The holistic approach

When it comes to making trade forecasts, a big-picture approach is required. This is essential in helping to provide investment decisions for the liner shipping industry, writes **Mike Garratt**.

UK-based consultant MDS Transmodal has developed a model – principally based on global customs returns – to more accurately forecast traffic growth in the container liner shipping industry.

One of the consequences of the ending of shipping cartels (ie conferences) in Europe will be the imposition of severe constraints on the legal exchange of trading intelligence between shipping lines.

Quite naturally, this has resulted in vigorous debate, during which the European Liner Affairs Association (ELAA) has argued that the most effective way of minimising unit costs is to pool (and therefore exchange) individual shipping lines' demand data, to ensure that the supply of – and demand for – service capacity can be matched well. Shippers' councils, however, have pointed out that other industries seem to be survive without such practices.

TABLE 1: ESTIMATED INTERNATIONAL THROUGHPUT, 1996-2006 (MILLION TEU)

Tradelane	1996	2006	Growth	% growth
Asia-Europe/Med	8.2	27.3	19.1	232
Transpacific	10.4	33.9	23.5	226
Transatlantic*	6.6	14.6	8.0	122
Other	25.6	63.6	38.0	148
Global trade	50.8	139.3	88.5	174

Notes: * = includes West Asia to North America; figures include both loaded and empty containers; excludes domestic (including offshore) and transhipment movements

This debate also draws attention to the industry's limitations in understanding just what drives demand, and how (and where) that demand needs to be met in the long term by port facilities and inland infrastructure.

In particular, there is an evident mismatch between the cries of 'short-term vessel overcapacity' – which is heard so often from ocean carriers – while, simultaneously, holding an apparent certainty that more terminal and inland network capacity is urgently required.

The industry's literature is dominated by analyses of short-term fluctuations between shipping supply and demand, which gives little guidance to the public sector agencies responsible for consenting (and often funding) the infrastructure that all those new ships require.

Yet, in comparison to other industries, there is a great deal of evidence already available that can be used to inform investment decisions. For instance:

- vessel deployment is in the public domain
- ports almost universally publish data on both their traffic throughput and infrastructure plans
- detailed trade data is available on a timely basis from national customs authorities.

What is required, therefore, is not detective work, but comprehensive and detailed analytical techniques that allow all that data to be marshalled to useful effect.

MDS Transmodal has tackled this issue, and developed its own methodology and trade route forecasting model.

Forecasters have normally attempted to link GDP and currency exchange rates, in order to determine the rate of change of demand for liner shipping services. However, this is not a reliable methodology.

In the UK, as in many other developed countries, total inland freight moving by road and rail (including international trade) grows at less than half of the increase in GDP – most growth lies not in manufacturing goods, but in the service sector – while container traffic grows at double that of GDP.

The high rates of container traffic growth in recent years cannot be fully explained by growth in physical consumption, therefore. Indeed, growth in container trade between countries is more heavily influenced by the strength (or weakness) of trade barriers, the relative, differ-

TABLE 2: ESTIMATED TOP-15 LARGEST-GROWING COMMODITIES IN THE CONTAINER TRADES, 1996-2006 (THOUSAND TEU)

SITC5	Commodity description	1996	2006	Absolute growth
78439	Vehicle parts	534	1 842	1,309
82159	Furniture (wooden), excluding for kitchens, offices and bedrooms	406	1 644	1,239
77878	Electrical equipment, including domestic	88	1 033	944
82119	Parts of seats	324	1 126	803
5730	Bananas	516	1 185	670
82155	Bedroom furniture	137	697	560
82139	Furniture (metal), excluding for offices	170	729	559
25119	Wastepaper and paperboard	76	578	502
75260	Input or output units (eg computers)	287	783	496
51389	Polycarboxylic acids, etc	125	592	468
89399	Articles made of plastic	379	839	460
25111	Waste kraft and corrugated paper	196	645	449
77811	Batteries and cells	447	866	419
66245	Glazed ceramic flags and tiles	208	626	418
82117	Seats	102	516	414

Note: SITC5 commodity descriptions have been simplified

ent and changing costs of production, and the level of consumer market saturation already reached by importers, rather than by GDP growth per se.

Container demand also needs to be kept in perspective. Hence, out of a total world port container throughput of around 440 million TEU in 2006, only half would have comprised fully-loaded international boxes arriving at terminating ports, with the balance made up of empty containers, repositioning moves, transhipment cargo and domestic traffic.

In developing a credible model, MDS Transmodal decided that, on account of changing world prices for many manufactured goods, at least 10 years' data was needed.

Given that the only long-term credible cross-check of such a demand model was actual port container throughput data (freight conference statistics will soon disappear, anyway), it was pointless modelling just the east/west trades.

Consequently, the MDS Transmodal model is global in nature, and it captures all container services and port traffic data. It is based on:

- Collation of trade data from all the major trading countries by individual commodity (five-digit SITC level, or around 3,000 commodities) and country of trade, 1996 to the present day (on a quarterly basis, to facilitate quarterly updating).
- Filtering of that data, to estimate the proportion unitised (ie excluding the majority of bulks and conventional trade), based on customs data where available (as it is in the US, UK, Spain and France, for example).
- 'Creaming off' estimated airfreight.
- Conversion through stowage factors to TEU.
- Distinguishing those flows moving by sea in lo-lo systems from overland or ro-ro trailer flows.
- Allocation (where relevant) to ports used in different countries (eg French traffic through Antwerp, Paraguay traffic through Santos, etc).
- Estimation of empty containers through calculating trade imbalances.
- Allowance for the fact that new containers tend to be manufactured in net exporting countries, and are 'culled' in net importing countries, when no longer fit for purpose.
- Addition of offshore domestic flows, where identifiable (eg US/Puerto Rico and Spain/Balearic Islands).

These steps, adjusted through experience and a variety of cross-checks, resulted in aggregate and individual country trade estimates being made. These corresponded reliably with reported port traffic figures (net of reported transhipment volumes).

However, for some countries, further refinements were needed, to take account of domestic and local empty repositioning movements. An empty container 'returned' by a feeder vessel to a hub port, and subsequently shipped onwards by a deepsea vessel, is not necessarily classified as transhipment.

On a global basis, the MDS Transmodal model reproduced collective port container throughputs to within ±1% of that reported for every year since 1996.

In terms of the results, the model demonstrated that the total number of TEU handled at the world's ports grew about 10.6% per annum over the 10-year period. Meanwhile, the total weight of cargo for a 'constant' basket of goods – which, in MDS Transmodal's view, represented container traffic in 2001 (the mid point in the analysis) – rose by a much smaller 5.9%/annum.

Meanwhile, increasing levels of containerisation explained another 2.5% growth per annum, and a general transition to the move-

FIGURE 1: GLOBAL DEMAND TRAFFIC, 1996-2005

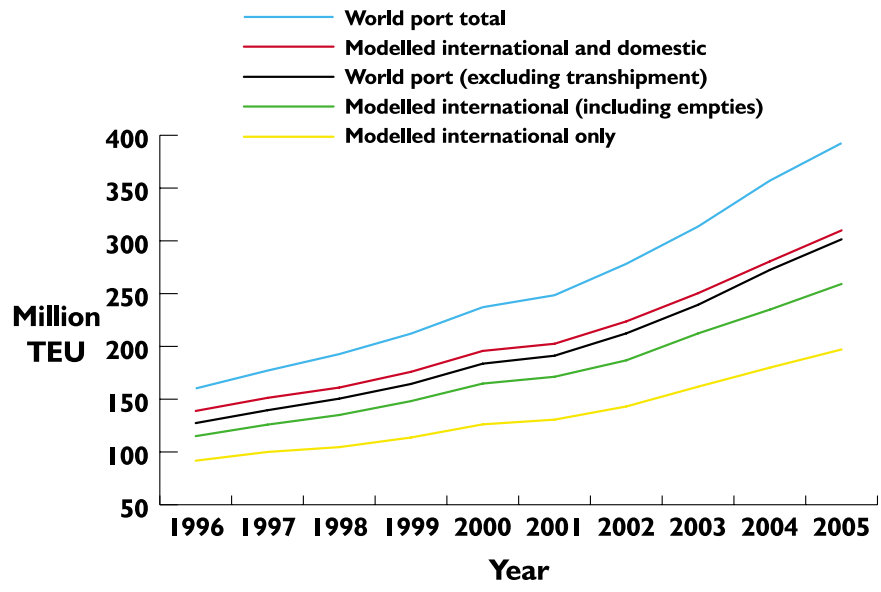
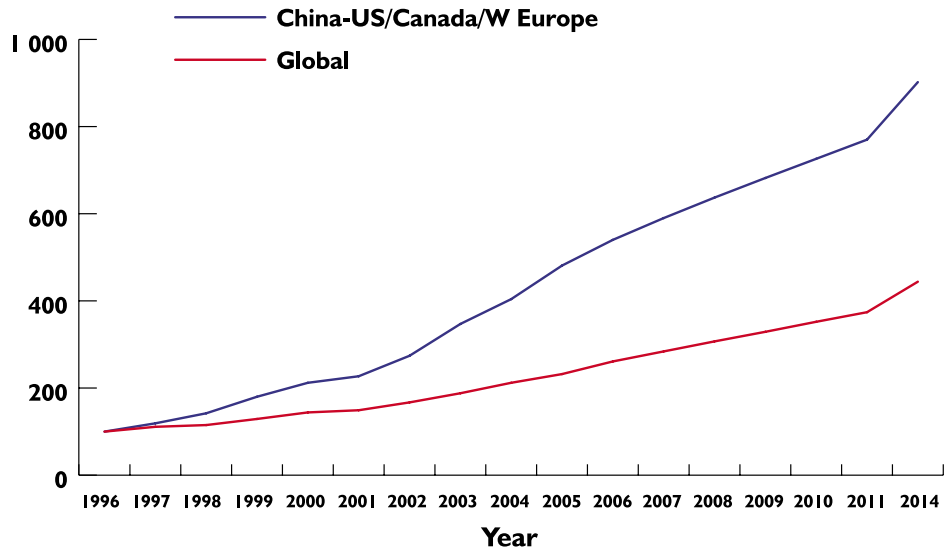


TABLE 3: ESTIMATED QUARTERLY LOADED TRADE, 1996-2014 (MILLION TEU)

	Loaded only demand			2006		2009		2014	
	1996	2005	2006	Demand	Supply	Demand	Supply	Demand	Supply
Asia-Europe/Med	7	19	21	27	33	34	43	46	55
Transpacific	8	19	21	34	43	42	56	54	68
Transatlantic	6	12	13	15	19	18	24	24	30
To/from Sub-Saharan Africa	2	4	5	6	12	8	15	11	21
To/from Australasia excluding Americas	2	4	5	5	7	7	9	9	12
Total	**26**	**59**	**66**	**87**	**114**	**109**	**147**	**145**	**186**
Load factor					76%		74%		78%
Other international	16	38	42						
Empty containers	9	28	31						
Loaded and empty	51	125	139						
Other traffic	15	30	33						
Total port to port	66	154	172						
Plus matching discharges	66	154	172						
Transhipments	33	91	103						
Global port traffic	165	400	448						

Note: excludes domestic offshore trades, such as California to Hawaii; Note: West Asia to Americas included in transatlantic tradelane

FIGURE 2: HISTORIC AND EXTRAPOLATED INDICES OF CONTAINER TRADE GROWTH: GLOBAL VS TOP 30% OF CHINESE EXPORTS TO W EUROPE AND N AMERICA, 1996-2005



ment of lighter goods (linked to more 40ft containers) added a further 2%/year to the growth equation. Elsewhere, the increase in empty container movements contributed 0.2% per annum. This reflected growing trade imbalances – a figure that would have been much higher, but for the further tonnages of containerised traffic that have emerged (wastepaper, scrap metal, etc) to fill what would otherwise be fresh air.

Figure 1 illustrates the various components of the model, and how it explained reported worldwide port throughput.

Clearly, the coincidence of modelled international and domestic TEU volumes and reported port throughputs, net of transhipment traffic, demonstrated that the model reproduced port volumes experienced over a period of rapid growth and change. Therefore, this provides reassurance for future forecasts.

The fact that such estimates can be arrived at using public domain information – relying, in particular, on the highly detailed, accurate and up-to-date information from customs authorities around the world – suggests that the shipping industry need not rely on the exchange of data between ocean carriers.

In terms of individual trades and commodities, these are summarised in tables 1 and 2.

The strength of this forecasting process is that the method allows every detailed commodity and country-by-country flows to be identified at a level that individual shippers recognise and can track.

Table 2 describes the fastest-growing commodity groups at the five-digit SITC level in absolute terms. Such analysis has much wider implications than shipping alone, of course, in that it improves our insight into the economic development that ocean carriers have helped to facilitate.

A detailed, commodity-based forecasting technique is also far more reliable than using a simple GDP multiple in detecting change. The expansion in global container trade over the last decade has been driven by a relative handful of commodities exported from China, and this was clearly evident well before the nation joined the World Trade Organization (WTO).

Figure 2 describes the performance of those leading commodity classifications, which together represent 30% of China's containerised exports being shipped to North America and Western Europe, as compared with overall world container trade growth. Should current trends continue, these volumes will exceed 900 million TEU by 2014. Their growth rate is twice that of the world average.

The industry will recall the miscalculations made with respect to the relationship between supply and demand during 2002, following falling growth rates experienced in 2001. These could have been avoided if that same bundle of goods had been tracked more carefully.

Figure 3 describes how both global container growth rates and exports from China to the Americas and northern Europe dipped in 2001, and then recovered the following year. That particular bundle of commodities actually slipped into decline (quarter-on-quarter) during 2001, but recovered rapidly before the end of the year.

The gloom that was being expressed by major ocean carriers and commentators through most of 2002 – which itself delayed plans for expansion – could have been avoided, had the appropriate data been monitored more closely.

Figure 4 reveals annual growth rates for both global and China/North America/northern Europe trades respectively, compared with changes on a quarterly basis for the leading (indicator) bundle of commodities for trade from China.

It is an unfortunate feature of the liner shipping industry that, while it is concerned with short-run fluctuations in slot capacity, it depends crucially on the provision by other parties of dredged channels, quays, road, rail and inland waterway infrastructure, more of which cannot be financially justified without taking a very long-term view.

Table 3 describes how the forecasts for loaded intercontinental containers can be added to empty, intra-continental and transshipment lifts to equate to estimated global port-handling activities.

These intercontinental forecasts can also be compared with the anticipated build-up of world shipboard capacity (based on confirmed orders) and demand up to 2014, assuming current estimated load factors (including the long-distance movement of empty balancing containers). Overall, intercontinental container traffic volumes are expected to grow at a level of 7% per annum between 2006 and 2014.

In table 4, the supply/demand balance has been used to interpret the need for shipping capacity up to 2014. It estimates the number of slots that will be required by ship size, assuming some slowdown in sailing speeds, to reflect rising bunker prices. This reduces the effective capacity of the world's fleet by 10% (see 'Tortoise or hare?', *CI* August 2006, p45, and actions already taken by CMA CGM).

TABLE 4: FORECAST NEED FOR CONTAINER VESSELS, 1996-2014

	2006	2009	2014
Inter-continental demand (million TEU)	87	109	145
Intra-continental demand (million TEU)	52	67	92
Forecast longhaul demand	**139**	**176**	**237**
To be served by a fleet of	**Present**	**Plus ordered**	**Plus extra needed**
1 000TEU to 3 000TEU	1 745	2 161	2 400
3 000TEU to 5 000TEU	627	873	1 000
5 000TEU-plus	487	786	1 100
Mean vessel capacity (TEU)	3 092	3 362	3 670

Note: figures include both loaded and empty containers

FIGURE 3: ANNUAL GLOBAL CONTAINER GROWTH RATES AND CHINESE EXPORTS TO NORTH AMERICA AND NORTHERN EUROPE, 1997-2005

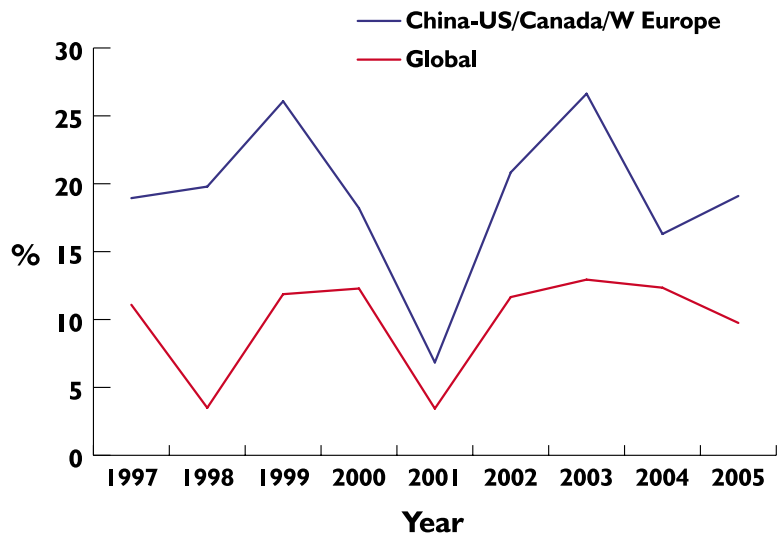


Table 4 demonstrates a need for a further 700 vessels by 2014 on intercontinental routes, assuming consistent load factors.

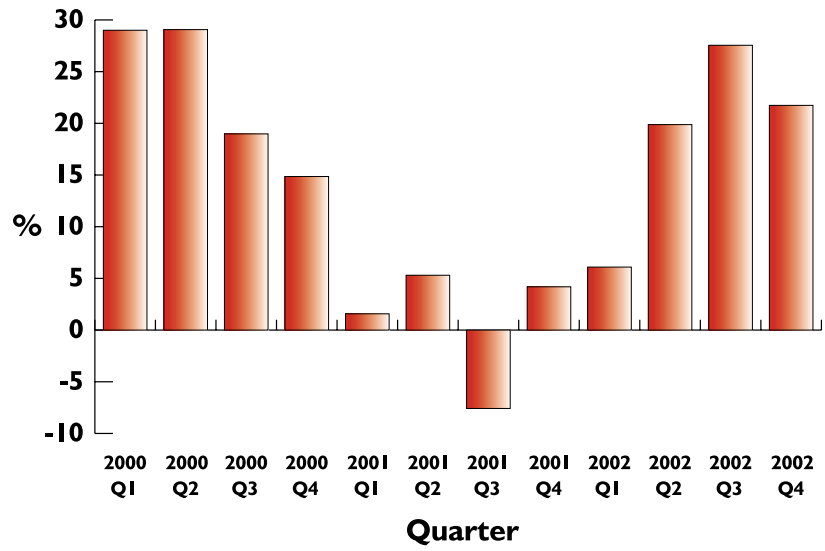
Meanwhile, with the Panama Canal likely to be capable of handling ships of between 12,000TEU and 14,000TEU by 2014, ocean carriers will focus their investment strategies in the period from 2009 on larger vessels. Short-term, deployment of these assets could prove challenging.

The recent rush by banks and pension funds to buy ports and port terminals has, in part, been driven by the very growth expectations that are described above. However, the need for more port and inland infrastructure capacity needs to be carefully considered.

In several parts of the world, port productivity is poor, and the scope to sweat existing assets is considerable. On the other hand, without substantial additional port development programmes – eg throughout Asia – trade growth could be put at risk. Consequently, this could influence the effective deployment of the larger vessels being built at the moment.

Therefore, what is the true demand for terminal facilities? The following figures are based upon the premise that benchmarks can be established for quay productivity for both gateway and transhipment traffic (of 1,100TEU and 3,300TEU per quay-metre respectively) that a handful of the world's most efficient ports already reach.

FIGURE 4: QUARTER-ON-QUARTER GROWTH RATES OF CHINESE EXPORTS TO NA & NW EUROPE (BASED ON TOP 30% COMMODITIES), 2000-02



MDS Transmodal analysed 800 container terminals worldwide, focusing on the main container pots, defined as those with at least 13m access channel depths and annual throughputs in excess of 1 million TEU. In all, this covered 64 ports, and was equivalent to 69% of global container-handling activity.

On the basis of forecast trade growth, and using the above productivity benchmarks, MDS Transmodal calculated that an overall shortage of container-handling supply will result. This will be equivalent to be 168 million TEU of handling capacity by 2014 (see table 5).

The main shortfalls will occur in Asia, followed by northern Europe. Assuming the worldwide balance of gateway cargo (currently 77%) and transhipment container lifts (23%) remains constant, that equates to a need for 130km of additional deepwater quays over the next eight years, and an extra 1,300 ship-to-shore gantry cranes, over and above continuing replacement needs.

Will these forecasts come to pass?

In principle, these forecasts depend upon the drivers that have been active over the past decade to carry on pedalling.

What this holistic approach does permit is the continual monitoring, reassessment and co-ordinated estimation of need for both port and shipping capacity.

TABLE 5: FORECAST NEED FOR FURTHER PORT CAPACITY, BASED UPON BENCHMARK EVALUATION, 2006-14 (MILLION TEU)

	2006 major ports		2014 major ports		
	Benchmark capacity	Throughput	Benchmark capacity	Throughput	Shortfall
Asia	225	195	225	324	128
Europe/Med	95	61	95	101	29
Americas	70	43	70	72	10
Africa	0	0	0	0	0
Australasia	7	4	7	7	1
Total	**397**	**303**	**397**	**505**	**168**

All data for tables and charts were provided by MDS Transmodal.

*For further information on the model, contact MDS Transmodal's website (*www.mdst.info*).*

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