Terminals in northern Europe: large, mega and ultra-mega facilities


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Over the past few years we have seen an increase in terminal development across the globe. The word "mega-terminal" is often used in this context. Growing trade volumes and the newest generation of ultra large ships drive the need for larger and more efficient terminals in the container industry. But how do these developments affect terminal size and port throughput?

Mega-terminals are a direct consequence of growing trade volumes and the scale increases in vessel size. The trend of maximising economies of scale in shipping is visible in almost all subsections of maritime trade but can predominantly be observed in the container business. The strong growth in the deployment of ultra-large container ships of up to 20,000 TEU is well documented. There are no signs that the number of ultra-large container ships will decrease in the coming years.

Terminals are urged to upgrade their facilities to reach unprecedented productivity levels, mainly through automation, a higher crane density, faster terminal operations and advances in yard management and onward inland transportation. At the same time, the call sizes of large vessels lead to a need for more quay space, larger stacking areas and bigger cranes that are able to reach towering stacking heights.

Terminals in northern Europe

Let's start by stating the obvious: terminals are growing in size. However, not all terminals are growing at the same rate. An analysis by ITMMA of the University of Antwerp shows that, when comparing terminal developments in the Port of Antwerp from 1890-1930 to those from 1980 until today, average terminal sizes have increased for all types of cargo. For general cargo terminals this is by a factor of 5, bulk terminals by a factor 4.5, logistics 1.7, RoRo terminals 1.7 and containers by a factor of 7.

Industrial terminals are the exception with an average decrease in size by 50%. The same trend is visible when comparing the development phase from 1950-1966 to that of 1980 to today. Only this time bulk, industrial and logistics terminals declined in surface area (by 40%, 25% and 22%, respectively) and container, Roro and general cargo terminals grew by factors of 3, 3 and 6, respectively. At present, container terminals, industrial terminals and RoRo terminals are on average the largest, followed by bulk, general cargo and logistics terminals (Figure 1).

Container terminals in northern Europe are on average the largest in size. This is a result of the wave of terminal expansion projects in major north-European ports over the past decade – such as Maasvlakte 2 (APM Terminals and Rotterdam World Gateway) and the Euromax terminal in Rotterdam, the Deurganckdock (PSA and Antwerp Gateway) in Antwerp, Port 2000 in Le Havre, Altenwerder in Hamburg, and further extensions of the terminal complex in Bremerhaven and JadeWeserport in Wilhelmshaven.

The arrival of the new generations of mega-ships played a key role in mobilising resources to realise much larger terminal complexes than before. In the mid-1990s, a new container terminal in the Hamburg-Le Havre range typically had a design capacity of 0.5 to 1 million TEU per annum. In the mid-2000s, this figure amounted to 2 to 2.5 million TEU, while the latest terminal facilities are reaching annual capacities (when fully operational) in excess of 3 to even 4 million TEU.

The growing capital needs and commercial risks have given an incentive to form more complex partnerships in view of operating the terminals. For example, DP World invested about US$750 million in Rotterdam World Gateway on Maasvlakte 2 in collaboration with four container carriers. In Antwerp, a decision was taken to move MSC's volumes (some 4.5 million TEU per year) from the right bank to the Deurganckdock, a terminal better suited for large vessels – this was in order to concentrate all future 2M network traffic on the left bank of the river. The introduction of the new coalitions and mega alliances such as 2M, O3, CKYHE and G6 are contributing to increased pressures on terminal operators to offer sufficient terminal capacity.

Throughputs

The allocated terminal area is strongly correlated to TEU throughput (Figure 2). Rotterdam, Hamburg and Bremerhaven are having a relatively high throughput for the allocated land. Note that the figures relate to 2014, so the Rotterdam data does not include the new Maasvlakte 2 terminals which opened for business in 2015. On the other hand, Antwerp and Le Havre have a somewhat lower use of the allocated land area. In Antwerp, the picture is expected to change very soon given the strong container growth in the Scheldt port (+8% in the first nine months of 2015), the ongoing move of MSC to the (now still underutilised) Deurganckdock and the associated shift in the use of the Delwaidedock on the right bank from container to non-containerised flows.

Land allocation

It would be presumptuous to assume that land allocation is the only driver for TEU throughput. Other factors are also important when discussing container volumes, such as the dock labour system, the nature of the terminal operators involved (dedicated terminal or not), the yard equipment used, the amount of

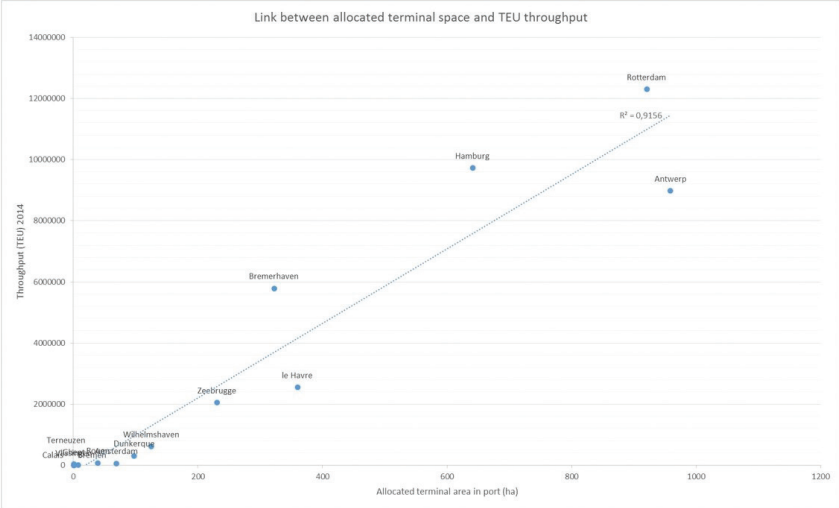

Figure 1: Terminal size distribution for all major ports in the Hamburg-Le Havre range

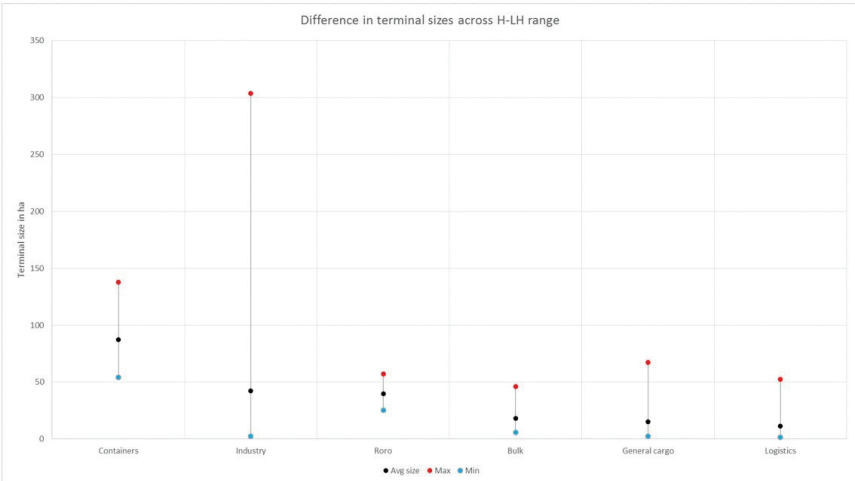

Figure 2: Relationship between terminal space and TEU throughput (2014)

automation, and so forth.

As ship size is one of the main drivers for terminal size, one could argue that terminals will reach their maximum size once ships stop growing in size. Economies of scale remain considerable and in an environment in which rates are under a continuous pressure, each penny counts. The limits of ship size largely revolve around their operations, rather than any structural constraints. The current generation of ships is already pushing the boundaries of maximum size. We also expect that terminal size will ultimately reach its limits. The added effects of liner shipping alliances, the rise of automation and the human tendency to go ever higher, bigger, better and faster are factors pushing terminals beyond mega. However, the size of mega terminals is also going to be affected by other factors:

- Firstly, further improvements in land productivity and lower dwell times due to better synchronised hub-feeder operations and intermodal connectivity will continue to increase the annual capacity per hectare of terminal land. As such, less land will be needed to offer a similar annual capacity provided the terminal operator is able to secure enough resources to make the necessary productivity leap
- Secondly, as terminals grow in size, the cost and complexity of intra-terminal container movements increases as well. Therefore, mega-terminals will increasingly be managed as a collection of adjacent sub-terminals
- Thirdly, given the commercial risks associated with mega-terminals, the ownership of these facilities is expected to become even more complex in the future
- Fourth, the growing needs in terms of berth length, yard capacity and the bundling of feeder and inland flows will lead to a further consolidation of container volumes in mega terminals. Examples include the recent closure of the Eem- and Waalhaven facilities in Rotterdam and the planned reorientation of the Delwaidedock (located behind locks) in Antwerp to non-containerised business. In extreme cases, smaller ports and terminal facilities will find it increasingly difficult to maintain a position in the large-scale container business (see the position of Amsterdam, Dunkirk and Thamesport, to name but a few)

About the author

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About the organisation

PortEconomics
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PortEconomics is a web-based initiative aimed at generating and disseminating knowledge about seaports. It is developed and empowered by the members of the PortEconomics group, who are actively involved in academic and contract research in port economics, management, and policy. Since October 2012, Port Technology International and PortEconomics have been engaged in a partnership.

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