

Mega Container Ships, Pros, Cons and Its Implication Recession

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Abstract: The size of container vessels has grown up in the past ten years and the trend prospect to be continued, according to analysis almost half of current ships order is for vessels exceeding 12,000 TEU's. Mega vessels have advantages to liners and for holding down the coast of ocean shipping but also raising concerns among vessel operation, insurance and they require for infrastructure adaptations and productivity level. Moreover further increase in ship size could result negative impacts and crises in recession.

Key words: Pros, cons, global economy.

1. Introduction

The impressive growth rate of world economy has strong affected the shipping industry during last decades, especially liner shipping that carry approximate 25% in volume and 75% in value of world trade. As for an example from 1990 to 2006, the world wide container increased from 30 million TEU to 100 million TEU (Cairu, 2008) while in 2014 reached 171 million TEU as UNCTAD statistics. In the competitive market with high demand, the idea of increasing the size of the ship to satisfy the high demand of market and to get the benefit of economic of scale was considered as the outstanding strategy of shipping line.

Ships are getting bigger in size and mega ships are the new generation of container vessels. Good signal of market, economic and commercial advantages offered by megaships outweigh its limitations that liner operators make a lot of effort to overcome. Size of ships as well as the trend of very big ships seems continuous growing if an economic crisis does not happen. The recession of global trade can be diverted everything upside down, as a result container trade has been hit very hard, so mega ships become the big question. Therefore, this paper will discuss the

overview of container ship development, the reasons for the strong development of the ship size for the last period and important commercial and technical challenge as its limitation. Moreover, the paper will focus on the strategies for liner operators and how to deal with mega ships.

2. Evolution of Container Ships

Containerization has played an important role in the world's economy and other industries, especially shipping industry and it is called as the third revolution of transportation. Since containerization, we have had more convenient facilities in shipping industry such as faster transportation, easier packing, securing cargo as well as professional cargo handling. With more than 40 years development of containerization, container ships have evolved from small size as feeder ship to Panamax, post panama, Suez max and the latest one is Malacca-max vessel.

In 1968 the first Lancer-class ship was introduced, with a capacity of 1,100 TEU. After that, the capacity continued to rise but was limited by 4,000 TEU during a long period of time within the 1970s. Since 1988, the first post-Panamax container ship appeared with capacity of 4,300 TEU and was called C-10s. In 1996, Maersk's S-class container ships of 6,000-plus TEU were brought into operation. Ten years later, the

appearance of EMMA Maersk has marked for the new vessel generation. Following Maersk, there are unprecedented order number of big ships as ULCSs (ultra-large container ships) which were able to carry 12,000 TEU and above. In 2007 over 120 ULCS vessels were ordered and by 2011 there were approximately 150 container ships of 12,000 TEU and above in service (bimco, mega year). The size of the ships is continuously increasing and now Malacca-max containerships of 18,000 TEU which are around 400 m in length, 60 m in breadth, 21 m in draft and speed of 25 knots are now existing. The evolution of container ships as nowadays can be explained in following part by reasons that consider as the pros of big container ships.

3. Mega Container Ships Pros

3.1 The Booming of Demand

The booming of demand is one of the advantages for the development of container ships. As the stable growth of global demand for maritime in term of World Sea born trade, world merchandise export, and GDP for last period. The seaborne trade increase is found in most of areas in the world.

The global container trade has grown quickly in recent years and now reaches more than millions of TEUs annually. The booming in demand has been mostly attributing by the huge export from China to North America and European market (Gardiner, 2005). Globalization brings great benefit for shipping industry, it creates many plants in multiple countries, and huge demand for shipping service actually has been driven from sourcing of raw material all around the world. As Bimco (2007) showed that: “very strong double digit growth on head haul Asia to North Europe and Mediterranean trade is almost encourage and has a knock-out effect elsewhere”. The long haul route from Asia to Europe and to Transpacific has required bigger ships to satisfy the demand and to take advantage economic of scale. Moreover, the balance of global supply and demand seems pretty healthy until 2007

when the global demand is 8.8%. Average Annual Growth Rate (compounded annually) and World Container Fleet Capacity is 11.9% (Maersk).

3.2 Economic of Scales

Economic of scales at sea is the greatest advantage of mega container vessels (Stopford, 1999). As per theory, the cost advantages can be achieved by expanding the scale of the firm (Ma, 2008). The cost per unit will be decreased as the quantity of the unit increase. Applying in container ships, cost per TEU is decreased when the vessel capacity increases. Therefore, when calculated the economy of scale of a Malacca-max would offer a unit cost 30% lower than a Panamax. The economics of scale with its implications mostly come from capital and fuel cost while the carrying capacity of mega ships increases respectably. As shipping is intensive capital and fuel cost accounts 60% of operating cost, so it always the most concern of ship owner.

The new building price for bigger container ship was higher than smaller one but in term of investment per TEU, the bigger ship is less cost than the smaller ship. Moreover, the vessel with two times bigger, not going to consume two time fuel and fuel consumption per TEU always favors for big container ship. According to Drewry shipping consultants (2001) with the bunker price USD 110 per ton as for an example, the fuel cost for 10,000 TEU vessel is around USD 0.60 per TEU per annum while it cost 0.87 USD per TEU of a 4,000 TEU ship (Cairu, 2008). Similarly as crews, there do not need two time crews if the ship size is double. Other different areas can also enjoy the economies such as overheads, dry-docking, surveys, etc. In short, larger ships accrue economies of scale both in building and operating costs. However, it is important to note that, economics of scale will be affected by those factors as time spending at port during the voyage, time handling cargo, process after discharge cargo from mega to hinterland with logistic chain, all those can be trade off factor with the cost advantages and productivity of ship size.

3.3 The Trend of Consolidation among Shipping Lines

Recently, the high competitive markets are requiring ocean carriers in general and container carriers in particular lower cost and higher quality of service which they are offering. The shipping company wants to be bigger in the size of company as well as the size of the ship to satisfy the demand of high competitive market. They have trend to merge, acquisition, integrate in horizontal or vertical, Grand Alliance, all this kind of consolidation are pros factors for the ship size increase, as when the company becomes bigger and has more recourses, strong financial condition, it can easily invest in bigger ship, and also the integration in vertical (such as the cooperation between shipping line with terminal company or stevedore companies) that helps the mega ship to be handled smoothly.

4. Disadvantages (Cons)

New generation of ship size has become controversial topic with a lot of arguments about the challenges big ship may face up such as whether have sufficient cargo to fill up the ship on frequency, deep-sea ports to accommodate the ships is qualified, trade is balance, technical issues. All these concern and worries become realistic since Emma Maersk which was the bigger vessel at operation in 2007 with 370 m long, 56 m wide, 16 m draft, has limitations for many port since few ports in the world can offer the “nautical conditions, infrastructure, superstructure, and the inland connection” (Cairu, 2008) to handle this kind of ship. It requires liner operator and their counter parts a lot of effort to deal with problem from operating.

4.1 Port Problems

Mega container ships undoubtedly create big challenges for ports. There are four types of major problem on port facilities when mega container enters to port. Firstly, the draft limitation is common problem because most hub ports do not have enough draft which mega container can berth easily without any draft limitation. Dredging the fairway can be the effective

solution for coping with this matter. However, high cost of dredging will contribute to the total cost. Secondly, lack of crane ability can be another reason escalating the lack of port facilities. In the past, if you want to increase loading or unloading productivity of a container vessel, it is not difficult to raise the loading speed by adding one or two gantry cranes. However nowadays, with the width growing of the ship, crane can no longer be added. Therefore, it will be the challenge to have an effective operation with such huge ships at port. Thirdly, the limited berth size is other demerit for mega ship, Chief executive of Mearsk had warned that for some these reasons an 18,000 TEU vessel could “consistency be four or five days slower than a line which use the smaller vessels”. Because the big ships are also less flexible in port area, they have limited choice to come along side berth with their side, so it may result in longer time stay in port and also will negatively affect economies of scale. Besides, it has limit ports that vessel can call. Hubs and spoke system are the choice of those ships and it inevitably leads to the feeder and transshipment costs for ship owner (Cairu, 2008).

Finally, less developed hinterland facilities are one of drawbacks for mega container ships in port. Hinterland is the area of land behind or around coast, it has various types of facilities related to operate container including container yard, warehouse, and road for land transportation. Therefore, hinterland influences to the container operation directly. If these facilities cannot adapt with the growth of mega container ships, it will make the port congestion problem more serious. For the shipping, reliability is very important, and port congestion is one of factors which make the ship line become unreliable.

In fact, it takes time and needs a lot of investment for the port and hinterland to be able to offer quality service to maximize the utilization rate and minimize time in port where diseconomies of scale happen.

If vessels use traditional network, they will spend a lot of time at port, and for bigger ships, they cannot

take advantage of economic of scale if spending much time at port, so using hub and spoke system to be sure that most of the time is on sail. And it is one of less flexible of mega ship. In addition, investing in mega ship is implication for shipping line invests in terminal, to be sure that when their vessels come, they have space for them to avoid waiting time. And it requires dedicated terminal, when vessels come it can go straight to the berth and will not waste the time, beside it is equipped with good infrastructure and equipment to deal with handling cargo for big ship. It is the reason why Maersk create APM terminal when they feel that other cannot do it well, it's also the reason for the trend to create own terminal or integrated with stevedore company.

4.2 The Imbalance of Trade and Uncertainty of Global Economy

Due to the strong growth rate of industrial production in China, and the emerging of some Asia countries, the trade imbalance is widening in the majority of the east/west and north/south trades. (Bimco) almost 50% of containers were leaving North America and 20% in Europe were empty according to ISL, 2007, (Cairu, 2008). It leads to the cost of ship owner. In addition, if the prize of fuel oil increases, it will have negative impact on the variable shipping and the total costs of the ships (investment, depreciation, fuel etc.) were doubtful, many shipping lines have decided to reduce speed and find other solutions to reduce fuel consumption.

Moreover, the uncertainty of world economy is also a problem, the weakening of the US economy may reduce consumer demand, and rely much on China industrial economy very vulnerable when the supply for the market bases on it. That's the case today, when shipping lines order more new mega container and launch to the market as the high supply but the world economy hits the bottom, China economy goes down sharply, there will be lots of excess supply leading to the decrease of freight rate and huge lost for ship owner.

In fact, the bigger ship will suffer more difficulties than the smaller and incase of layup, it will be very costly for liner operator.

4.3 The Larger Risks and Environment Impact

The bigger the ship is, the larger the risk is. The value of commodities transported by container is getting higher and higher, therefore in the event of accident, the loss of huge amount of cargo will be the lost for ship owner, cargo owner and insurance company. The loss of the *MSC Napoli* that carried 4,500 TEU box was a third of the size of the largest vessels in that time and is already the second most costly maritime insurance casualty after the *Exxon Valdez*. Therefore "the larger the ship, the more costly it is to insure, and then there is the matter of ship safety and security risks," Mr. Vallat said. Furthermore, the environment will be threatened by a possible huge the oil spill because the quantity of fuel oil of mega container ship is equal to that of a small tanker. It would cause serious pollution to the environment.

Furthermore, emission CO₂ is hot issue today and very important in the future. Port managers are more and more taking concern on environment, they will charge port due base on CO₂ emission from ship. The fact is that, big ship has more CO₂ emission than small ship. When the port due so high, it will not be economical any more, beside now many ports go for green tariff, is it becoming barrier for mega ship? So what is optimal size of the ship, is better to use 10,000 TEU or smaller ship, one component needs to consider how much CO₂ is, what is price of 1 tone CO₂ emission that shipping line needs to pay?

5. Challenges Today and Strategy of Liner Operators

Financial crisis becomes a hot topic future prospect, it affects almost industry, and raises the big challenge for shipping industry. A significant global slowdown forecast for GDP growth is considered as key driver for container demand. Very strong market like China also

slows down considerably, the financial crisis and the economic downturn and the oversupply that leads to the tumbling freight rates. For example during the last financial crisis in 2008 the Westbound rates from Asia to Europe decreased sharply from \$1,400 to an average \$350 per TEU (Cairu, 2008). Some carriers accepted even lower rates in an effort to fill up their ships, to improve capacity utilization and to reverse the downward trend of the base freight rates. In order to deal with this challenge, many ships have to be laid up, the older, smaller tonnage was taken out of the global fleet and replaced by the big one. Continuing to slow steaming despite a lower oil price, re-routing, some other measures to utilize ship space are the strategy that liner operators apply for vessel in general and mega container ship in particular.

5.1 Layup and Postpone Delivery Date

Layup ship is considered as effective solution for the ship to save cost and stabilize market especially when the freight lower than the cover costs and not sufficient cargo to fill the ship. The reason is that mega ship has very high capital cost, so in case of layup, it is very costly for the ship owner. On the other hand, owner vessels on order will be seeking delivery delays. According to Claus-Peter Offen-German ship owner, who has come to South Korea to ask for a postponement on four of the 18-strong series of 14,000 ships on order, it is a need to cut around 40% of global shipbuilding capacity (Janet Porter, 2009).

5.2 Slow Steaming

Slow steaming is common solution if the fuel price is much high, and still the economic solution to reduce fuel cost. For liner shipping activities, not least container shipping, bunker oil is a considerable expense. According to Germanischer Lloyd (LSE, 2008a) or to the World Shipping Council (LSE, 2008b), the fuel bill for 8,000 TEU ship accounts was around 50-60% of its operating costs, if reducing 10% of speed can save 25% of fuel cost (Porter, 2008), it's based on

the formula: $P = C.V^3$ (P: power, C: constant, V: speed of vessel).

For example: with the container vessel 8,000 TEU, speed (V): 25 knot, P1: 6,000 KW.

If the vessel reduces speed 10% (22.5 knot)

$$P1 = C. (V1)^3$$

$$P2 = C. (V2)^3$$

$$P1/P2 = C. (V1)^3 / C. (V2)^3 = (V1 / V2)^3$$

$$P1 = P2. (0.9)^3$$

$$P1 = 0.73P2$$

Therefore if ship owner reduces 10% of speed, the fuel consumption will reduce: 25-27% and it can save 50% of fuel cost, speed reduction to 20 knots would require just 50% power. Given that voyage time will increase as a consequence of the reduced speed, the fuel saving will be somewhat less, about 40% (Tozer, 2008). So slow steaming can offer a large saving in fuel consumption.

5.3 Re-routing

In a further effort to save cost, re-route some services from the Suez Canal around the Cape of Good Hope, it will lead to longer transit time several days, therefore consume more fuel, however for the time being bunker costs are relative low, compared with Suez Canal tolls ship-owner have to pay, and it is more outweighed. For example, for a week Asia-Europe service, even diverting eastbound only at a saving of \$300,000 a voyage means an annual saving of some \$15.5 m. Diverting in both directions and multiplied over several routes adds up to a major boost to struggling bottom lines (Matthews, 2009). While freight earning and profitability is coming under such pressure, the opportunity to generate such major savings is too good to consider.

5.4 Advance Cargo, Network Adjustments (Optimizing Asset Utilization)

For mega ship utilization is very important, as we mention above, the economics of scale only reach when the ship utilized 80-90%. So some shipping lines

which are operating mega ships have strategy as below. Plus Advanced cargo: when cargo that was scheduled to load on vessel A on week 2, reach the transshipment port but operation can load this cargo on vessel B on week 1 to maximize B, for the vessel A, depend on following shipments to decide.

Plus Omission ports of call: If the ports do not have much cargo, ship can skip this port and continues to go to other ports. The cargo in that port can be loaded or discharged by feeder to the big ship at the transit port or move to next sailing schedule. Normally big ship will go from Europe to some port of China, in case any port does not have much cargo, they will omit at this port to avoid port charges, and save fuel cost also, they can use feeder to ship cargo at the nearest port.

Besides, some big shipping lines try to cooperate with each other about the cargo to utilize the ship, Maersk, CMA, MSC. For some sailing routes, they use same ship, new vessel-sharing agreements, instead each shipping line invests in 8-9 ships to deploy service each one can contribute 2-3 ships. Moreover, some big liner operators such as Maersk start with some project like Bunker project, stream light project, that deal with how to save fuel, how to get the good price for fuel, cut cost, increase effective operation.

Container ships continued to cause most concern and financial pain, despite a program of lying up and redelivering surplus tonnage, slow steaming, cost cutting and vessel re-deployments. All the strategies still need to continue and especially in this situation today, the cooperation among shipping lines as well as with shipper is essential and all may cross the finger for the recovery of global economy and the shipping industry will be soon back again, the answer is only time.

6. Conclusions

Mega container ship is considering the important mark for the development of shipping. With many advantages including economic of scales, the support of the market with positive signals, the trend of

consolidation among liner operators, big ship still has many challenges that need to analyze and consider like lack of suitable port facilities, the uncertain global economy, larger risk and technical issues. All these problems seem to be revealed clearly today, that hit the containers industry very painful and someone may be doubtful about the future for mega ship.

As we all know that shipping is cycle with 4 stages: trough, recovery, and peak, collapse (Stopford, 2004). If today is at trough stage, it means the shipping industry will recover again and one day the booming of shipping will begin, the problem is only time and shipping line has to be strong enough and strategic to deal with this difficult time. "Boom is welcome, recession is more welcome" (Mr. Matsushita—Panasonic Group founder). "Demand and supply will adjust in the proper direction" (Cairu, 2009). After gloomy, bright will come. Someone might say, mega ship is good when economic booming, not in recession, but with the cycle of shipping, there still has a room for mega ship in the future, as all realize the outstanding benefit from mega ship from both supply and demand side, however, the ship owners need to consider carefully all the factors before taking any decision to order mega container ships in terms of the right size, at the right time and in the right place.

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