Implications of mega-ships on ports and terminals

Neil Davidson, *Senior Analyst - Ports & Terminals, Drewry Maritime Research, London, UK*

Growth of ship sizes

The rapid and dramatic growth in container ship sizes over the last few years has been well documented. The largest ships are deployed on the Asia-Europe trade route and Maersk Line's 18,000 TEU Triple E vessels have already been surpassed by China Shipping Container Lines' new 19,000 TEU vessels. These mega-ships, on one of the primary east-west trade routes, naturally grab the headlines. However, what is just as important is that their introduction has caused the cascading of many large vessels into secondary/north-south trade routes. As Table 1 shows, in the last three years, average ship sizes have increased markedly on all the routes shown, but the biggest growth is actually in the secondary/north-south trades.

The container ship order book is set to reinforce this. There are 139 vessels of 14,000+ TEU due to be delivered by the end of 2016 and they will push even more 'smaller' vessels in the 8-10,000 TEU size range into cascaded routes. However, there are also over 100 vessels of 8-10,000 TEU on order in the same time period. These vessels will go straight to secondary/north-south routes such as those involving Latin America, the Middle East and perhaps the Asia-US East Coast route via the expanded Suez Canal.

Growth in alliances

Hand-in-hand with ship size growth is an increase in the scale of liner alliances. The only way to fill ever-larger container ships, and obtain the potential economies of scale that they offer, is for carriers to pool their volumes on particular trade routes and share ships. Table 2 shows schematically how the 16 main carriers are coming together into just four main groupings. It is important to note that these are operational vessel sharing agreements though, commercially, carriers remain separate and in competition.

Not only are alliances growing in terms of the number of member lines, they are also seeking to expand their geographical coverage. For example, Evergreen has joined the CKYH Alliance on the Asia-Europe trade route, and now the rebranded CKYHE is seeking to extend this arrangement to the Transatlantic and Transpacific trade routes.

In addition, besides shipping lines operating on the same trade route opting to share ships, other forms of alliances are emerging too, with a recent agreement between UASC and Hamburg Sud to cooperate a pertinent example. UASC is primarily in the east-west trades, and Hamburg Sud primarily in the north-south trades, so in this case, each carrier is looking to expand its network coverage at a stroke by teaming up.

Implications for ports and terminals

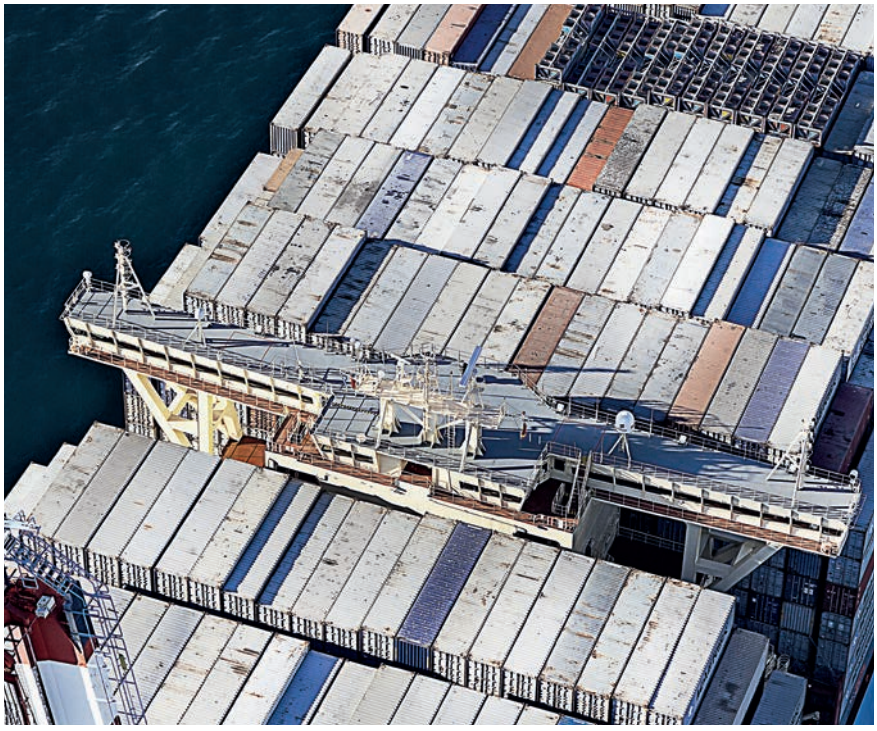
Infrastructure and equipment

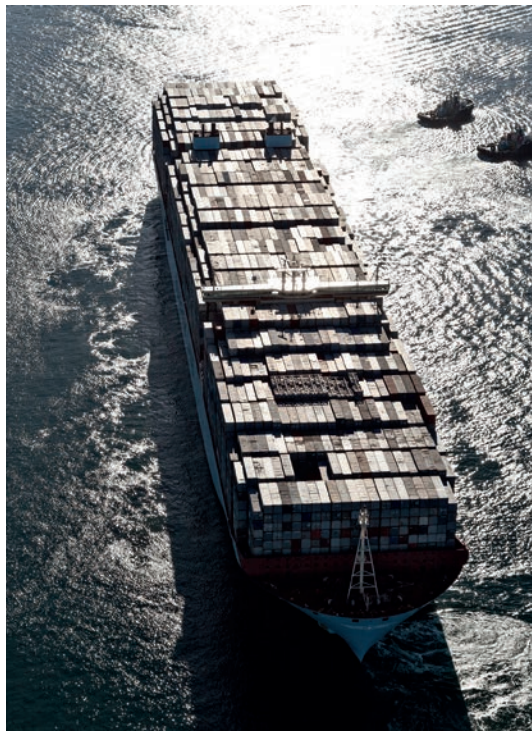
The need for enhanced infrastructure and equipment is across the board and not just an issue for ports handling the world's biggest ships, because ship sizes are increasing across the board. This means larger (and more) cranes, longer and deeper berths, deeper and wider approach channels and turning basins, and greater air draft.

Trade route type	Trade route	Average vessel size (teu)		Increase
		Mid 2011	Mid 2014	
Primary (east-west)	Asia-North Europe	9,158	11,638	27%
	Asia-Mediterranean	6,379	8,669	36%
	Asia-US West Coast	5,858	7,115	21%
Secondary/north-south	Asia-East Coast South America	4,600	7,303	59%
	Europe-East Coast South America	4,243	7,427	75%
	Asia-West Coast South America	4,525	6,671	47%
	Asia-Middle East	4,553	6,707	47%

Source Drewry Maritime Research

Table 1: Development of average container ship size, 2011-2014





Capacity

Equally imperative is the accompanying need for a yard/landside operation capable of coping with larger loads and sufficient inland transport capacity. The question has to be raised: who will pay for all these increased requirements? At present, it is not clear.

With the rapid increase in ship sizes and the issues this creates for ports, it might be easy to assume that many traditional ports can no longer participate in the container trades. However, in fact, very few ports have been sized out of the game and ever larger ships are still squeezing into ports with navigational and access restrictions. For example, ports such as Antwerp and Hamburg have long river passages and draught restrictions, but are still seeing calls by the very largest of ships.

In the secondary/north-south trades, numerous smaller ports are seeing calls by relatively large vessels in the 8-10,000 TEU size range as Table 3 shows. Many of these are ports which might easily have been written off as being unable to accommodate such ships. The reason why such big ships are still calling is simple - cargo. At the end of the day, if the cargo demand is there, then lines have to find a way to continue calling, preferably directly.

Bigger ships and alliances are having a profound effect on the nature of capacity which is needed in ports. The ever larger combined volumes of bigger alliances demands fewer and larger terminals in

Shipping line	Alliances/vessel sharing agreements (VSAs)	
Maersk	P3 (denied)	2M
MSC		
CMA CGM		Ocean Three
China Shipping	China Shipping/UASC	
UASC		
NYK	Grand Alliance	G6 Alliance
OOCL		
Hapag-Lloyd		
APL	New World Alliance	
MOL		
Hyundai		
Cosco	CKYH Alliance	CKYHE Alliance
K Line		
Yang Ming		
Hanjin		
Evergreen	Independent	
16	**6**	4

Source: Drewry Maritime Research

Table 2: Schematic illustration of container line alliance development

Latin America	Black Sea
Buenaventura	Constanza
Buenos Aires	Ilychevsk
Callao	Odessa
Coronel	
Iquique	**Adriatic**
Itajai	Koper
Itapoa	Rijeka
Montevideo	Trieste
Navegantes	
Paranagua	**Africa**
Rio Grande	Cape Town
Salvador	Coega (Ngqura)
San Antonio	Durban
San Vicente	Port Elizabeth
Santos	Port Louis
Sepetiba	

Source: Drewry Route Capacity Database

Table 3: Ports in secondary/north-south trade lanes currently receiving calls by 8-10,000 teu sized vessels

each port. However, in many ports, due to historical development and physical constraints, capacity is fragmented, both physically and in terms of ownership, across a number of smaller terminals.

Streamlining

The formation and expansion of alliances has also resulted in many carriers (or related terminal companies) having terminal interests which do not neatly correspond with those of their alliance partners. Streamlining and unifying terminal facilities, ownership and usage by alliances is not a straightforward task. This is especially challenging on the US West Coast with its history of each carrier having its own terminal in each main port, but the complexity is also evident elsewhere. In the US, the Port of Oakland has facilitated the expansion of SSA Marine's Oakland International Container Terminal, taking over the former APL and Hanjin terminals, and creating a single, much larger terminal with a linear berthing line able to accommodate bigger ships and greater volumes.

Numerous other reshuffles of terminals both physically (in terms of layout and location) and in terms of ownership are being triggered. For example, in Antwerp, MSC has been given the go ahead to move its traffic from its terminal behind the locks to an enhanced riverside facility in the Deurganckdok. The move will see the redevelopment and expansion of the existing PSA terminal to create the MSC PSA European Terminal (MPET) with an initial capacity of more than seven million TEU per annum. MSC alone accounts for a massive throughput of 4.5 million TEU per annum, which is around half of Antwerp's container traffic – and that's not even taking into account its 2M alliance partner, Maersk Line.

Peak volumes

Another profound effect of bigger ships is increased peaking of volumes at ports and terminals. Bigger ships are translating into less frequent port calls, and therefore greater volume peaks and troughs. This increased surging of volumes puts pressure on terminals and leads to a need to provide infrastructure, equipment and human resources to be able to meet the peak, which may well then be significantly under-utilised in the troughs. Again, the question has to be raised: who will pay for these increased requirements?

Linked to the issue of peaking is that of speed of handling and vessel turnaround times. Shipping lines are deploying larger vessels with bigger container exchanges per port call and are looking to receive faster handling in order to limit the extra time spent in port. It used to be the case that the typical port stay was 12, 24 or 36 hours, but even 36 hours is a challenge given the size of some exchanges. For example, in October 2014, the ECT terminal in Rotterdam handled an Evergreen vessel with an exchange of 10,557 containers. This was done at an average of over 150 berth moves per hour, a creditable performance by world standards. However, this still resulted in a vessel stay of 67 hours.

Operational factors	Commercial factors
How the ship is stowed for the port in question	Speed of turnaround required or guaranteed
Size of the container exchange per vessel call	Flexibility, availability and cost of dock labour (and their normal hours of working)

Source: Drewry Maritime Research

Table 4: Factors influencing speed of container vessel handling

Conclusion

The larger the ship, the longer the physical distance the crane trolley has to travel, both outwards across the vessel, and down into it, and so just maintaining handling speeds per crane has challenges. Add to this the fact that the biggest ships are not (at present) any longer than their predecessors and it means that the number of cranes deployed per vessel cannot be increased in direct proportion to vessel TEU intake.

In any case, speed of handling is not just an operational issue but a commercial one as well, as Table 4 shows. Speed of handling is closely linked to the cost of handling. The question has to be therefore: what level of productivity does the shipping line want (they may or may not want the fastest) and, once again, are they prepared to pay for it?

About the author

Neil Davidson has over 25 years experience in the port sector. He joined Drewry in 1997 and founded the company's ports practice. Neil has spoken at over 80 industry conferences, seminars and private briefing sessions worldwide and regularly contributes expert insight and analysis to the trade press and national newspapers, as well as TV and radio.

About the organisation

Drewry

Drewry is one of the world's leading international maritime consultancy and publishing organisations. Founded in 1970, the company has over 40 years' experience within the maritime sector, employing over 90 specialists across offices in London, India, Singapore and Shanghai. The company provides research reports and consultancy services with a brand renowned for its quality. Drewry reports are sold in more than 90 countries and consultancy services are commissioned by over 70 countries.

Enquiries

Neil Davidson,
15-17 Christopher Street,
London, EC2A 2BS

Tel: +44(0)20 7538 0191
Email: davidson@drewry.co.uk