to increased innovation to satisfy demand.

**Ship Efficiency and Environmental Impact**

In terms of emissions per ton of cargo, marine shipping is the most efficient form of commercial transport. However, due to the sheer scale of the industry, shipping contributes to about 3 percent of the world’s emissions. In order to minimize air pollution from ships, the International Maritime Organization (IMO) has established sulfur emission control areas (SECAs) or emission control areas (ECAs).\(^7\) The emission limit requirements are being addressed by use of low sulfur fuels, using post-combustion treatment of the exhaust, and by use of alternative fuels, such as LNG.

Further, in 2011, the IMO addressed the overall efficiency of ships when it adopted an Energy Efficiency Design Index (EEDI), which is aimed at promoting the use of more energy efficient (less polluting) equipment and engines.\(^8\) The EEDI requires a minimum energy efficiency level per capacity mile (e.g., ton-mile) for different ship type and size segments.

Another concern with shipping has been the potential for the transport of invasive species in ballast water. The IMO International Convention for the Control and Management of Ships’ Ballast Water and Sediments,\(^9\) which

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6 UNCTAD, *Trade and Development Report, 2015: Making the International Financial Architecture Work for Development* (New York and Geneva, 2015).

7 See “Prevention of Air Pollution from Ships,” IMO, http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Air-Pollution.aspx, last accessed 14 February 2018.

8 See “Energy Efficiency Measures,” IMO, http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Technical-and-Operational-Measures.aspx, last accessed 14 February 2018.

9 London, 13 February 2004; see “BWM Convention and Guidelines,” IMO, http://www.imo.org/en/OurWork/Environment/BallastWaterManagement/Pages/BWMCongressionandGuidelines.aspx, last accessed 14 February 2018.
entered into force in September 2017, marks a significant step towards halting the spread of invasive aquatic species, which can cause problems for local ecosystems and lead to substantial economic loss. Under the Convention, ships are required to manage their ballast water to remove, render harmless, or avoid the uptake or discharge of aquatic organisms and pathogens within ballast water and sediments.

**Ship Size**

One of the ways in which the shipping industry has sought to enhance overall efficiency has been through increasing ship size and capacity. However, we have seen limits to ship size already occurring with crude oil tankers and large LNG carriers. The largest crude oil tanker, built in 1979, was over 560,000 ton deadweight capacity; since that time, however, the industry has seen ships of around 350,000 dwt ton capacity as the most useful maximum. Similarly, a number of very large LNG carriers were built in the late 2000s with capacities up to approximately 265,000 cubic meters. More recent ship orders have been in the 170,000 to 185,000 cubic meter range.

Part of the problem with these very large ships is the limited access to ports. The sheer physical dimensions are hard to handle at many berths, and also draft/depth limits in many commercial ports do not allow for such mega-ships, restricting where they may be deployed.

To date we have not seen these technical size limits reached for container ships, with recent orders for 22,000 TEU ships. Again, port facilities and shore-based cargo handling and infrastructure systems are being stretched, so we may see a de facto reduction in the size of such ships before long.

**Port Size and Infrastructure**

Port infrastructure, including shore facilities in terms of cargo handling or storage, will limit the rate of growth in ship size. One of the dimensions that most impacts design options and operations as ship size increases is water depth in a port. Many of the world’s most significant ports, like New York and Rotterdam, have had to invest in channel and berth dredging to increase water depths but the economics of initial and continuing maintenance dredging must be compared to the improved transport efficiency in using larger ships. Ultimately, to participate in global trade, water depth matters.

One way to overcome port draft restrictions is to develop offshore ports where larger ships can discharge and temporarily store cargoes prior to delivery. One example of this is the Louisiana Offshore Oil Port (LOOP), which is a deep-water port designed for unloading crude oil cargoes from deep-draft tankers unable to access existing Gulf coast ports. The LOOP Marine Terminal
is located in open waters of the Gulf of Mexico approximately 29 kilometers (18 nautical miles) offshore from the State of Louisiana. Other concepts for offshore ports for container and other types of cargo offloading and distribution are being examined, and we may see future developments of this type as cargo volumes rise.

**Panama and Suez Canal Improvements**

Both the Suez Canal, opened in 1869, and the Panama Canal, opened in 1914, have had a major impact on global shipping for a century or more in terms of both routing and vessel design. Over the last few decades, ships have been specifically designed to optimize cargo capacity given canal size limitations. Both canals have added capacity with a new, wider Panama Canal now in service and the expansion of the Suez Canal to allow for two-way traffic. These projects will no doubt result in further opportunities for creating new classes of ships to take advantage of the increased capacity.

**Potential Future Changes**

Over the past two decades, we have seen a shift in cargo patterns with developing countries no longer being predominantly exporters. UNCTAD notes that the balance of developing country traffic was more than three times loaded to unloaded in 1970, but by 2016 had shifted to a more balanced trade.\(^\text{10}\) This trend is likely to continue.

In addition, we will see expansion of routes supplying raw materials and food imports from Africa and South America to China. The New Silk Road, which will provide an overland connection between China and Europe, is likely to have a moderating effect on marine transport.\(^\text{11}\) This will most likely be in the form of reducing the rate of increase rather than in diminishing the actual volume of marine cargo.

We are also likely to see less oil transported to Europe and North America as demand stabilizes. However, we will see increased trade in LNG, with significant increases in imports into Asia. Finally, a major change in marine transport could occur as the world moves to reduce the use of fossil fuels. At the present time approximately 40 percent of all seaborne cargoes are fossil-fuel

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\(^{10}\) UNCTAD, *Review of Maritime Transport 2017* (Geneva: UNCTAD, 2017), Table 1.4(b).

\(^{11}\) See P. Tae-Woo Lee et al., “Research Trends and Agenda on the Belt and Road (B&R) Initiative with a Focus on Maritime Transport,” *Maritime Policy & Management* (November 2017), 1–19, doi.org/10.1080/03088839.2017.1400189.
related, namely, oil, gas, and coal. As the world reduces the use of such fuels, it seems likely that the demand for their marine transport will also diminish substantially.

**Conclusion**

Demand for commercial marine transport will continue to grow with innovations being brought to the market to satisfy increased demand. Developments already underway point to increased efficiency and reduced environmental impact; to the lowering of manning levels on ships, maybe even unmanned ships in the not too distant future; and to improvements in marine and port infrastructure. For the foreseeable future there is no other system that can match the overall efficiency of commercial shipping in providing transoceanic movement of freight.