



FOREST L. REINHARDT
RAMON CASADESUS-MASANELL
FREDERIK NELLEMANN

Maersk Line and the Future of Container Shipping

There is a difference between just moving a container and moving it in the most sustainable, easy, and reliable way. And that difference is worth something to our customers.

— Morten Engelstoft, Chief Operating Officer, Maersk Line, 2012

It was a cold February afternoon in 2012 as Søren Skou looked out the window of his office across the Copenhagen waterfront. Skou had just recently been promoted to become CEO of Maersk Line, the world's largest container shipping company, and the flagship company of the Danish conglomerate A.P. Moller-Maersk Group. He was taking the reins at a difficult time: the sluggish global economy had severely depressed container rates, while fuel prices were still at record levels. On some trade routes, the company—like its competitors—wasn't even meeting the costs of deploying its large and expensive container ships.

Skou was confident that the company would pull through. After all, it had recently completed a successful turnaround following the Maersk Line's first ever annual loss in 2009 and the Group benefited from a diverse holding of activities, which included an oil and gas business. However, Skou needed to assess whether Maersk Line was headed in the right direction, both to be able to compete in this slower market but also once the economy, and global trade, picked up. In 2010 the company had decided to focus on three differentiators to help it maintain its position as the global leader: reliability, ease-of-doing business, and environmental performance.

Maersk Line had the ambition of becoming the sustainability leader in an industry that was often criticized for environmental impact, most notably the greenhouse gas emissions (GHG) from its heavy fuel use. It wanted sustainability to be fully integrated in the business' decision-making, helping it be the low-carbon industry leader with a 25% reduction in CO₂ per container emissions by 2020. The company had successfully launched several initiatives, which had results in emissions reductions and significant fuel savings. Other initiatives had required time and investment, but would help position the company as the sustainable leader in the future. Maersk Line was hoping that customers would increasingly make sustainability a purchasing criterion, thus differentiating Maersk Line from competing carriers. With market conditions currently so poor, Skou had to ensure that all resources and investments were spent wisely, on everything from upgrading vessels to training the sales force. Could sustainability really provide Maersk Line with a competitive advantage in an industry that was considered to be commoditized?

Professors Forest L. Reinhardt and Ramon Casadesus-Masanell and Research Associate Frederik Nellemann prepared this case. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

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The Container Shipping Industry

The shipping industry was generally divided into three main segments: bulk, tankers, and container ships, which shipped an estimated 3.6, 2.7, and 1.5 billion tons of goods in 2011, respectively.¹ The container shipping industry, in which Maersk Line operated, was at the heart of global trade flows. Standardized cargo containers, fixed departure schedules, and a vast hub-and-spoke network of automated ports and terminals allowed huge volumes of tradable goods to be cost-effectively shipped across the globe.² In 2010, an estimated 140 million TEU^a containers were shipped,³ and about 90% of world trade was carried by the international shipping industry.⁴ The flows of the container traffic reflected international trade patterns, with manufactured goods from Asia going to consumers in Europe and North America representing the largest share of containers. Respectively, these two corridors (in both directions) represented 12% and 15% of global container trade. In addition, the intra-Asian market was close to a quarter of global trade and growing rapidly.⁵ (See **Exhibit 1** for a breakdown of trade lanes).

Historically, container demand had grown at a rate of 9%-10% per annum, reflecting both a growth in underlying global demand and trade but also the increased share of containers in global transportation. Since 1980, the containerized trade had grown at a multiple of 2-4 times the growth in global GDP.⁶ Most notably, the industry had experienced a surge in seaborne trade beginning in the early 2000's as trade with China grew and an increasing share of manufacturing moved to Asia.⁷ Continued globalization and increased global trade meant further growth was expected; however, it was uncertain whether further containerization could drive volume growth at previous levels given the large share gains in recent years.⁸

Customers

Customers either purchased capacity on the spot market or negotiated contractual freight rates with carriers. Spot rates were sold on a vessel-by-vessel basis to smaller customers or freight forwarders, who organized shipping and logistics services on behalf of customers. Negotiated rates occurred with large companies who were global in operations, with sourcing, manufacturing, and end-sales happening in various parts of the world. This group of large customers, which only accounted for ca. 0.5% of total customers, shipped approximately half of all industry volume. The largest customers would tender their total predicted shipping needs annually to the carriers, sometimes forcing them to accept lower rates on certain trades to win volumes on other larger trades. The major purchasing criteria were freight cost, transit time, schedule reliability, and frequency of departure, although the priorities varied across industries and geographies. Customers were price sensitive in their attempt to minimize transportation costs, which as a rule of thumb comprised 2% of total product cost.⁹ Customers also benefited from high levels of price transparency amongst the various carriers.

Large customers frequently used multiple carriers to ensure a high frequency of sailings and choice, as well as price competition amongst carriers. Shippers often sought to avoid having one dominant player from controlling their supply chains.¹⁰ Generally, large companies would not place in excess of 40% of capacity with a single carrier, although there were exceptions, particularly for smaller customers. However, Maersk Line surveys indicated that many key clients saw the consolidation of supply chains and their providers as a predominant trend for future years, albeit one

^a The TEU, twenty-foot equivalent unit, was the standard measure for container size and cargo carrying capacity. It represented a metal container 20 feet long, 8 feet wide, and up to 9 feet tall. The FEU (aka FFE), or forty-foot equivalent unit, was sometimes also used and it was equal to two TEU. Various specialized containers also existed, including the reefer for temperature controlled cargo and various types of equipment capable of unitizing odd-sized, heavy, and liquefied cargo.

that had been slowed by the slow economy and which made minimizing transportation costs a priority.¹¹ In recent years, with spot rates at low levels, some carriers had even seen customers opting for shorter contracts. This was being partly mitigated by an attempt to roll out more market-indexed contracts. However, in the longer term, it was expected that supplier simplification could yield cost benefits, as well as help foster partnerships to create leaner and more agile supply chains.¹²

Major costs

The three largest costs for most shipping companies were terminal costs, vessel costs, and fuel costs, which were a combined 75% of costs. (See **Exhibit 2** for a cost breakdown of Maersk Line).

Terminal costs Terminal costs were the largest item. On average, every container was handled 3-4 times at a terminal per journey, and at each terminal the operator had to pay a fixed fee to dock the vessel, as well as per container for unloading, loading, and storing on land until they could be sent with the next available vessel. Ports were typically run by local authorities and the terminals were run by private operators. Modern terminals were highly automated and could discharge large volumes in short turnarounds.¹³ Maintaining good relations with ports and terminals was important for the operators in order to ensure access for their vessels, particularly in case they missed their allocated slot. The container terminal operator market was dominated by four global portfolio owners with a combined market share of almost 30%. The remaining major terminals were largely single location operators.

Vessel costs Deploying a global network of shipping lines was extremely capital intensive. For example, establishing just a single weekly service on the round-trip Asia-Europe trade could require upwards of \$1.2 billion in investments (most operators offered up to three to four weekly departures).¹⁴ (See **Exhibit 3** for development of new build prices). Labor costs mattered less since most modern ships were fairly automated, and could operate with limited crews. Container carriers also relied on chartered vessels, which were owned and leased out by third parties. The carrier chartering the vessel generally paid for fuel, port charges, and a daily hire to the owner. On average, approximately 53% of capacity in the industry was on chartered vessels,¹⁵ with an average contract length of 7-10 months.¹⁶ (See **Exhibit 4** for variation in chartered vessel rates).

Container networks were complex and inflexible, making capacity management a key aspect of the business. As opposed to bulk operators who shipped commodities, container vessels shipped smaller cargoes from a wide variety of customers, required greater coordination and overhead. Further, container lines sailed on a fixed timetable, which limited the ability of vessels to be shifted in response to supply and demand imbalances. Capacity management and vessel utilization was made more difficult by other factors. Seasonality meant that cargo volume, and capacity requirements, varied throughout the year. Sudden shifts in consumer demand or production fluctuations could also result in flawed forecasting of vessel space requirements. Further, imbalances on trade lanes resulted in vessels sailing less full on the return leg, e.g. from Europe back to Asia. Finally, capacity increased in ship-sized increments, which meant that when trade was growing, vessels had to be ordered in multiples dictated by the service frequency, with sufficient capacity to cater for future growth.¹⁷ Capacity planning was also made difficult by the long time (approximately 2 to 4 years) it took shipyards, based predominantly in South Korea and China, from order to delivery of a modern container vessel.¹⁸

Fuel costs Container ship engines also consumed large amounts of fuel, called bunker, which made it a significant cost for carriers. In 2010, Maersk Line consumed 9.8 million tons of fuel oil, in addition to diesel, natural gas, and electricity. Bunker fuel was much heavier and had a higher

burning temperature than other petroleum products, such as gasoline and jet fuel. Recent years had seen very large increases in the price of bunker fuel, rising from approximately \$250 per ton at the end of 2008 to close to \$700 per ton in the beginning of 2012 (see **Exhibit 5** for historical prices).¹⁹ Being a petroleum product, bunker prices were sensitive to many of the same factors that drove oil prices. It was common for operators to pass on some of the cost increases to customers in the form of an additional Bunker Adjustment Factor (BAF). An estimated 60% of extra fuel costs could be recovered through the BAF; however, there was often a delay between price movements and adjustments to the BAF, since major customers had fixed contracts.²⁰ Oil prices were expected to remain high, although that depended in large part on the world's abilities to reduce energy intensity and switch to non-fossil fuels. However, a predicted 3 billion more middle class consumers were expected to emerge by 2030, creating strong demand for energy. Further, demand was predicted to rise just as the cost of finding and extracting new sources of energy was increasing. For example, since 2000, the average cost of bringing a new oil well on line had increased by an estimated 100%.²¹

Competition

In 2012, the top 10 global container operators comprised approximately 66% of the capacity in the market.²² In 1996, the top 10 carriers controlled 35% of the total capacity.²³ The lower half of the shipping market was very fragmented.²⁴ Many of the large carriers were privately owned by governments, as was the case with Chinese COSCO and CSCL or Singaporean APL, or by the founding families. (See **Exhibit 6** for an overview of the top 10 carriers).

The industry was prone to sharp swings in container rates, with pricing driven largely by changes in global demand and capacity utilization in the market. Price fluctuations for each trade lane were unique (see **Exhibit 7**). "Pricing is cut throat in shipping, because at the end of the day it is better to carry some cargo than no cargo," explained Anders Boenaes, Vice President and Head of Africa Trade at Maersk Line. Movements were also affected by the expected balance between supply and demand, since customers' perceptions of their future ability to purchase cargo space drove their willingness to pay.

Overall, the container market experienced extremely low pricing in 2009, caused by demand contraction and the resulting collapse in ship utilization.²⁵ Many shipping companies had also placed orders for extra capacity when rates and returns were high before 2008. This extra capacity hit the market when demand was weakest.²⁶ In 2009, shipped volumes decreased approximately 10% and rates fell by 26%.²⁷ On the Europe-Asia route, 2011 freight rates were below \$700 per TEU, less than half the peak a year prior.²⁸ The price volatility meant that vessels were even forced to occasionally sail at rates that didn't even cover the fuel consumption. "We have a price war in the container shipping industry," stated A.P. Moller-Maersk Group CEO Nils Smedegaard-Andersen. "And we will continue to have that for a while."²⁹

On a per-ton basis, shipping was the cheapest way to transport goods. To cover the same global trade routes, rail or truck was either geographically not possible, or was prohibitively complex and expensive given wide discrepancies in infrastructure and the barriers of moving goods across national borders. Air transportation of goods was also an option, but was much more expensive given its fuel intensity and limited capacity per aircraft. For shipping perishable goods, most companies provided refrigerated containers, called reefer containers, which were cooled using external power sources on the ship or truck carrying it. As a result of increasing precision in the ability to control temperature, modern reefer containers could transport most types of food as well as other time-sensitive products like flowers. However, the lower transport costs of shipping had to be weighed against the added inventory costs of the slower and more variable transport time. Shipping

companies also competed with non-consumption, as certain production shifted back to local sites. Due to rising average wages in China, the cost of transcontinental shipping, as well as the extra inventory costs of variability in stretched supply chains, some manufacturers were finding that it was cheaper to locate near major Western markets.³⁰ A May 2011 report by the Boston Consulting Group predicted that the Chinese net labor costs for manufacturing were expected to converge to U.S. levels by 2015.³¹

The Transportation of Goods: From the Factory to the Store

In the simplest terms, the container shipping industry helped to transport goods from where they were manufactured to where they were sold. The reality of how this was achieved was more complex. According to one supply chain executive, “while getting a container from port A to B may be fairly commoditized, the end-to-end logistics is certainly not.” Most transportation required a combination of transport modes. Goods might be loaded into a van at the factory to be taken to a forwarder, who packed them into a container that would go by barge to the port. At the port the goods would wait to get on board the next available vessel, which would move it to a port near the final destination or a distribution center from where a train or truck would take it to a retailer. In 2012, many container carriers supported their core product of container shipping by providing these additional inter-modal transportation services through a network of suppliers. Some operators, however, only offered port-to-port services which could be pieced together with other logistics arrangements made by the customer for the other legs of the journey. In addition to the coordination of the intermodal transportation, which required scheduling and network coordination, operators also had to address other complications. These included the availability of containers, which varied according to their use, ensuring customs and documentation clearance, complying with applicable maritime laws, as well as managing insurance and liability of the goods as they are moved throughout the supply chain.³²

Companies could purchase capacity for a specific vessel and trade route on the spot market directly from the operator or, depending on volumes, they could negotiate rates for the duration of a contract based on expected capacity demands. Contract negotiations generally involved the tendering of rates from the major carriers based on forecasted demand, after which rates would be agreed and volumes allocated. Each contract was unique and could be priced according to how much of the entire journey the operator would provide or coordinate. In addition to the transportation of the containers, operators could also provide a range of logistical and customer services. Such ancillary services included customs clearance and tracking of information flows.³³

Individual operators differed in the complexity of their route network, which impacted the level of service that could be provided to customers, specifically the frequency of departures, the ports serviced, and the reliability. Maersk Line had the biggest service network on a stand-alone basis. However, it was also common in the industry to see alliances formed in order to provide full network coverage; however, this required extra coordination between partners. For example, in December of 2011, the G6 Alliance was formed with some of the world’s largest carriers creating one of the largest networks in the Far East-to-Europe and Far East-to-Mediterranean container shipping markets with more than 90 ships in nine services calling at more than 40 ports.³⁴ The same month, MSC and CMA CGM also announced an alliance on the Far East-North Europe trade.³⁵

Operators often differed greatly in terms of the reliability of service. In 2011, the industry average for on-time delivery was only 56%,³⁶ with the average delay one day, although this figure varied by trade.³⁷ The low reliability could be explained by a number of factors, including bad weather at sea, congestion or disruptions at the ports of call, as well as knock-on effects of delays at previous ports.³⁸

Much of the delay arose from containers missing their slot at a port and having to wait for the next available vessel. A reliable service required a critical mass of vessels calling frequently on the major ports as a form of buffer capacity. It also required a willingness to speed vessels up at the cost of added fuel expenses if delays forced a shipment behind schedule. Lowered customer expectations also worsened reliability. If customers feared that their containers would not always get on the desired vessel due to overbooking, then they would themselves book more capacity than needed, thus creating a reinforcing spiral that made capacity planning and port efficiency even more difficult, thus impacting on-time reliability and asset utilization.³⁹ Poor reliability obliged customer to invest in higher inventory levels in order to avoid disruptions to their sales or production processes and meet service level agreements.⁴⁰

The Environmental Consequences of Shipping

The shipping industry had adverse impacts on the climate and environment. The main pollution was the exhaust emissions from the heavy fuel oil powering ship engines. Specifically, shipping was a large source of the greenhouse gas emissions linked to climate change. There was strong scientific consensus that climate change was occurring, was very likely caused primarily by the greenhouse gas emissions from human activities, and posed significant risks for a range of human and natural systems.⁴¹ In 2009, maritime shipping accounted for approximately 3.3% of global emissions,⁴² or slightly more than for all of Germany. Unabated industry emissions were expected to more than double by 2050.⁴³ “We are an industry that pollutes a lot,” explained Morten Engelstoft, Chief Operating Officer of Maersk Line. “But shipping is by the far the most efficient form of transportation. Unfortunately the industry’s sheer size means that our impact is big.” (Exhibit 8 shows the comparative emissions of different transport modes).

The combustion of heavy bunker fuel also released significant emissions of sulfur oxides^b (SO_x), nitrous oxides (NO_x), and other particulate matter. For example, the low-grade bunker fuel commonly used had up to 2,000 times the sulfur content of normal diesel fuel used in automobiles.⁴⁴ As opposed to greenhouse gas emissions, which had a long-term impact on the global climate irrespective of the source, these emissions were predominantly local and had a much shorter lifespan in the atmosphere.⁴⁵ They were primarily a concern when vessels were near mainland or docked, since they were a leading cause of smog and acid rain, which could lead to cancer and asthma.⁴⁶ Sulfur emissions were estimated to be responsible for the premature death of more than 60,000 people annually in the U.S. alone.⁴⁷ Reducing sulphur content required either installing scrubber equipment or switching to light fuel oils such as marine diesel oil,⁴⁸ which could cost 40% more than normal heavy bunker fuel.⁴⁹ Finally, in addition to emissions, there were also environmental issues related to waste water management and the life-cycle management of the vessels and containers.

Regulation of the shipping industry

The regulation of shipping was difficult given the international nature of the business. While local authorities, including the ports themselves, were able to regulate certain pollution and waste performance at the terminals, broader standards were difficult to coordinate at the national level. Industry standards were thus set by the International Maritime Organization (IMO), a United Nations specialized agency, which represented 170 member states, often major ship owning countries and coastal states. The IMO’s main purpose was to adopt treaties that improved the safety and

^b According to the International Maritime Organization, SO₂ emissions had a cooling effect on the earth’s climate that was in the short term partly offsetting the heating effect of CO₂ emissions. However, CO₂ stayed in the atmosphere much longer meaning that the dominant long-term climate impact was from the CO₂.

security of international shipping and prevented marine pollution from ships, including all kinds of emissions. Any standards or regulations adopted by the IMO had to be implemented at the country-level by the signatories.

Specifically, the IMO was working on market-based and non-market based measures to mitigate the industry's impact on GHG emissions and climate change. The non-market based measure was the Energy Efficiency Design Index (EEDI), which was a complex set of design standards intended to stimulate innovation and technical development related to the efficiency of new vessels. In effect, the standards would result in a gradual reduction in the installable engine power, which acted as a speed limit on vessels. Since fuel consumption, and with it emissions, was a non-linear function of speed, slowing the speed of ships could have a significant impact on fuel spending and emissions. Generally speaking, when speed was reduced by 20%, fuel consumption was reduced by 40% per nautical mile.⁵⁰ These standards were, however, widely criticized since they might lead to smaller, under-powered ships. The impact on GHG emissions was also questioned, since the standards applied only to new builds.⁵¹ Initially, the EEDI would have a bigger impact on tankers and dry-bulk ships, and less on very large container vessels,⁵² although this might change as the design standards were made stricter. The EEDI had the advantage of being easier to implement within the IMO processes, requiring only an amendment to an existing annex convention.⁵³

Other market-based mechanisms to address GHG emissions were also in discussions at the IMO, including a carbon tax or levy on fuel as well as cap-and-trade system. No formal measures had yet been adopted, partly because doing so would require a new IMO Convention to handle the funds generated.⁵⁴ Most in the industry expected some form a carbon price to eventually be implemented. A price on carbon was seen as the simplest and most efficient way to reduce emissions: polluters for whom it was cheaper to adopt measures that reduce emissions than pay the tax would do so, whereas for those whom it was cheaper to pay the tax would do so.⁵⁵ Further, in 2010, The European Union said that it would regulate CO₂ emissions from shipping, potentially by including shipping in the bloc's Emissions Trading Scheme, if the IMO failed to take appropriate action.⁵⁶ In 2012, the EU's European Trading System (ETS) had begun to include all aviation flying in and out of Europe as part of its carbon market.

In 2008 the IMO also adopted progressive standards that would limit the sulphur content in fuel globally and around emission control areas (ECA), which were designated coastal areas. For example, the U.S. and Canada's ECA was 200 nautical miles from their coastline.⁵⁷ By 2015, the limit around these emission control areas would be 0.1% (the heavy fuels normally used had a sulphur content of up to 5%).⁵⁸ Further ECA's were expected to be adopted in the future.⁵⁹

The A.P. Moller-Maersk Group

A.P. Moller-Maersk Group was a Danish conglomerate with operations with a variety of activities, its largest being shipping. The Group had approximately 115,000 employees in 130 countries. In 2011, Maersk Line and the other container businesses, which included regional container lines and DAMCO a freight forwarder, contributed \$27 billion of the Group's \$60 billion in revenues (see **Exhibit 9** for financial data). It also had other shipping-related businesses, including Maersk Tankers, which owned and operated oil and gas carriers, and APM Terminals, which was the world's fourth largest container terminal company. Maersk Line was one of APM Terminal's biggest customers; however, it increasingly sold to other shipping operators,⁶⁰ with the share of non-Maersk sales increasing from 34% in 2007 to 44% in 2010.⁶¹ The Group's other main activity was oil and gas, including exploration, development, tankers, and drilling. In 2011, the oil & gas segment accounted for 21% of revenue (see **Exhibit 10** for segment breakdown). The Group also had retail activities,

including department stores and supermarkets, as well as a 20% interest in one of Denmark's largest banks, Danske Bank A/S.

All businesses within the group were operated independently and at arm's length principle; however, Maersk Line believed there were a number of advantages to being a part of a conglomerate like A.P. Møller-Mærsk. First, the Group's strong balance sheet gave Maersk Line access to funding for new investments since it was considered a strategic business in the Group. Second, Maersk Line enjoyed purchasing power on a number of key costs. For example, the Group was the world's largest purchaser of bunker fuel. Third, the Group's Maersk Maritime Technology department developed and shared innovations about design, mechanical, and operational changes that could improve the fuel efficiency of the Group's 1000-strong fleet of various ships. Finally, the Group believed that its diverse energy and transportation businesses gave it credibility and unique access with customers, whether in the development of a new port in West Africa or securing a key container customer.

A.P. Møller-Mærsk was founded in Denmark by Arnold Peter Møller and his father Peter Mærsk Møller in 1904. Mærsk Mc-Kinney Møller, the son of co-founder Arnold Peter Møller, officially took over as CEO following the death of his father in 1965. The company focused initially on the tramp trade, where vessels serviced custom port-to-port trades as demand dictated, eventually migrating to liner service where ships sailed according to fixed routes and schedules. In the 1960's the company expanded early in use of the standardized shipping container, which lowered the cost of shipping goods and helped to drive the exponential growth that the industry experienced in subsequent decades. Maersk Line's leadership position in the container shipping industry was strengthened by a number of key acquisitions including Sealand (1999), Safmarine (1999), and Royal P&O Nedlloyd (2005). In 1962, it also won the concession to develop petroleum resources in the Danish North Sea, laying the foundations for the company's current oil & gas business.

The company was still influenced by its founding family. It owned, directly and through various funds, 58% of the share capital and 76% of the voting rights. In addition, two of the founder's granddaughters sat on the company's board of directors. Mærsk Mc-Kinney Møller remained Chairman of the controlling A.P. Møller and Chastine Mc-Kinney Møller Foundation. While the family and its foundation gave generously to various philanthropic causes in Denmark, for example building Copenhagen's opera house in 2004,⁶² it was not known for any explicit commitment to environmental issues. However, the reputation of the company (and family name), both in Denmark and abroad, was considered extremely important.

Maersk Line

In 2012, Maersk Line was the world's biggest container shipping company with over 17% of the world's operating fleet,⁶³ which at any given time transported cargo worth approximately 3% of the world's global seaborne trade.⁶⁴ Maersk Line transported everything from manufactured goods, to highly sensitive, perishable commodities. Its vessels made approximately 70,000 port calls annually on behalf of its over 100,000 customers.

In 2012, the Maersk Line had the world's largest global network, comprised of 660 owned and chartered container vessels with a total capacity of 2.6 million TEU.⁶⁵ Maersk's own vessels accounted for approximately 47% of its capacity, with the remainder chartered from third parties.⁶⁶ Its network had practically global coverage, although most competitors in 2012 had similar scope through strategic alliances. Overall, Maersk Line and its container business had approximately \$17 billion in invested capital.⁶⁷ The average size of its vessels was 3850 TEU versus the industry average of 3100 TEU.⁶⁸ In addition, Maersk Line's owned vessels tended to be more modern, with an average age of 8 years versus the 12-15 years of some of its largest competitors.⁶⁹ Maersk Line's containers were

subject to continuous modernization, allowing for increased amounts of specialized or sensitive cargo. The average age of Maersk Lines containers was less than five years.⁷⁰

Approximately half of Maersk Line's volumes were tied up in long-term contracts, often one year in duration, with the remaining volumes sold in short-term contracts of approximately one month where prices were determined by market spot prices. An estimated 25% of Maersk Line's business went to large key clients like Walmart, Nike, and Tesco, and 15% to select key client freight forwarders. Key clients generally were tied to longer-term contracts. The other volumes were 50% smaller customers and 10% other freight forwarders. Maersk offered additional value-added services through logistics suppliers enabling door-to-door to service for its customers. This included a comprehensive inland intermodal network (e.g. truck) and extensive feeder connections to smaller ports not serviced by the large container vessels. In this respect, the freight forwarders could be considered customers, suppliers, and competitors for Maersk Line's transportation services.

In the mid 1990's, Maersk Line had enjoyed price premiums of up to \$700 per container, however, the price competition created by the commoditization of liner shipping and the fragmented industry effectively eroded any rate premium.⁷¹ Despite these pressures towards commoditization, Maersk Line felt that ultimately other buying factors besides price mattered to customers, including schedule reliability, money-back guarantees, quick notifications of delays, intuitive self-service where possible, and ease of business.⁷²

In 2012, Maersk Line set out to differentiate itself by addressing the three fundamental challenges it saw in the industry: its unreliability, complexity and environmental impact.⁷³ Maersk Line believed it was cost competitive given its larger vessels and fuel efficiency efforts.

Reliability Maersk Line had the goal of becoming the industry leader in reliability. Maersk Line was the industry leader with approximately 80% on-time delivery for all its shipments. To further improve this, it launched in 2011 a "Daily Maersk" service on the Asia-Europe route that would deliver daily shipments from four main ports in Asia to the three main European ports with fixed transportation times. The goal was to deliver 95% of these containers on time, an improvement from the industry average of 65% on that trade.⁷⁴ "I think one of the reasons the industry has become commoditized is that service has not been good historically," explained Nils Smedegaard-Andersen. "When customers expect that only half of their containers will arrive on time, you just try to get the best deal."⁷⁵ Under Daily Maersk, if a container did not arrive on time, the customer would be compensated up to \$300 per container depending on the number of days delayed.

For customers, increased reliability could potentially eliminate significant buffer in their supply chains. According to Marc Engel, Chief Procurement Officer at Unilever, "getting to 95% reliability would be an absolute game-changer for global sourcing. The company that leads this will have a real competitive advantage." In time, the hope was that it would become the worldwide standard for all Maersk shipments, although doing so would require significant scale and capacity. Reliability required that all serviced ports operated entirely as planned and having sufficient capacity buffers in case of delays. Implementing Daily Maersk on the Asia-Europe trade alone required a fleet of 70 vessels.⁷⁶

On other trades, Maersk Line worked with terminal partners to address inefficiencies and reduce the time in ports. For example, Maersk Line could improve communication with the terminals or how containers were stowed. The terminals could also improve coordination and operation of their cranes. With select terminal partners, it had agreed to a goal of reducing time in port by 30%, of which a 10% improvement had already been achieved. Some of the terminal improvements would benefit all carriers, whereas others required specific knowledge and integration into carrier operations.

Simplicity Maersk Line also sought to stand out in terms of its customer service in helping reduce the complexity of shipping goods. Parallel to the physical flow of goods was an immense information flow (often paperwork) needed to process orders, clear customs, and track the cargo, which was an immense burden for both Maersk Line and its customers. Maersk Line sought to streamline and digitize much of this process, for example allowing customers to easily order and follow their cargo online. Such an online system would allow customers to look up prices, schedules, and availability, have a simplified documentation process, as well as track cargo, with automatic notifications of delay.⁷⁷ Particularly with large key clients, there was scope for tighter IT-system coordination to facilitate the purchasing process. In addition, Maersk Line had customer service centers all over world and dedicated service teams for each segment of its customer base.

Maersk Line and its Environmental Impact

In 2008 the entire A.P. Moller-Maersk Group launched its Sustainability Strategy, which hoped to turn sustainability into a mid- to long-term driver for profitable business across all units in the Group. The Group expected an increased demand for transparency, accountability, and responsibility from a variety of stakeholders, including customers, investors, and regulators. The strategy was viewed as a way to mitigate the risks associated with these shifting expectations as well as explore the business opportunities that they provided. By 2013 all business units were to have the strategy fully integrated in their decision-making and operations. It had four key themes that were to be aligned across the organization: environment and climate change, health and safety, social responsibility, and responsible business practices.⁷⁸

Maersk Line decided to take a strong industry leadership position on the sustainability agenda, with a focus on achieving advantage in environmental performance. It would still meet or exceed Group compliance expectations on other key sustainability areas, including anti-corruption practices, health and safety, and security, which included addressing piracy. Maersk Line had three stated objectives for its environmental performance. First, Maersk Line wanted to become the global leader in low-carbon shipping. By 2020, Maersk Line had the goal of reducing its CO₂ emissions per container by 25%. At the same time, Maersk Line worked with regulators to increase industry standards. Second, Maersk Line wished to take the company, and the industry, towards zero SO_x emissions. Finally, the company wanted to reduce its impact on the marine environment.⁷⁹ According to Morten Engelstoft, Chief Operating Office of Maersk Line:

Sustainability has been a concern for a long time. It has always been a part of our core values, in particular a commitment to 'constant care', which means taking care of today, while actively preparing for tomorrow. We just didn't call it sustainability, and we hadn't previously worked to integrate it so deeply into our strategy. But we realized that it can't be an after-thought. Really closing the gap on CO₂ can only be a result of how you design your network, your vessels, your products, and ultimately your entire operating model.

Maersk Line believed that an integrated sustainability strategy strengthened its push for de-commoditization of the container business. While it was hoped that differentiation would result in price premiums for Maersk Line, at the very least, it hoped customers would treat environmental performance and transparency as a baseline expectation needed to win or retain business. The ultimate goal was to use environmental performance to build closer customer relationships and increase customer loyalty, thus gaining a greater allocation of customers' volumes as a preferred supplier and business partner.⁸⁰

Operational Changes

Slow steaming In 2007, Maersk Line was the first operator to introduce slow steaming, where vessels sailed at less than the full engine load as the standard. Since July 2008, the average speed of all Maersk's vessels had decreased by 27%.⁸¹ Technically operating below capacity could put strain on the vessel's engines if not managed appropriately. Maersk Line played an active role in openly sharing its technical learnings about slow-steaming with the industry, making it the standard on a large majority of trade routes. By 2012, an estimated 70-80% of the industry's fleet slow-steamed.

In addition to reducing fuel consumption and CO₂ emissions, slow steaming had a number of other benefits. First, it helped absorb spare vessel capacity, since slow steaming required adding extra vessels in order to maintain departure frequency and overall annual throughput capacity. Without slow steaming, unutilized vessels would otherwise have had to be laid up. By 2011, an estimated 9% of global capacity was being absorbed by slow steaming.⁸² Further, it helped Maersk Line provide a more reliable service, giving customers greater certainty regarding cargo arrival time. If a vessel was delayed in port due to unforeseen circumstances, slow steaming gave Maersk Line the ability to adjust speed accordingly to meet the schedule and deliver on time.

For operators, the main drawbacks to slow-steaming were the costs of the additional vessels which were added to maintain departure schedules. These costs partly offset slow-steaming's fuel and CO₂ reductions; however, overall since 2009 Maersk's fuel savings due to slow steaming had averaged about 7% per container moved.⁸³ For customers, particularly those shipping high value commodities or perishable goods, the biggest drawback was the increase in transit time. Maersk Line had partly mitigated this by decreasing port calls on certain trade routes, upgrading refrigerated container technology, as well as working with terminals to reduce in-port time. Further, by improving reliability, slow-steaming reduced variability and, potentially, inventory costs for some customers. Since many large companies paid fixed fuel surcharges in their negotiated contracts, they did not immediately benefit from the reduced fuel consumption, although would in subsequent negotiations.

Maersk Line believed that slow steaming would have a permanent role in its operations, and it was already integrating it into its network planning, customer value proposition, and long-term operating model. However, would it make financial sense once container demand picked up, fuel prices fell, or if the competition began to ship at normal speeds again?

Optimized Operations Maersk Line also utilized its large database of fleet performance to optimize how its vessels were run. For example, this data helped captains adjust speeds and routes based on such factors as weather, currents, and port delays. It also allowed Maersk Line to provide fuel consumption benchmarks to its crews, so they could see how they compared relative to the best performers. Fuel efficiency was also linked to compensation for captains. Maersk Line was continuously optimizing its network of departures, such that vessels were deployed most efficiently, for example by adjusting the required speeds on different legs of a journey. Scheduled departures could typically be changed twice a year. Some of this performance data was also being shared with the vessels and its crews that Maersk Line chartered. In 2011, fuel efficiency of its chartered vessels increased by 5-8%.⁸⁴

Sulphur emissions reductions In addition to reducing CO₂ emissions, another key objective of Maersk Line was to drive the industry towards zero sulphur emissions. It advocated voluntary fuel switches at select ports to more expensive low-sulphur fuel when its vessels approached, thus limiting harmful local pollution. Low-sulphur marine diesel oil traded at roughly a \$250 per ton price

premium relative to normal bunker fuel in 2010.⁸⁵ This was driven partly by refining capacity constraints for the low-sulphur fuel. Maersk Line was also developing scrubber technologies for that could clean exhaust gasses beyond IMO requirements, which could be installed in future new vessels.

For example, in September 2010, Maersk Line announced that it would use low-sulphur fuel while at berth in Hong Kong, a port Maersk Line called on 850 times annually. Four months after the announcement, 12 other lines had followed suit, and Hong Kong was considering making the fuel switch mandatory. The switch in the Hong Kong port entailed an additional cost of \$1 million annually for Maersk Line.⁸⁶ Currently, it made switches at six locations; in some cases it received partial or full compensation from port authorities for the extra fuel costs. "We want a level playing field," explained Jacob Sterling, Head of Climate and Environment at Maersk Line, "but we also want to be leading the way to this level playing field."

Protecting the marine environment Maersk Line sought to reduce the impact of its vessels at sea. By 2015, its goal was to install chemical-free ballast water technology across 100% of its owned fleet. Further, all waste from owned and chartered vessels would be disposed of safely in ports. To stimulate this, Maersk Line had ranked its top 100 ports on environmental performance and cost of waste disposal, and was engaging with them in ensuring appropriate action. Finally, the company was also engaging in strategic partnerships with research institutions and customers to provide marine research on the state of the world's oceans.⁸⁷

Technical Changes

New vessels Maersk Line wanted to set the industry standards for the environmental performance and fuel efficiency of container vessels. In 2011, Maersk Line ordered twenty 18,000 TEU Triple-E vessels to be deployed on the Asia-Europe trade, costing an estimated \$190 million each. The 400-meter vessels would be the world's largest by capacity, exceeding the current largest, Maersk Line's 15,500 TEU E-Class vessels,⁸⁸ and the industry standard of 13,500 TEU vessels on the trade.⁸⁹ The Triple-E ships had up to 59% lower unit costs⁹⁰ and 50% lower CO₂ emissions per container than the industry average. The vessels were also designed with their end-of-life in mind. Each would come with a 'cradle-to-cradle passport' describing the material composition of the ship such that it could eventually be dismantled and recycled responsibly.⁹¹ Further, Maersk Line was introducing a fleet of WAFMAX and SAMMAX vessels, which would be the largest vessels ever deployed on the West African and South American trade routes, respectively. They would be 20-30% more fuel-efficient than existing vessels. Like the Triple-E, these vessels are equipped with advanced waste heat recovery systems.

Investing in increasingly larger ships to achieve scale efficiencies, however, also carried a few risks. First, the push towards bigger vessels stretched the capabilities of many terminals. The new Triple-E vessels could only call on select ports that had the infrastructure to handle vessels of such size. For example, India's seaports could not handle ships bigger than 12,500 TEU vessels.⁹² Second, there was a risk of creating overcapacity in the market if the competitors followed suit or if the corresponding trade growth did not occur. Maersk Line believed its orders were appropriate given its expectations of demand on the Asia-Europe trade route, which were an increase of 5-8% annually from 2011-2015.⁹³ However, Singapore's Neptune Orient Lines had already ordered ten vessels of 14,000 TEUs and Orient Overseas Container Line had ordered ten of 13,000 TEUs.⁹⁴ **Exhibits 11-12** showed the forecast development of containership fleet capacity, including large vessels. "Competitors see that they need to compete on size," explained Peter Rønne Andersen, Chief Financial Officer for Maersk Line. "However, the risk is that they all invest as if they will become the future leaders of the industry, which leads them to collectively over-invest." Could Maersk Line

expect competitors to invest rationally given the capacity that had already been ordered? Would they even have the financial strength to do so?

Existing vessels Maersk Line had developed an investment plan for the technological retrofit of its existing fleet to reduce its energy consumption and relative CO₂ emission. For example, it had installed \$10 million waste-heat recovery systems on many of its vessels, which used exhaust to drive turbine and generate auxiliary power. While they could add significant complexity to the engine systems, Maersk Line had developed expertise in installing waste-heat recovery systems, which could have energy savings of up to 10%. Maersk Line was also a leader in the use of advanced hull coatings, with a vast database of millions of ship miles of experience to help select optimal coatings. In longer charter contracts, Maersk Line was also making limited vessel upgrades, although it was primarily working to align expectations on future environmental performance with the chartered vessel owners.

When scrapping vessels, Maersk Line also sought to use environmentally certified shipyards who, compared to traditional scrapping, took more precautions in the recycling and disposal of materials. Unfortunately, this often meant receiving less for the materials of the old vessel. A recent decision to recycle 10 vessels responsibly resulted in approximately \$20 million in lost revenue

New fuels To achieve any large-scale environmental gains, different alternatives to the heavy fuel oil used in ships were ultimately needed. “The shipping industry needs to dramatically reduce greenhouse gas intensity in the coming decades. In the short term we can gain a lot by focusing on improving fuel efficiency,” explained Soren Stig Nielsen, Head of Maersk Line Sustainability. “But in the longer term we would like sustainable biofuels to become a commercially available, low-carbon fuel. And who knows, maybe biofuels can also be a way to reduce our fuel cost over time.”⁹⁵ Maersk Line was alone in the industry in testing and exploring alternative fuel sources such as biofuels. All had varying performance with respect to cost, availability, sustainability, infrastructure, and engine compatibility.⁹⁶ Most of the fuel testing was done as part of larger research projects, where Maersk Line could facilitate testing as well as provide commercial guarantees for any new fuels that met its criteria. For example, in 2011, Maersk Line, in collaboration with the U.S. Navy, tested algae-based biofuels on one of its vessels. The test ships ran on a combination of biofuel and petroleum-based fuel, but some were also being tested at 100% biofuel levels.

Selling Sustainability

Maersk Line sought to be the industry leader in providing transparency and environmental information to its customers. A 2010 survey by Maersk Line found that 80% of customers considered, or would in the future, sustainability factors in their selection process. For more progressive customers, such as Unilever, who had articulated a vision of doubling their business while reducing their supply chain footprint, environmental performance and transparency was expected to become an entry requirement to win business. For example, one of Unilever’s purchasing criteria was a rating on its supplier scorecard, which was linked to the company’s sustainability plan and goals.

Maersk Line had begun to provide all key clients with monthly Customer Scorecards on, among other things, their carbon footprint relative to the industry average from shipping with Maersk Line. Eventually, the information sheets would be able to tell customers how their carbon footprint has changed from year-to-year and would assist customers in budgeting for their corporate carbon impacts. Figures were verified by external auditors, a practice Maersk Line was working to make the industry standard. Maersk Line also worked to educate customers about the environmental impacts of the transportation industry in order to assist them in knowing what to ask for from other carriers.

Maersk Line believed that providing customers with this transparency helped create deeper partnerships with customers, where potentially Maersk Line could become a partner in assisting with the configuration of customers' supply chains, optimizing container flows, transportation of semi-finished goods, or reverse logistics, where the recycling of used products was part of the production process.⁹⁷

However, Maersk Line faced a number of challenges in positioning sustainability with its customers, both key and regular clients. Most customers did not yet have a consistent approach to sustainability in their supply chain or procurement. Lucas Vos, Chief Commercial Officer of Maersk Line explained:

We'd like sustainability to be important, but the reality is that we are in the middle of a global economic crisis, which means that the sustainability agenda gets put in 2nd place. Right now we are focused on being as competitive as we can be. Yes, higher up in our customer's organization the response to our sustainable focus has been positive. But lower down with the procurement people, where a lot of our sales are being made, it's difficult. They simply have different time horizons and different incentives.

Conclusion

Søren Skou was facing a very difficult first year at the helm of Maersk Line. Fuel prices showed no signs easing, rates were severely depressed, and new vessel capacity was expected to hit the container market soon. Skou was, however, also slightly optimistic. Maersk Line was the world's leading carrier who had the advantage of being a part of a strong conglomerate, and it had recently outlined a number of key initiatives for how it could differentiate itself in the market. Skou recognized that shipping had a substantial impact on the environment, and would thus need to be part of the solution. Many of the sustainable initiatives Maersk Line had undertaken thus far had helped the company save fuel and money. But this was only half the story.

Skou wondered whether a sustainable approach to shipping could really create sufficient value to be shared between customers and Maersk Line. Could Maersk Line use it to differentiate itself from the competition? Maersk Line's rivals CMA CGM and Hapag-Lloyd had both launched CO₂-calculators that allowed all of their customers to calculate the carbon footprint of a shipment's journey.⁹⁸ APL had been named Sustainable Shipping Operator of the Year in 2010.⁹⁹ Maersk Line believed that its integrated focus on sustainability would be difficult to replicate, but would customers and end-consumers be able to tell the difference? Would it ultimately make any difference when it came time to select an ocean transportation partner?

Exhibit 1 Global Trade Lane Characteristics, Percent of trade by volume, 2010

Trade Lane	Global Trade	Maersk Line
Asia-North America	15%	13%
Asia-Europe	12%	40%
Europe-North America	4%	10%
Intra-Asia	24%	5%
Other intra-regional	16%	10%
Others	28%	22%

Source: Adapted from J.P.Morgan Cazenove, "A.P. Møller-Mærsk: Pricing in the Doldrums; Initiating with Underweight," February 1, 2011, via Thomson ONE, accessed December 2011.

Exhibit 2 Distribution of Container Shipping Unit Costs, 2009-2010

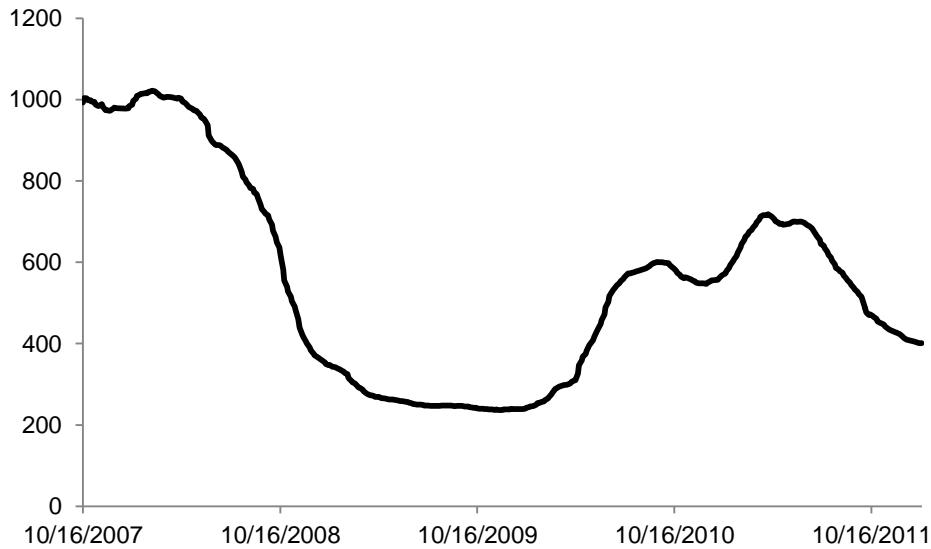
	2011	2010	2009
Terminal costs	24%	25%	25%
Vessel costs	26%	24%	25%
Bunkers (Fuel)	26%	21%	18%
Inland transportation	12%	15%	14%
Administration and other costs	8%	11%	12%
Containers and other equipment	4%	4%	6%
Total	100%	100%	100%

Source: Company documents.

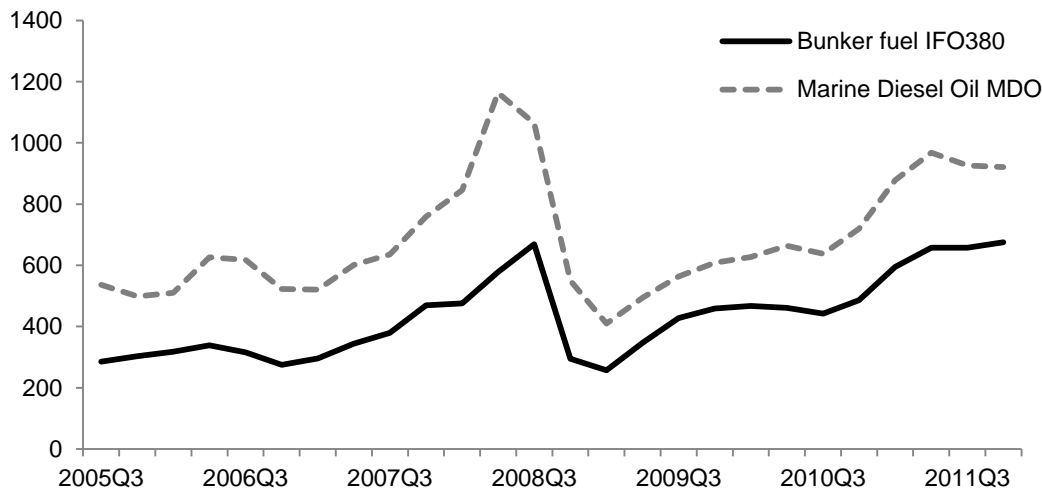
Exhibit 3 Development of New Build Prices, USD Million, 2006-2010

	1,500 TEU	2,500 TEU	5,500 TEU	10,000 TEU	12,000 TEU
2006	33.4	46.8	85.0	134.5	144.5
2007	34.0	44.9	85.0	136.4	154.6
2008	38.6	55.9	93.7	138.8	146.4
2009	26.8	40.5	79.0	107.5	113.5
2010	24.0	35.0	68.6	100.0	106.1

Source: Adapted from Drewry Maritime Research, "Container Forecaster 4Q11", December 22, 2011.

Exhibit 4 Chartered Vessel Rates, Index Start = 1000, October 2007 – January 2012

Source: Adapted from Container Ship Time Charter Assessment Index, via Bloomberg LP, accessed January 2012.

Exhibit 5 Bunker Fuel Prices, USD per Ton, 2005Q3 – 2011Q4

Source: Adapted from "Transport-Related Price Indices: Prices", New Zealand Ministry of Transport, <http://www.transport.govt.nz/ourwork/TMIF/Pages/TI008.aspx>, accessed January 2012.

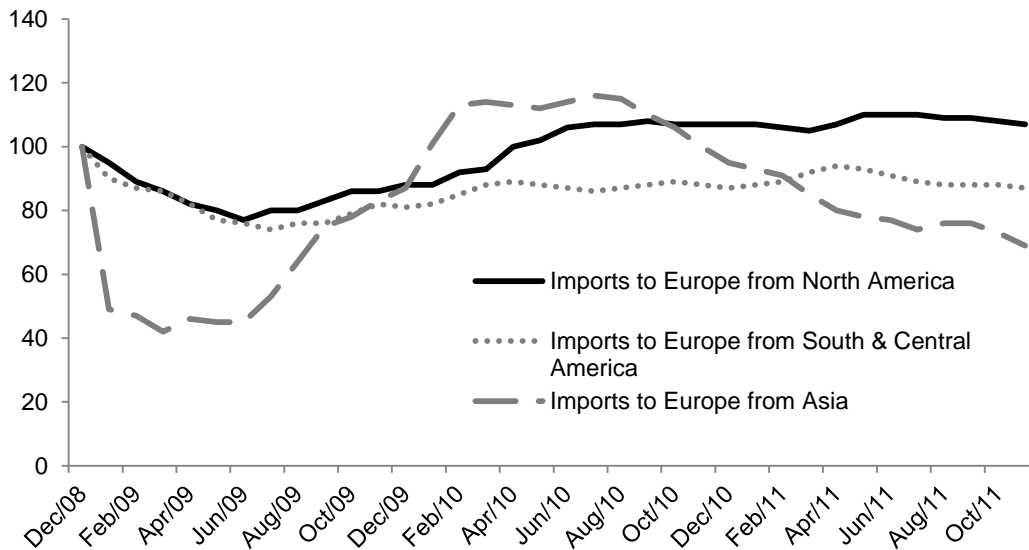
Note: IFO 380 is a mix of 88% of residual oil and 12% of distillate oil. MDO mainly consists of distillate oil and has a much lower sulphur content.

Exhibit 6 Capacity of Container Shipping Industry and Ownership, January 2012

Company	Capacity Share	Controlling Owner
Maersk Line	17%	APM Foundation
Mediterranean Shipping Co.	14%	Aponte Family
CMA CGM Group	9%	Saade Family
Hapag-Lloyd	4%	Ballin Consortium
COSCO	4%	Chinese State
APL	4%	Temasek (Singapore)
Evergreen Line	4%	Chang Family
CSCCL	4%	Chinese State
Hanjin Shipping	3%	Hanjin Group
MOL	3%	Mistui

Source: Company documents; Adapted from "Alphaliner - TOP 100", Alphaliner website, <http://www.alphaliner.com/top100/index.php>, accessed January 2012.

Exhibit 7 Container Rates Along Select Trade Routes, Index December 2008=100, January 2008 – November 2011



Source: Adapted from "Trade Volumes and Price Indices", Container Trade Statistics, http://www.containerstatistics.com/trade/total_trade_routes, accessed January 2012.

Exhibit 8 CO₂ Emissions per Ton of Freight per Kilometer Transported

Type	Grams CO ₂
Aircraft	500-950
Modern Truck	60-150
Modern Train	30-150
Modern Ship	10-40

Source: Company documents.

Exhibit 9 Financial Key Figures, A.P. Møller-Mærsk Group, 2008-2011 (USD Millions)

	2011	2010	2009	2008
Revenue	60,230	56,090	48,522	67,270
EBITDA	14,661	15,867	9,193	16,478
Profit/loss	3,377	5,018	(1,024)	3,462
Total assets	70,444	66,756	65,511	64,925
Total equity	36,190	34,376	30,610	29,972
Cash flow from operating activities	7,262	10,132	4,679	8,524
Cash flow used for capital expenditure	(9,759)	(4,638)	(7,874)	(10,281)
Return on invested capital after tax	8.3%	12.2%	-0.3%	10.1%
Equity ratio	51.4%	51.5%	46.0%	46.2%
Dividend per share	174	178	63	123

Source: Company documents.

Exhibit 10 Segment Overview, A.P. Møller-Mærsk Group, 2009-2011, USD Millions

	2011	2010	2009
Revenue			
Container activities ¹	27,295	26,038	19,929
Oil and gas activities	12,616	10,250	9,025
Terminal activities	4,682	4,251	4,240
Tankers, offshore and other shipping activities	5,929	5,634	5,516
Retail activity	10,314	10,537	10,683
Other businesses ²	1,805	1,455	1,498
Unallocated revenue and eliminations	(2,411)	(2,075)	(2,311)
Total	60,230	56,090	48,580
Profit/loss for the year			
Container activities ¹	(537)	2,642	(2,127)
Oil and gas activities	2,061	1,659	1,164
Terminal activities	649	793	494
Tankers, offshore and other shipping activities	740	240	275
Retail activity	990	394	397
Other businesses ²	188	170	(83)
Unallocated revenue and eliminations	(714)	(880)	(1,144)
Total	3,377	5,018	(1,024)

Source: Company documents.

¹ Includes Group's global container services Maersk Line, Safmarine, and MCC, and Damco, a logistic and forwarding company

² Includes The Odense Steel Shipyard Company, Danske Bank, Maersk Container Industry, and other smaller businesses

Exhibit 11 Forecast Containership Capacity Development, Total Industry, Thousand TEUs

Year	New builds	Scrap	Fleet	Growth
2006	1,384	29	9,472	16.7%
2007	1,366	33	10,805	14.1%
2008	1,380	86	12,099	12.0%
2009	1,171	351	12,919	6.8%
2010	1,379	131	14,167	9.7%
2011	1,273	50	15,390	8.6%
2012	1,420	75	16,735	8.7%
2013	1,510	85	18,160	8.5%
2014	1,559	100	19,619	8.0%
2015	1,219	110	20,728	5.7%
2016	1,090	110	21,708	4.7%

Source: Drewry Maritime Research, "Container Forecaster 4Q11", December 22, 2011.

Exhibit 12 Planned deployment schedule of 10,000+ TEU Vessels by End-2014, No. of Vessels

	10,000-12,999 TEU		13,000-15,999 TEU		16,000+ TEU		Total
	Owned	Chartered	Owned	Chartered	Owned	Chartered	
Maersk Line			8	13	10		31
CMA CGM	16	7	3	2	3		31
MSC	6	11	15	20		4	56
Cosco	8		8	8			24
Hanjin	7	5	7	2			21
APL	10		5				15
HMM		5	5				10
MOL				5			5
Hapag-Lloyd			10				10
OOCL			6				6

Source: Drewry Maritime Research, "Container Forecaster 4Q11", December 22, 2011.

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