2007

NORTH SEA BALTIC HUB

MARKET ANALYSIS, SCENARIO AND PORT ACTION POINTS

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Contents

Figures

Tables

Introduction

The recent development of maritime transport in the Baltic Sea region (BSR) is characterised by a large increase in shipping volumes. There are many uncertain elements as for the geographical structure of demand development. One is that new and improved land transport connections over time will introduce new corridor competition for maritime corridors. Another is the development of Russian port capacity in the BSR and other transport corridors, which has the potential to change the present structure of transit flows via the Baltic Sea countries. A third uncertain element is to what extent maritime goods operation will be further concentrated.

These uncertainties might be of a substantial magnitude. There is a lack of information on goods flows and the future role of maritime transport in the transport chain. Economic and transport statistics as well as analytical tools are also less well developed for the BSR. Projections of transport demand are therefore particularly difficult and uncertain in this area.

SCOPE OF THE PROJECT

This project draw from the findings in the Baltic Maritime Outlook 2006, WP1 of the Master Plan Studies for Development of the Motorways of the Baltic Sea, and is focused on containerized transhipment flows to/from the BSR, here defined as including the following countries: Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Poland, Germany, Denmark and Norway.

Trade growth

Seaborne container transport between the continents has increased considerably during recent years and all forecasts indicate that this increase will continue for many years. The future growth of trade in the BSR in relation to expanding markets overseas i.e. transhipment volumes are expected to be very high. In total, over 6 million TEU:s are handled in Baltic and Scandinavian ports.

Congested ports

Import/export between Europe and Far East/USA is today mainly handled through hubs in the Mediterranean Sea, Southern England and through European ports in the Hamburg – Le Havre range. For the Baltic Sea direct overseas calls are only made in the ports of Göteborg and Aarhus. In relation to this there is a need for modal shift to avoid rapid growth of heavy cargo transport on main European roads with destination/origination to/from continental gateway hubs. Recently it has become obvious that the growth of container traffic also has resulted in congestion in Continental transhipment ports.

Alternative hubs

It is of vital importance that the BSR can offer safe, efficient and high quality trans-ocean transportation possibilities to its industry. Customers are therefore asking for complementary possibilities for transhipment in the BSR. Further development of the existing transhipment ports in Göteborg and Aarhus as North Sea Baltic Hubs can reduce the pressure on congested European ports.

Preconditions for an NSBHub

In order to position the ports of Göteborg and Aarhus as NSBHubs it requires a larger market potential in a wider catchment area than the respective domestic markets to generate a critical container turn over with respect to deep sea calls. Shipping lines choice of port of call does however depend on a variety of

interrelated factors. It is the objective of the NSBHub project to identify and investigate these factors to present a competitive NSBHub transport system offering the BSR cost efficient transhipment solutions.

Transhipment in the BSR

The end result of the project will provide a consistent basis for shipping lines to evaluate alternative shipping routes and related hub and spoke ports. This is also the case for the concerned transhipment and feeder ports, regions and infrastructure providers in the BSR to evaluate upcoming investment needs and strategic impacts. There is a need for a comprehensive information and overview of the expected future development to verify or reject statements calling for additional Baltic/Scandinavian transhipment capacity.

The aim of this project has been to create a concept for commercial as well as political decisions fostering the development of a North Sea Baltic Hub. This report gives a coherent view of the market for containerized transhipment flows in the Baltic Sea Region. Although that there are difficulties concerning the transparency of the market at hand is this report a platform for further actions.

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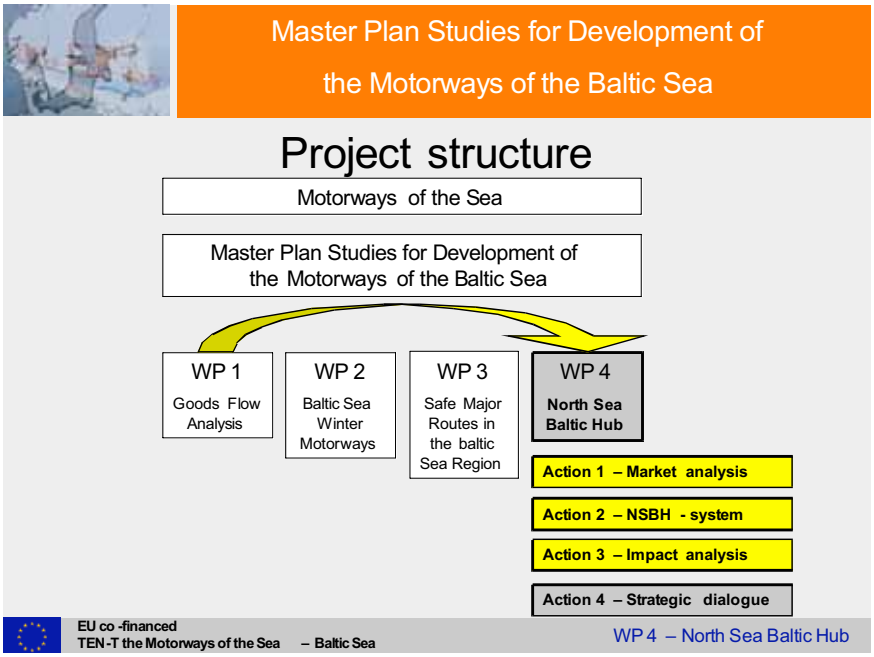
Summary

This report is the result of Work Package 4 in the Master Plan Studies for Development of the Motorways of the Baltic Sea as illustrated below. The report covers Action 1-3 in the Work Package. The report draws upon general findings about goods flows and trade from work package 1 and input from the strategic dialogue with actors carried out in WP 4, Action 4. This report gives a comprehensive view of the conditions for using containerised shipments and how that service is organised within the Baltic sea region.



In the *first chapter* the general container market is presented. That includes the cargo, the market structure, the fleet development, the prices and rates, ports and terminals and the customer demands. The latter is gone through via an expose over the Finnish and Russian market since the former has very high demands and the latter is the most promising one for the future.

- In chapter one the most important point is that the market for container transports will continue to grow world wide since the tonnage to transport containers already has been bought and the large operators will put it to use. This means that the container will continue to attract cargo from not yet containerised goods.

In *chapter two*, the current flow of containers in the North Sea Baltic Region is described. The vessels that have been used in the provision of the transport services have been identified and the traffic has been mapped.

- The most important findings are that Hamburg and Bremerhaven are the two most used transit ports and that Unifeeder, Team Lines, Finnlines and Maersk are the dominant service providers having three quarters of the capacity.

Chapter three describes the North Europe shipping profile when it comes to strategies, location of companies and the choice of tonnage. Special implications for operations in the Baltic are highlighted as for instance ice. Impact from the container traffic in terms of logistic pros and cons are given along with effects on the environment.

- Important findings are that the current services have high frequency, the destination decides the choice of transhipment hub and that "Old habits die hard". Also important is that the deep sea operators safe-guard the feeder operations and that new hubs cannot afford cost disadvantages.

Chapter four is a thorough overview and benchmarking exercise as regards the spoke ports in the area, when it comes to volumes, lead times and frequency and reliability.

- Two things are striking when it comes to the conditions that the different spoke ports operate in. The Finnish ports have not just icier conditions than the others (except St Petersburg) they also have the highest charges for fairway dues all the year around. The highest port dues are found in St Petersburg where everything is rather slow and expensive.

In *chapter five* the North Sea Baltic Hub model is tested and calculated and factors having an impact on the idea as such are presented. Factors that come under scrutiny include port turn around times, time charter and bunker costs. This is allocated and discussed for both feeders and deep sea ships.

- The conclusion is that if the amount of cargo carried to the hub port is sufficient, it would be cost effective to allocate a hub in the Baltic area. This highlights that the volumes is a key factor.

Chapter six deals with economic growth and trade assumptions inherited from the Work Package 1 which then is transformed to a detailed growth scenario regarding TEU in the Baltic Sea in the year 2020.

- The most important conclusion is that in the base case the volumes of currently 6 million TEU in the NSBHub area will grow to 20 million in the year of 2020.

Chapter seven is a brief SWOT analysis of the ports of Aarhus, Göteborg and Helsinki. The different ports strengths, weaknesses, opportunities and threats have been judged. In the cases of Aarhus and Göteborg from transhipment point of view and the Port of Helsinki from a feeder port perspective.

Following the SWOT analysis, chapter 8 gives an impact analysis where both the growing volumes and the SWOT are taken into account and action points for the different ports are set up.

For Aarhus to become a hub port the action points are;

- Highlight the competitiveness of the port; cost and efficiency wise.
- Underline the supplementary features with the Port of Göteborg.
- Stress the quick port turnaround times which enable an attractive schedule.
- Look for synergies including the Port of Gdansk.
- Market the ability to combine feeder and short sea cargo at the same location in the port, which increases potential cargo volumes.

For Göteborg to become a hub port the action points are;

- Allocate efforts to continue to expand the already extensive rail network service.
- Review the pricing policy and consider making it more transparent.

- Given the new equipment, the port should be able to show world class performance in efficiency; this should be monitored and highlighted externally.
- Look for synergies including the Port of Gdansk.
- Consider the landlord alternative.
- Market the ability to combine feeder and short sea cargo at the same location in the port, which increases potential cargo volumes.

For the port of Helsinki the action points are;

- Cement the relationship with the Finnish industry; make full use of the opportunities that the new hinterland connections from Vuosaari offer to integrate into the industries' supply chains.
- Market the capabilities of the new logistic centre. Focus on major multi-national enterprises that are targeting the Russian market.
- Work with the Finnish authorities to lower the level of fairway dues.

Finally the *appendix 1* comprises a thorough presentation of the ports of relevance from a North Sea Baltic Hub point of view.

- Russia and other CIS countries have severe problems with import capacity. Most ports outside these countries have made extensive investments to meet with demand for growing volumes.


3

1 Container market overview and trends

SUMMARY

- **Containerisation of general cargo, a driver for welfare in the entire industrialized world**
- **Deep sea freight rates constantly under pressure**
- **Over supply of deep sea capacity in the near term ensures continued pressure on freight rates**
- **Containerisation of general cargo will continue**

1.1 The containerised cargo

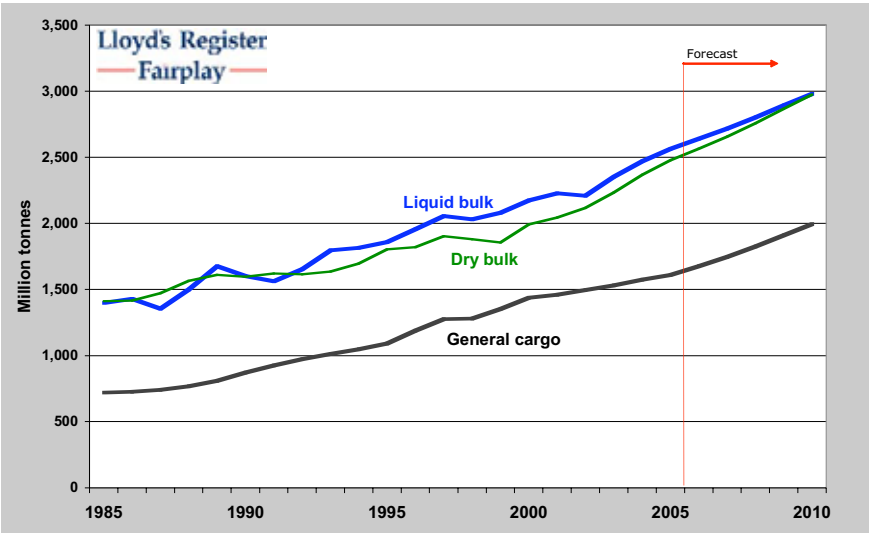
The container as a transporting unit has opened up new markets for many companies all around the globe. The attraction of sending batches of containers to almost any remote place on Earth at a decent cost rather than having to charter an entire ship, which obviously craves a lot larger volumes, goes a long way in explaining the success of the containerised system.

A substantial part of the containers in circulation are run by the large container line operators. Still, there are important volumes of containers owned by the shippers that are being handled in the same network.

Figure 1 below displays the development of the transoceanic trade. The bulk volumes dominate clearly accounting for some ¾ of the tonnes of goods carried in deep sea trade. Early estimates amount to about Bn6.9 tonnes carried in deep sea trades 2006, whereof Bn2.6 tonnes of liquid bulks, a little less major dry bulks and about Bn1.7 tonnes of general cargo.

Trade grows steadily over time, which the illustration highlights. It should be noted that trade normally grows even in periods of business contraction, however at a lower pace. It takes major recessions to produce negative growth in trade.

Figure 1: *Total world seaborne deep sea trade, million tonnes*

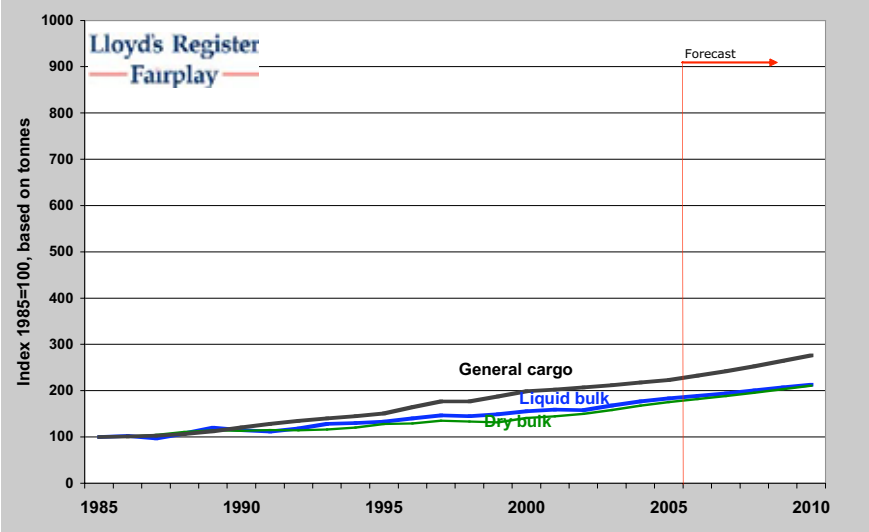


Over the 1985-2004 period, average annual growth in seaborne trade was 3.4% based on tonnes carried. Figure 2 illustrates the indexed development over that

period for liquid bulk, dry bulk and general cargo. As the figure illustrates, general cargo has on average grown at a rate twice as high as those for liquid and dry bulks.

General cargo includes minor bulk cargoes, vehicles, palletised and containerised cargo to mention the major categories.

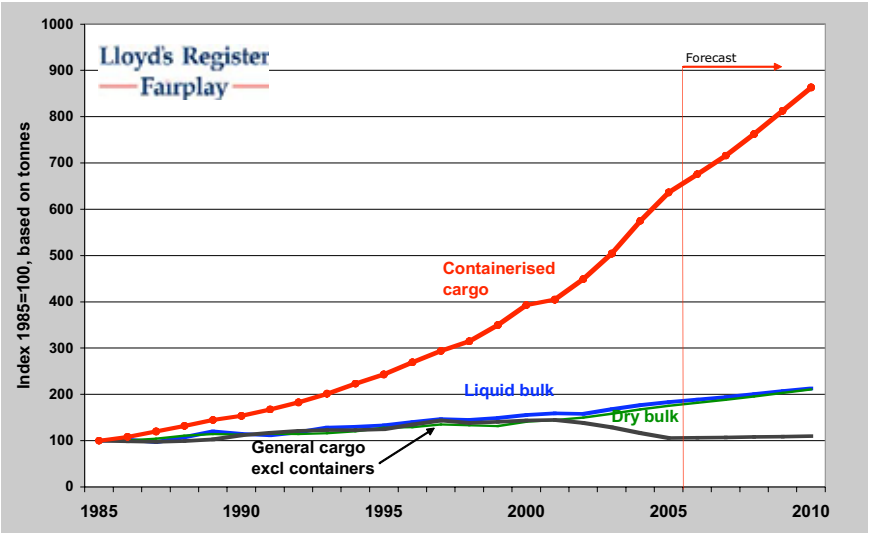
Figure 2: *Total world seaborne deep sea trade, million tonnes, index: 1985=100*



In the following graph, containerised trade has been extracted from the general cargo curve. The effect is striking; over the entire period containerised trade has grown at an average annual rate of ten per cent. Meanwhile has the general cargo category excluding containers hardly grown at all and over the last three years it has decreased significantly. These diverging developments are of course interlinked. The container has taken over a substantial part of shipments from the general cargo vessel segment and general cargo ships are today rarely employed in deep sea operations.

It should however be emphasized that general cargo vessels fulfil a very important feedering function, particularly in the Far East, but also in the Baltic.

Figure 3: *Total world seaborne deep sea trade, index: 1985=100, container separated*

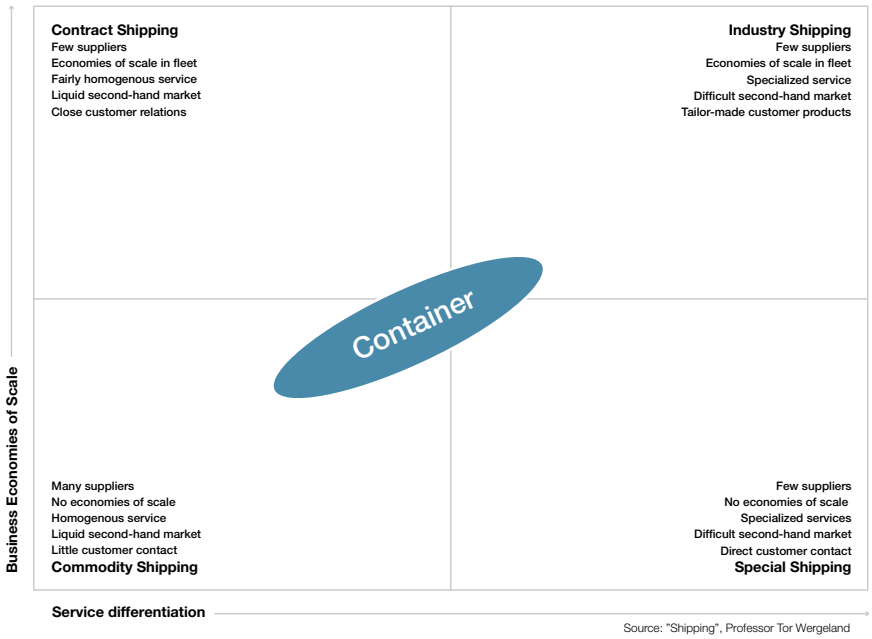


1.2 **The market structure**

The container shipping business is truly an international business and the decisions from the world wide operators affect the stream and pattern of the flow of containers all around the world. Therefore it is crucial to at least have basic knowledge of that industry and where it is today – 50 years after the seaborne container was introduced.

The strategic positioning of the container sector is illustrated in Figure 4. As for most segments, the situation is dynamic and container ship operations are moving in two directions; towards a commodity-like operation and towards a more industrialised one.

Figure 4: *Strategic types of shipping*



Source: "Shipping", Professor Tor Wergeland

Since the early 1990s, a major change has occurred in the ownership structure of the global container ship fleet. Whereas in the past major liner operators would mostly own and manage their own fleet, but with some reliance on the charter market for smaller classes of ships, during the past 10 years all operators in the so-called 'Top 20' fleets have increasingly moved towards using a greater share of chartered tonnage to expand their fleets. As the container ship sector reaches a certain level of maturity a typical pattern has emerged, where the "average" current policy is to have an owned/managed fleet providing about half its operating capacity, with the owned portion of the fleet concentrated on larger classes of vessel serving in the major east/west trades.

This shift has coincided with the liner operators' desire to move away from offering a simple quay/quay service to their shipper clients and instead to offer a complete logistics service, making use of sophisticated and expensive IT systems. Whether this policy has been successful is open to question, given liner operators' relatively poor financial results during the past 10 years. It has probably helped to secure many business deals, however.

In order to take advantage of KG financing, some operators have set up a German-based ship management division to operate newbuildings currently under construction.

Other measures have been to sell and charter back ships, mostly on long-term deals of up to seven years. This effectively ensures the ships are transferred 'off-balance sheet', which will enable the company to adjust its capital gearing, useful as a means of attracting future equity funding. Such moves are becoming more common in the container ship sector as returns on investment have continued to decline.

In the container carrier market, the Maersk and P&O Nedlloyd deal that resulted in a single company called Maersk Line (Figure 5), has triggered reactions from other companies. The remaining actors in the Grand Alliance – NYK, Hapag-Lloyd, OOCL and MISC – have since approached the New World Alliance members Hyundai Merchant Marine, MOL and APL. They have decided to co-operate and exchange slots at their Asia-Europe and Asia-Mediterranean trades.

Both alliances claim that this is not a first step to another larger alliance and that is probably wise since that would trigger action by competition authorities in all parts of the world. However, the moves made underline that we can expect further restructuring on the operator side going towards larger entities on the trans-oceanic trades in the future. The question is not if new mergers will occur, but when and which companies will be involved.

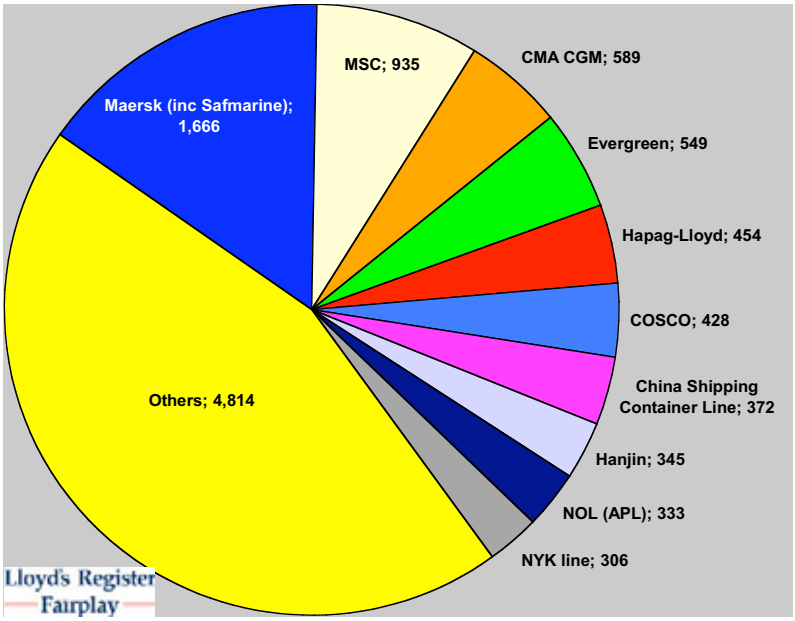
We have stated previously that structural changes must occur in the container carrier sector and in the last years we have witnessed CMA CGM buying French rival Delmas and Hapag-Lloyd buying CP Ships via its parent company TUI.

The deals have also resulted in other actions by various carriers, for example CMA CGM trying to unload some of its newbuildings to finance its buyout and the withdrawal from alliances of P&O Nedlloyd.

Within the container shipping segment, Maersk (including Safmarine) operates a fleet of about 1.7M TEU. This would give Maersk a 15% share if the TEU capacity in the general cargo sector is included. Without the general cargo carriers, Maersk's share increases to 18%. Some sources report a higher figure due to a higher estimated TEU capacity on Maersk's vessels.

Mediterranean Shipping Co (MSC) is the second- largest boxship operator and CMA-CGM the third.

Figure 5: *Major operators of the container carrying fleet based on TEU.*



The ongoing trend for consolidation in the container market for the large deep-sea operating companies has also reached the feeder market. Apart from the dedicated feeder services set up by the majors, the smaller specialised feeder companies have started to buy each other up, especially in Europe. Recent deals include Eimskip of Iceland's acquisition of a 65% stake in Finnish feeder specialist Containerships Ltd Oy, to be integrated with Kursiu Linija, a Lithuanian feeder company that Eimskip bought in the summer.

Other deals have been Finnlines' sale of Team Lines to Belgium's Delphis, and DFDS's acquisition of Norfolk Line's container shipping operations. The Grimaldi Group has strengthened its control over Finnlines Plc.

Commenting on these affairs, the head of sea freight at logistics specialist Schenker told *Fairplay* that shipping companies must work harder to get cargo closer to customers.

- This leads us to wonder when logistics companies such as Schenker or TNT will take over the feeder companies themselves – a logical step in gaining control over a larger part of the transport chain.

Feeder operators that are independent in the sense that they are not attached to any of the large deepsea operators continuously revise their feeder network to match cargo flows, ie demand. These smaller operators are trading in a market with sharply growing container flows and a modest supply of new tonnage, which has led to really good feeder margins, especially in northern Europe in recent years.

The liner conferences used by some container operators have been under scrutiny by many governments over the past decade, with the EU Commission in the forefront. The mergers and acquisitions within the industry will render the conferences obsolete. However, many operators still believe they are a good thing, which is debatable, but nevertheless the Singapore government has recently prolonged their grace period by another five years. Concurrently, Australian competition regulators stated that they did not find shipping conferences violating any regulations. However, they urged shipper and liner bodies to better manage confidential information required for negotiations under Part X of Australia's Trade Practices Act.

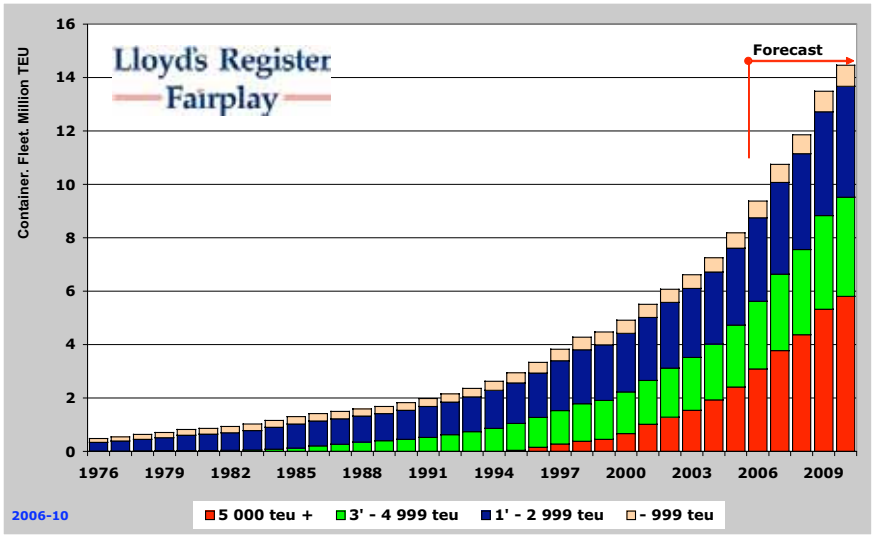
In Europe however, the conferences looks doomed in the long run.

1.3 **The fleet development**

In October 2006 the container fleet passed 9M TEU capacity and stands at 9.162M TEU. This year has so far seen an increase by almost 1M TEU, or 256 ships.

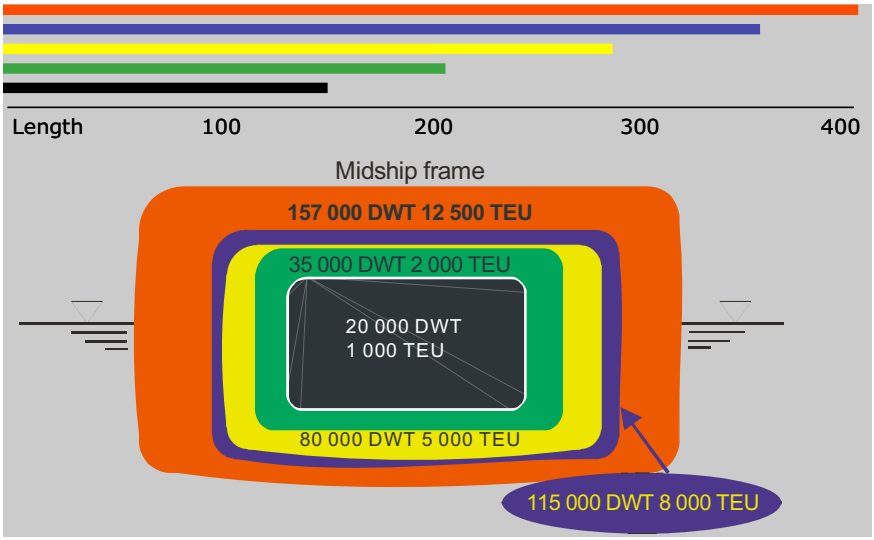
As Figure 6 illustrates, the forecast for fleet growth in the period up until 2010 predicts a continuing extremely high growth, with an annual average of 12%. The largest sector has an increase of no less than 19% yearly.

Figure 6: *Container fleet, thousand TEU*



The delivery of the 157,000 dwt *Emma Maersk* marked the first of a fleet of at least eight ships of that size class (12,508 TEU according to our register; somewhat higher or 13,500 TEU according to others). Regardless of the exact size, these new ships will put ports around the world to the test, and the question is how other ship owners will react – do they dare *not* to order ships of this size themselves?

Figure 7: *Large containership development*



According to Eiving Kolding, head of Maersk's container business division, "ships like this benefit our customers", emphasising that the benefits come from economies of scale they were still able to achieve. As regards the eventual problems in ports, Maersk's or rather its parent company AP Møller's solution is to buy the terminals themselves, thus we should expect them to be able to cope with these new ships.

However, forecasting new contracts within the container market becomes very difficult, as we find there is enough tonnage on the market and thus expect the coming years to show fewer orders than the last three. But as there is a distinct possibility that other large companies will follow Maersk and order *Emma* "look-alikes", this rather modest forecast could prove very wrong. Thus this development should be closely monitored. We believe that if one of the other majors

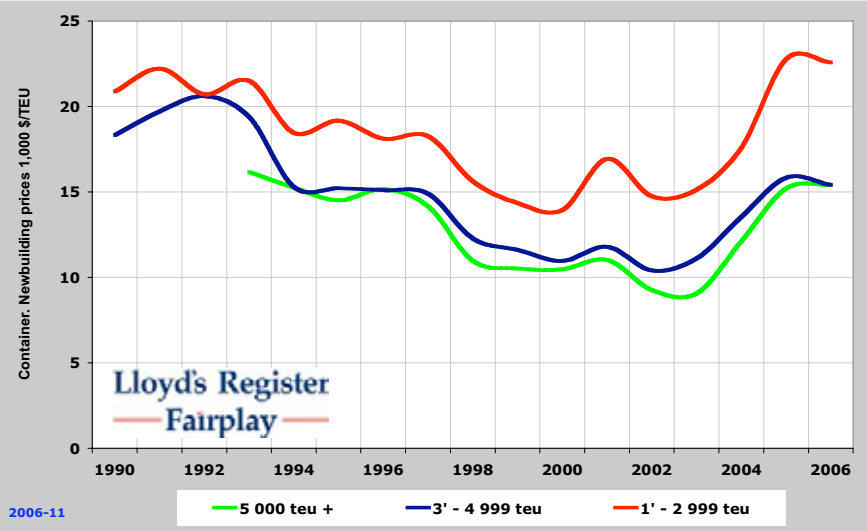
starts the spending spree, others will follow – even if freight rates do not justify the investments – or maybe exactly for that reason. If someone has cheaper capacity on the market, the price tends to fall by the day.

However, we think the market will behave and thus have a modest contracting outlook until 2010, at 1,467 ships, 20% less than in the previous five years. In TEU the corresponding ordering figures are 4.5M, 28% lower than in the last five years. We anticipate that the orders will actually increase by 6% in the below 1,000 TEU segment.

1.4 **Ship prices and freight rates**

The price in 2006 measured per TEU in all the size classes have stagnated at 2005 years level. Much of the explanation for this is the fact that every year the new vessels within in each size class are somewhat larger than before. As Figure 8 shows, the price increases for newbuildings cooled off in 2006. The indicator for SH10 in 2006 is based on one 1,042 TEU vessel which pushes the price per TEU upwards to a less representative level.

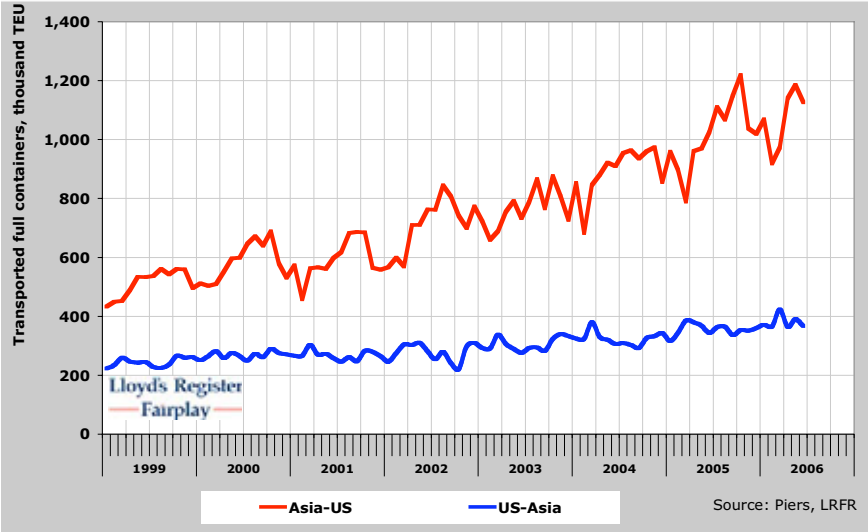
Figure 8: *Container prices per TEU*



The introduction of new shipyard capacity coupled with deteriorating markets in many shipping sectors will probably mean that deals closed in 2007 will be done at lower price levels than those in 2005. Adding to this is that much of the new capacity stems from China and rest of the world, all of which already have a lower price picture.

The main container freight route is Asia-US, featured in Figure 9. Until December 2002 the increase in trade averaged around 5,500 TEU per month, but since then the monthly growth has been nearly twice as high, at 10,000 TEU.

Figure 9: *Asia – US trade with filled containers, TEU*

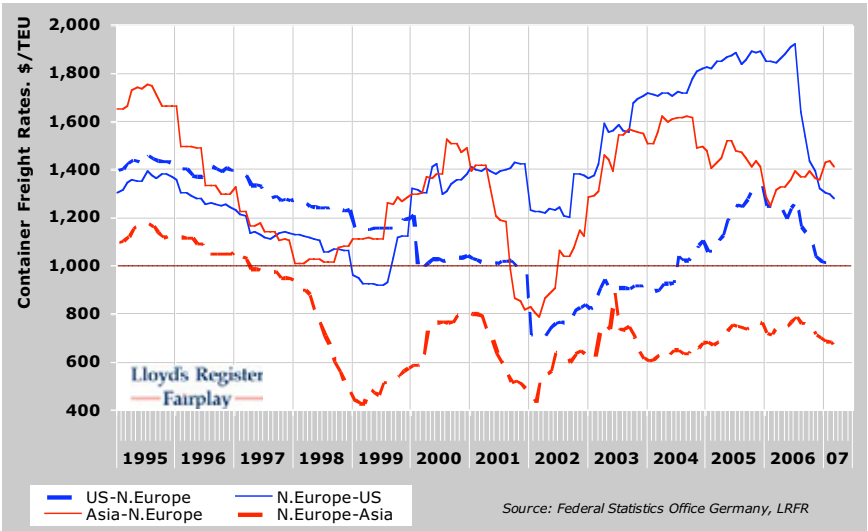


Jørgen Engell, executive VP of AP Møller-Mærsk Group, told a conference in Hamburg in September that the Maersk view was that the growth in demand for container transport is expected to slow down from the current 10% a year to 8% in 2007 and 2008, certainly lower than the expected fleet growth of 14% (2006), 15% (2007) and 11% (2008).

He continued by calling the description of the container supply/demand balance as "finely balanced", given by Howe Robinson MD Peter Kerr-Dineen, was overly optimistic, and emphasised that demand is clearly lagging behind supply. Engell then continued with the warning (or opportunity) that the market is about to face consolidation "the hard way", with operators being forced out of business.

The container freight index in Figure 10 shows that price levels have fallen in the Asia-Europe trade in recent years, while those for the opposite direction have fared better.

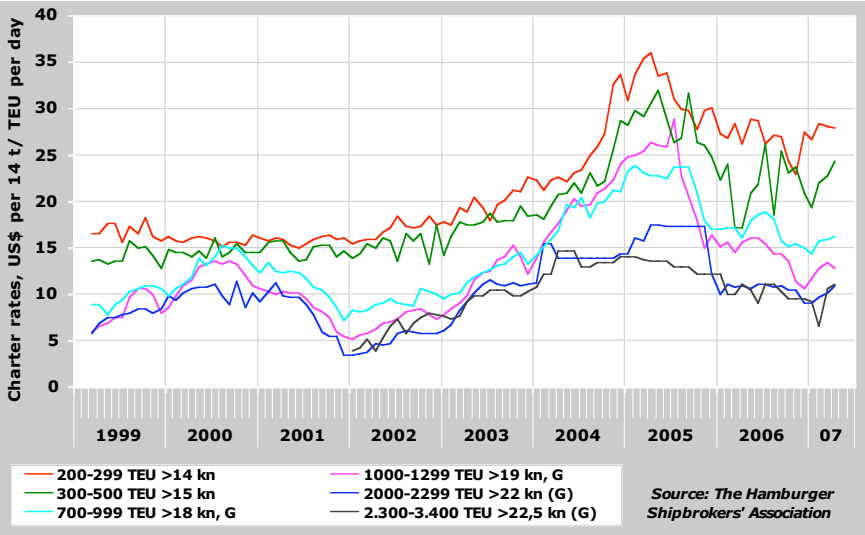
Figure 10: *Container freight index*



Charter rates (Figure 11) increased dramatically between early 2002 and mid-2005 as demand for capacity was outstripping supply, leading to high charter rates. After the peak in May the rates started to fall, and during November they plunged before stabilising in mid-December. There was not much unemployed

tonnage left for 2006 compared to the overall fleet. Because operators have been securing tonnage well in advance of the peak season, availability of large ships for charter remained tight up to that season. Ships of more than 3,000 TEU were as scarce as they were two years before.

Figure 11: *Container ship charter rates*



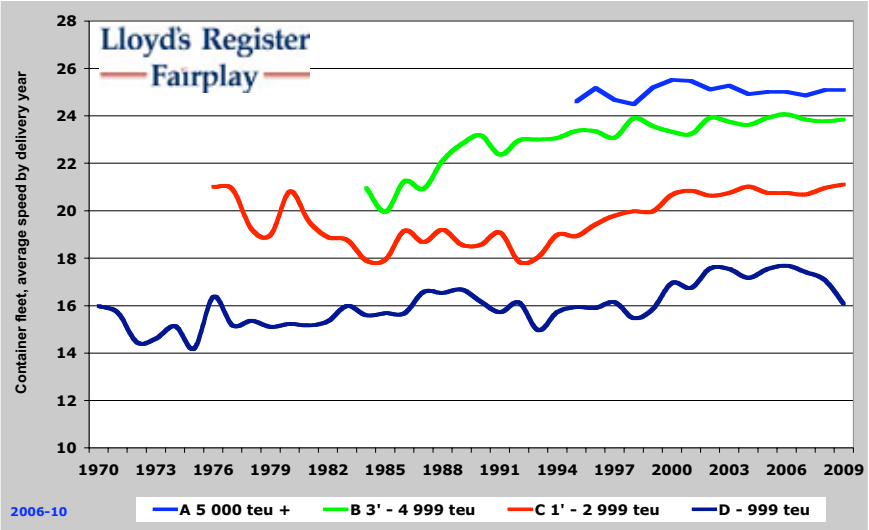
Charter rates therefore firmed during summer 2006, at levels significantly lower than last year, but still above the previous records. In the later part of the peak season, which lasts until September-October, a lot of goods are shipped from Asia to the US and Europe for the Christmas and New Year period of high consumption. When demand softens to its seasonal lows, the market will start to feel the full impact of the expected wave of newbuilding deliveries.

Combined with an increasing number of ships coming out of charter in the autumn, the number of new vessels coming out of the yards is creating a considerable number of ships that the market must absorb.

The average speed of the container ships delivered to the world fleet every year since 1970 according to their size class is illustrated in Figure 12. The norm for the last 20 years has been: the larger the ship, the faster. However, this development has started to fade in the sector above 5,000 TEU, where the sizes have increased rapidly but without increasing speed.

- Given the fleet growth in the near future combined with high fuel costs, the future may very well show that the ships will not actually use their speed potential.

Figure 12: *Speed development for deliveries*



Dr Hermann Klein, executive board member of Germanischer Lloyd, gave a hint in this direction at the SMM exhibition in Hamburg where he presented figures of optimum ship speeds and fleet sizes in respect of future fuel price rises. He predicted that, at $400/tonne, optimum speeds would be as low as 18kt, with correspondingly larger fleets to maintain capacity. He also thought that the fleet would be subject to an emission levy from 2013 onwards, following revision of the Kyoto agreement in which he thought shipping would be included. This would certainly be a way for operators to absorb the excess tonnage.

Another sign of this development came in mid-October, when the operators forming the Grand Alliance (Hapag Lloyd, NYK, OOCL and MISC) announced that they are to add a ninth vessel to their Asia-North Europe EU2 loop from early 2007 in an attempt to raise service quality and customer satisfaction. The investment will not entail additional capacity on that trade, but will enable the lines to guarantee the advertised transit times, explained Hapag Lloyd press officer Klaus Heims.

- Although slow steaming may be expected and thus absorb some tonnage, our forecast points to a modest-to-poor development for both freight rates and charter rates in the next three years, given the enormous supply of new ships to come. The rates will be hovering around break-even if not worse.
- Compensated for higher bunkering cost, this effectively means levels around those of 2001.

1.5 **Ports and terminals**

The capacity restraints capacity in north European container terminals got underpinned by a recent study from Drewry Shipping Consultants which forecast that port throughput would grow by seven per cent a year between 2006 and 2010 but terminal capacity growth would increase by only 5.4%. Governments and environmentalists are blocking the investment that private companies are willing to make and the governments are not investing themselves.

In Europe and the US, new berth and terminal developments are often halted on environmental or other grounds. It is therefore noteworthy that Maasvlakte 2 in Rotterdam finally seems to have been granted approval. However by improving efficiency in existing terminals wonders could be made. One example of this is that only two years after the major incidents of congestion seen in LA/Long Beach,

the US National Retail Federation is forecasting only "little or no network congestion" in the 2006 peak season. This comes without any significant port investment, but rather just by optimising use of the existing infrastructure. This despite the expected 20% increase in container throughput above the 2004 level.

In China there seem to be fewer problems on the terminal side. According to Zhouxiang Lu, second secretary at the Chinese embassy in London, the country's 11th Five Year Plan to 2010 contains approval for the construction of 156 new deepwater container berths. Problems do exist for Chinese container handling, but almost exclusively on the land side and not in the ports themselves. According to Kenneth Tse, head of Yantian International Container Terminals, the antiquated rail system, old small roads and bureaucracy are hindering efficiency at the country's fastest-growing facilities: Shekou, Chiwan and Yantian at Shenzhen. Given the Chinese approach to such matters we sincerely believe that they will solve the problems before they will be solved in the western world though.

Ports, especially those handling containers, are attracting increasing attention, as the fleet and container volumes grow by the day. It is therefore no surprise that investors are bidding for port operators. In the last years we have seen numerous mergers and take overs in the business. Also general investors have tried to take their share, even though the Goldman Sachs-led consortium was let down in its efforts to take over Associated British Ports.

Port operations still seem to be a profitable business, especially if Hutchison, the largest container terminal operator, is the benchmark. Current investment plans are still heavy with large stakes in two Chinese terminals (Yantian and Gaolan in Zhuhai), three European (Rotterdam, Felixstowe and Barcelona), one in Panama, one in Laem Chabang in Thailand and one in Oman.

Impressive of course – but is there room for the smaller ones to make a profit as well? For the time being we think the answer is yes but in view of the deteriorating situation for ship operators, the pressure on ports will be mounting. Nevertheless, seaborne volumes and traffic are set to increase significantly.

The struggle by transhipment ports to become large players gets more intense by the year. The ability to offer a total integrated service, incorporating two or more ports on a route, has developed into a strong competitive feature.

DP World has now stepped up to third place in the world ranking of port operators, behind PSA and Hutchison Port Holdings. DP World's takeover of P&O Ports raised security concerns in the US. The Brittish company managed six ports in the US and many Americans led by Senator Hilary Clinton objected strongly when President Bush accepted that these where to be owned by a United Arab Emirates (UAE) state company. The turmoil seriously hit the Presidents ratings and thus he may have been relieved when DP World announced that they decided to sell the six port operations. However, the actions from (mostly) democrats in the house have seriously given the US a negative aura when it comes to their view of even the most US friendly country or as General John Abizaid, the commander of the American forces in the Middle East, said about the ones opposing the deal – it "really comes down to Arab- and Muslim-bashing that was totally unnecessary."

In the aftermath of the above deal PSA International, the loser in the battle for P&O Ports; has bought 20% of the port portfolio of the largest operator on the container port market; Hutchinson Whampoa Ltd, for $4.4Bn.

In Russia, state rail operator RZD is looking to acquire ports to integrate them into the rail logistics network. CEO Vladimir Yakunin stated: "We are

negotiating for the purchase of stock in the share capital of [several] ports". That could make sense in terms of containers, but the statement also covered oil terminals, which was more surprising. Some observers think RZD will be used to recover the ports and terminals that have been partly privatised, for instance Novorossiysk reverting to be a state-owned facility – however, property rights are not the current Russian government's biggest strength.

On the more general side the EU Ports Directive may be on its way up on the agenda for a third time. Speaking to Fairplay, European Commission director of maritime policy Fotis Karamitsos said that the industry "could see something on port services after summer". Given the two past attempts, we certainly hope that the commissioner does a better job this time around, as Europe actually needs a port directive, and it should be a stringent one without too many compromises. The ports sector is one of the least developed in numerous locations throughout Europe, and those standing to lose the most are the citizens of Europe.

1.6 **Customer demands**

We have chosen to illustrate customer demands from a Finnish and Russian industrial perspective, mostly because the latter forms the largest potential market and the former one of the most demanding.

In the customers perspective the container industry can compete with trailers or flights with the price offered compared to the speed of delivery. This gives that break points exist when the distance is short enough for the trailers to be a realistic alternative.

From parts of the Mediterranean region, it takes a container about a week more to reach Finland than what it takes for a trailer to do the same, but as the freight is about €1,000 cheaper, the balance tilts in the favour of sea freight in most cases. Container and ship are the most obvious choice in cargo to and from Italy and Turkey, while trailers offer roughly an equal competition for parts of France and Spain, while the situation is worst for container trades in other parts of Western Europe.

Kim Metso, sea freight product manager at Schenker Oy, part of the German-owned freight forwarding group Schenker Logistics, says that "Trailers dominate the European business. The combined volume of sea and air freight is maximum 10% of that of the trailer business," he said. Sea freight to Germany, France and Spain is slightly cheaper than trailer freight, but much slower, which is the key reason why sea freight has a small market share. "With little volume, there is no initiative to set up shipping services."

Although Finland has a surplus in its trade with other countries in terms of value of goods, the country imports e.g. consumer goods that are or could be imported in containers in large volumes. The question whether a consignment will arrive in a container or in a trailer depends on a number of factors, according to two officials holding senior positions in the logistics operations at a major retail group. It was agreed during the interview that their names or that of the company would not be disclosed as the company policy dictates that only the group ceo talk to the media.

The location from where the consignment will leave is a core issue when the company decides which mode of transport to use. Containers have an advantage over trailers from Turkey and Italy, but they can also come to question from coastal areas of Germany, the Benelux countries, Spain and Portugal. If the cargo

comes from an area that is quite far from the coast, such as the Ruhr area of Germany or the Paris region in France, trailers are the number one choice. Meanwhile, there is a clear trend towards 40 and 45 foot containers instead of 20 foot ones due to volume growth.

From Northern Italy, the company often sends containers by rail to Rotterdam, from where they will be sent by sea to Finland. In case of the southern part of Italy, sea freight all the way becomes a more viable option. However, every container that the company books must be full of goods as it never uses boxes for less than container loads (LCL); in case of small volumes trailers become the obvious choice.

The two point out that time is an important factor in the choice of mode of transport and here container shipping suffers from rather long times boxes spend in hub ports, such as Hamburg. Finland is "a backyard to shipping lines," according to one of the officials, who said that feeder ship timetables take poorly into account the needs of importers. A feeder may have left Rotterdam or Hamburg on Thursday while a ship from the Mediterranean or a deep sea origin with cargo for the company will arrive the following day. This often leads to a six day wait before the containers of the company will resume their voyage.

A gradual introduction of faster feeder vessels may alleviate the situation, but nevertheless the schedules of feeders are geared mainly to serve the export industries such as paper makers, who ship large volumes. In the past, some ships called at St Petersburg first before a call in Finland, which further increased the lead time a box would require to reach the company from a hub in the continent. However, this situation has improved in recent times.

However, the six day wait in a hub port means that it will take 21 days to get a container from the Mediterranean all the way by sea against some 14 if a feeder connection was available without a wait of almost a week.

The company, which imports in the region of 10,000 containers a year, is in "constant talks" with the Finnish agents of container shipping lines to discuss the issues of port rotation and timetables. However, these talks rarely lead to major improvements in service as in the case of feeders operated by majors the decisions are made at regional or corporate headquarter levels of these carriers. They need to link each feeder service with their deep sea and e.g. Mediterranean services to and from European hub ports with an aim to optimise timetables in a broad context.

- Independent feeder operators tend to have a higher frequency of service from the hubs in the continent than those operated by deep sea carriers.

The road tolls introduced in Germany for lorries that pass through the country have not made the use of trailers less interesting, but it has increased the appeal of intermodal transport, whereby a trailer from Northern Italy is carried most of the land journey by rail. The toll charge is €130 for a lorry that travels through Germany from south to north and its introduction led to a small increase in railway fares for the carriage of trailers.

A retail group imports lots of goods that are sensitive to cold, which means that the goods should travel in containers under deck in the winter to prevent the goods from freezing. Once the ship reaches port, the container should be moved immediately after discharge from the ship to a heated slot where freezing of the goods inside will not occur. In the winter of 2005/06 the company experienced "a disaster" with the Port of Helsinki as obtaining heated slots turned difficult: they were frequently booked by export industries and the company had to enter

in stiff negotiations to secure an adequate number of heated slots. In the past, there have been problems with some ships in this respect as well, but in more recent times the vessels trading to Finland have had more adequate numbers of heated slots or under deck capacity to overcome the issue.

"The needs of importers have been little noticed as all focus has been on manufacturing and exports," says Jouko Nieminen, md of Intrade Partners Oy. The company is part of the retailing, hotels and restaurant group SOK and Intrade is in charge of the imports of non-food product lines that range from cosmetics to garden furniture. The company's turnover is budgeted at €597M this year and it employs a staff of 240.

There has been a switch in the focus of imports in the past decade in favour of Asia, which is now the origin of some 40% of the goods Intrade imports against 20% a decade earlier. At the same time, European manufacturers and producers have seen a reduction in their share to 60% from 80%. The trend of greater focus on Asia has increased the use of containers at the expense of trailers, although trailers are still the backbone of imports from countries surrounding the Baltic Sea. In imports from Asia, the company sometimes has LCL (Less than Container Loads), from which the cargo is transferred to a container heading to Finland that also includes goods going to other recipients. These boxes normally arrive from Asia to Hamburg or Bremerhaven, where transfer of the goods also takes place.

Intrade did use the Trans Siberian Railway to import cargo from the Far East until a sharp increase in freight made the option economically unviable at the beginning of this year. Concerns about the security of cargo also started to mount. But the rail link is much faster than sea connection, which makes Nieminen to conclude that he "would absolutely use it again" if the security and price issues were solved in a satisfactory way.

One of the major problems faced is the Russian customs clearance procedure, a function that seems to have many dimensions. The clearance is obviously a matter of trust where, as an example, double invoicing is a common issue of trading. The shipper knows it and the customs knows it but cannot and have not proper tools to prohibit the phenomena. In Russia actions to prevent from these type of frauds in trading must be taken by the government and until then there is no possibility to improve the situation. The phenomena as such will not change if the port capacity inside of Russia is improved it will only move the queues from the roads to the terminals, hence increasing the demand for space in the terminals.

The Russian demand of products is enormous and the cargo handling capacity has to be solved in one way or another if the situation will not continue to change to the worse. The high value cargo is transited over Finland.

Substantial price increases, poor time keeping and security concerns have greatly reduced the container traffic on the Trans-Siberian railway which has also affected trans-shipment of boxes via ports in Finland.

"At the start of the year, the Russian railway company increased its tariff substantially, by about $1,000 per box, which is more than 30%," said Seppo Herrala, md of Port of Hamina in Finland. Security of the cargo on the service has declined despite security fees that were introduced before the latest price increase and the time keeping of the train service has deteriorated as well, Herrala told Fairplay.

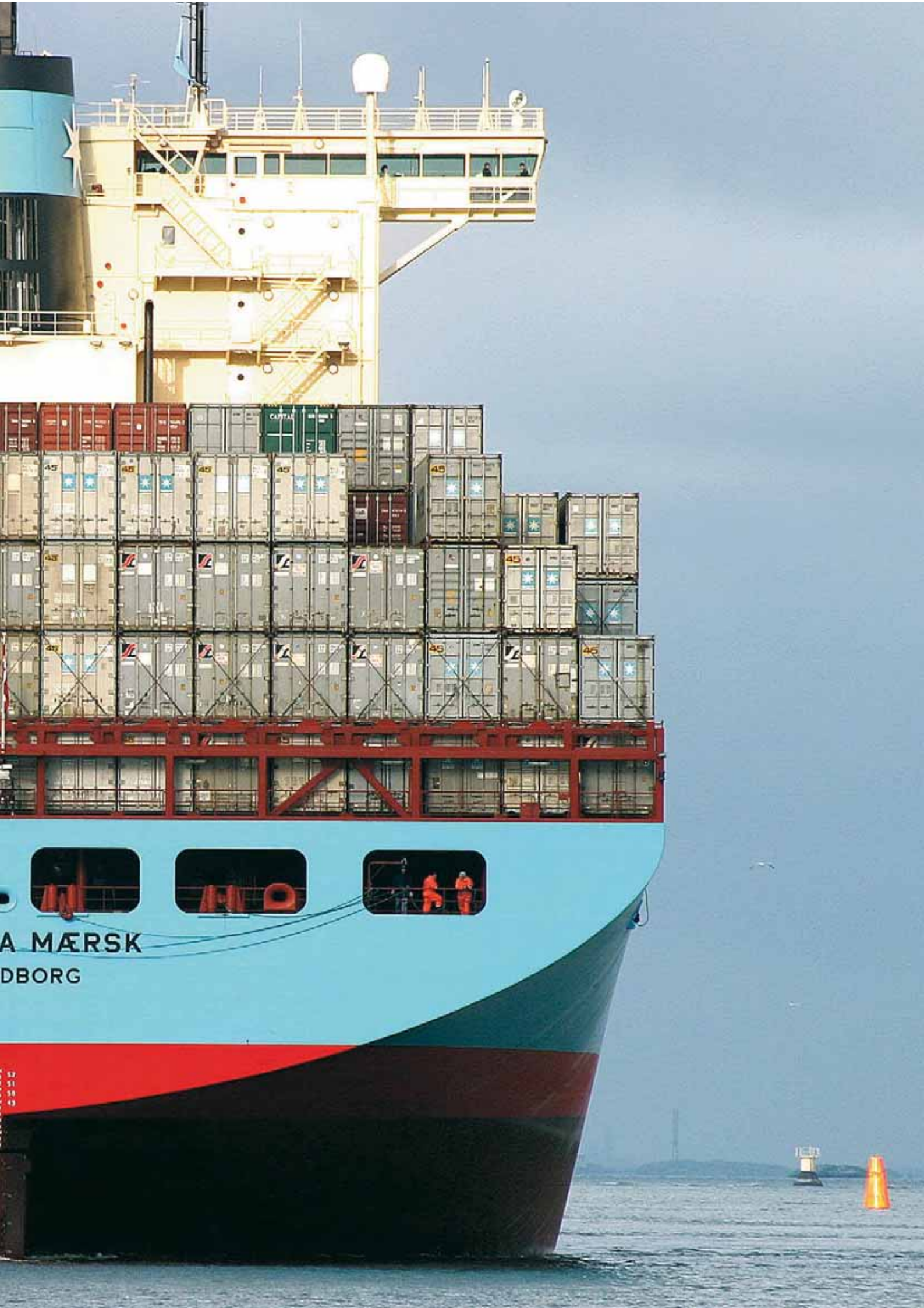
"Cargo owners in Asia started to switch shipments to sea already in the summer. At the moment, container traffic on the Trans-Siberian railway is very quiet or at a standstill," he continued. In 2005, Finnish ports handled 98,000 TEU of

cargo connected with the rail link, a drop from 151,000 TEU in the previous year. Hamina has handled about 50% of this volume, Herrala said.

Dr Erkki Hamalainen, research director at Kymenlaakso University of Applied Sciences in Finland, sees the problem that has arisen at the Trans-Siberian Railway as damaging in the short term, but the link retains a huge potential to transport cargo between the Far East and Europe. The price increase of more than 30% introduced early this year was about 3 times the average of the past several years – the figure has stood in the region of 12% – and the reaction from shippers was prompt and severe: in January and February, container shipments came to a virtual halt. Price clearly matters

A block train of more than 50 wagons each loaded with a 40 ft container (100 TEU) will reach Kouvola in Finland, the western terminus of the link, 10 to 14 days after it has departed Vostochny near Vladivostok in the Russian Far East. This compares with about 30 days by sea. Hamalainen notes that Finns should not be complacent about the possibilities offered by the rail link despite its current problems as the country has clear advantages over other options to develop the trade.

The capacity of Emma Maersk corresponds to 140 train sets and even if vessels of this size will not make direct calls to St Petersburg, one vessel of this magnitude supported by a developed feeder system is the alternative already in place at a competitive price.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2 Mapping of existing transport system and flows in the NSBH region

SUMMARY

- **10,000 port calls & a 7.2M TEU fleet in the region**
- **54 feeder operators, but the top four dominate**
- **The Baltic Sea – a 6M TEU region**

The transport routes of containers are set by the delivery conditions of the cargo in the containers. As a vast majority of the incoming containers to Europe carry consumer products the containers are addressed to the central warehouse of the consignee. This may be in close vicinity to the final destination of the cargo but it may also be anywhere in Europe. The location of the distribution centre of the products is the key. In some cases the containers are stripped in the distribution centres and reloaded for a specific market to where they are delivered via land based services, but it is also quite common to ship them unstripped to the final destination.

Each market has its specific condition and character of receiving and distributing the products in the container. The national customs procedure, transport condition, cost of transport, standard of transport system etc. sets the "normal" route for the country's containers operation in the country. The positioning of empty containers to areas having demand of containers also determines where the containers finally are stripped.

The pattern of how trade is done in a specific country varies between the countries and depends on many issues. The major ones are the condition of the infrastructure and the character of imports and exports. This may vary significantly not only for the country in general but also for different parts of the country. The characters of different markets are in wide terms described in the following for each country the following chapters.

2.1 The current container flows

In order to understand the container flows and the preconditions for how containers move in the Baltic it is essential to understand the conditions for the use of containers. As this is a very diverse business there is not one unique pattern that works as a rule in this respect but it may explain how the traffic flow of international cargoes are distributed in the Baltic Sea area.

The ports in Northern Europe handled about 44M TEU in 2005. Of these, some 6M TEU were handled in ports in the Baltic Sea Region and 38M TEU in ports in the UK, Belgium, the Netherlands and Germany.

The major transhipment ports in North-Western Europe are Antwerp, Rotterdam, Bremerhaven and Hamburg which together have a throughput of 27.8M TEU. Large volumes are also handled in the UK (primarily Felixstowe, Southampton & London ports), but only small volumes hereof are transhipped to other places than the UK and Ireland.

Since empties are included, the balance between inwards and outwards is fairly good; 19.1M/18.8M TEU. Transhipment takes place in ports where containers are discharged from deep sea carriers and loaded onto feeder vessels (or vice versa).

In the ports in Belgium, the Netherlands and Germany incoming containers from other continents amounted to 13.2M TEU in 2005. These volumes are in the following referred to as incoming deep sea cargo.

Of the incoming 13.2M TEU of deep sea cargo about 2.5M TEU are feedered to ports in the Baltic Sea region. Containers in the outgoing direction amount to approximately the same volumes.

Hamburg is by far the largest transhipment port for Baltic Sea containerised cargo, followed by Bremerhaven, Rotterdam and Antwerp.

Table 1: *Port container handling in NW Europe 2005*

Million teu	Total	Inwards	Outwards	- from other continents	- to other continents	- from Baltic Sea Region	- to Baltic Sea Region
UK total	**8.7**	**4.3**	**4.4**	**3.5**	**3.2**	**0.2**	**0.2**
Antwerp	6.5	3.2	3.3	2.7	2.8	0.2	0.2
Belgium other	0.8	0.3	0.4	0.2	0.3	0.0	0.1
BE total	**7.3**	**3.6**	**3.7**	**2.9**	**3.2**	**0.2**	**0.3**
Rotterdam	9.3	4.8	4.5	2.8	2.7	0.3	0.3
NL other	0.2	0.1	0.1	0.0	0.0	0.0	0.1
NL total	**9.5**	**4.9**	**4.5**	**2.9**	**2.7**	**0.3**	**0.4**
Bremerhaven	3.6	1.8	1.9	0.9	1.2	0.6	0.5
Hamburg	8.1	4.2	3.9	2.8	2.6	1.1	1.1
DE other	0.7	0.3	0.4	0.1	0.1	0.1	0.1
DE total	**12.4**	**6.3**	**6.1**	**3.8**	**4.0**	**1.7**	**1.7**
Total	**37.9**	**19.1**	**18.8**	**13.2**	**13.0**	**2.4**	**2.5**
				Deep Sea		Short Sea & Feeder	

Table 2: *Containers transhipped to ports in BSR*

1,000 teu	Total TEU	Total inwards	- Inwards deep sea	To BSR	DK		NOR				SWE								FIN								RUS	EST		LAT			LIT		POL		
					Total	Aarhus	Total	Moss	Kristiansand	Oslo	Total	Gothenburg	Gävle	Helsingborg	Malmö	Norrköping	Stockholm	Västerås	Total	Helsinki	Kotka	Hamina	Hanko	Oulu	Rauma	Turku	Total Baltic Russia	Total	Tallinn	Total	Riga	Liepaja	Total	Klaipeda	Total	Gdansk	Gdynia
UK total	**8,730**	**4,321**	**3,537**	**182**	**4**	**2**	**18**	**4**	**1**	**7**	**83**	**74**		**1**		**1**		**9**	**35**	**21**		**5**			**2**					**7**	**5**	**7**	**7**	**28**	**1**	**27**
Antwerp	6,501	3,217	2,742	156	3	3					39	39							11	5	1	5					65	4	3	21	19			12	1	12
Belgium other	765	349	203	120	11	5	7	2		4	7	7							88	26	12	27	5	1	9	1				1		3	3	3		3
BE total	**7,266**	**3,566**	**2,944**	**276**	**13**	**8**	**7**	**2**		**4**	**46**	**45**							**100**	**31**	**13**	**32**	**5**	**1**	**9**	**1**	**66**	**4**	**3**	**23**	**19**		**3**	**3**	**15**	**1**	**14**
Rotterdam	9,287	4,800	2,802	291	9	5	43			16	49	41							47	42	2	3					111	13	2	2			16	14	4	4	
NL other	176	113	49	70			9	2	4	2	6		1	3		2		1	17	10	2	3					37							1		
NL total	**9,462**	**4,913**	**2,851**	**361**	**9**	**5**	**51**	**2**	**4**	**18**	**55**	**41**	**1**	**3**		**2**		**1**	**64**	**52**	**4**	**5**					**148**	**13**	**2**	**2**			**16**	**14**	**4**	**4**	
Bremerhaven	3,641	1,760	906	521	33	14	58	3	4	22	80	26	7	17	3	2	9	3	82	25	38	9	5	1	7	2	132	9	5	16	8	1	41	33	69	3	46
Hamburg	8,130	4,235	2,797	1,053	106	55	102	7	9	43	191	92	9	21	4	3	11	4	242	68	102	25	12	3	20	5	206	27	19	35	29	2	30	20	114	5	92
DE other	675	302	117	128	3			1	1	7	9	13	2	4	1	1	2	1	96	20	31	8	4	1	6	2			2	20	3			13		1	15
DE total	**12,445**	**6,297**	**3,821**	**1,702**	**142**	**68**	**161**	**11**	**14**	**72**	**280**	**132**	**17**	**42**	**7**	**5**	**23**	**7**	**420**	**113**	**171**	**42**	**21**	**6**	**33**	**9**	**337**	**36**	**26**	**72**	**40**	**3**	**72**	**66**	**183**	**9**	**153**
Total	**37,903**	**19,097**	**13,154**	**2,660**	**248**	**84**	**239**	**19**	**19**	**101**	**488**	**292**	**18**	**47**	**7**	**8**	**23**	**16**	**632**	**217**	**189**	**84**	**26**	**7**	**44**	**10**	**564**	**53**	**31**	**108**	**65**	**3**	**97**	**90**	**231**	**15**	**194**

The larger part of the volumes transhipped via Hamburg are destined to St Petersburg, Finnish ports – primarily Kotka and Helsinki, Sweden – primarily Göteborg, Poland – Gdynia. The volumes via Bremerhaven follow a similar split.

Rotterdam's volumes are to a larger extent destined for St Petersburg. Remaining volumes are primarily to Göteborg and Helsinki. Antwerp volumes are for St Petersburg and Göteborg.

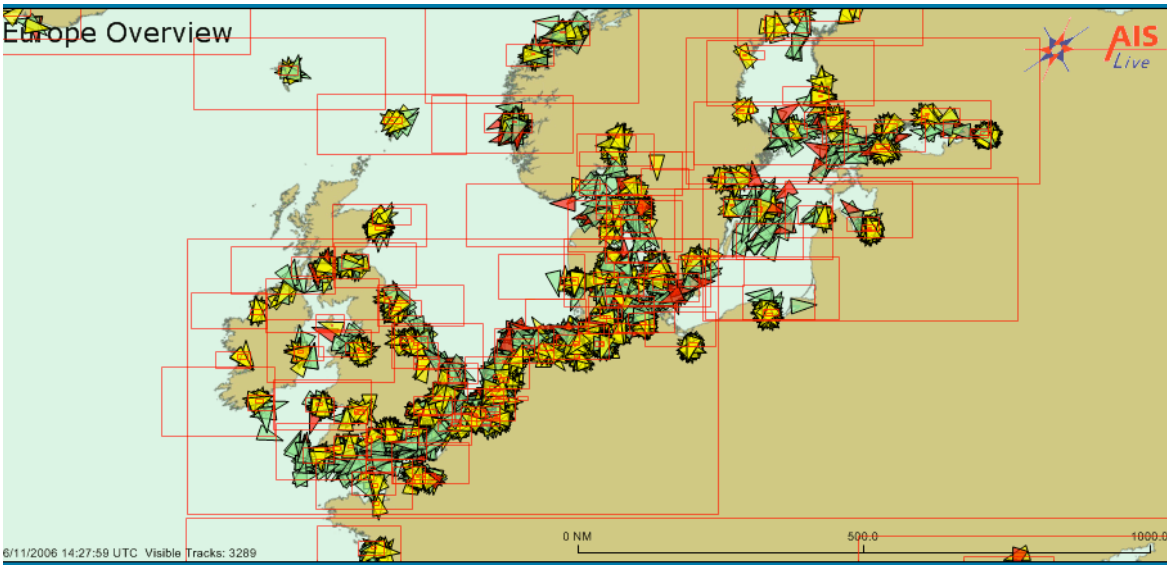
2.2 The structure of the current container transports

The overall transport situation of container operations is in general terms quite clear among the shippers, operators and port terminals. However, the actual situation is seldom known in figures.

The analysis of the container vessel traffic in the Baltic and to/from the transhipment hubs on the continent are based on the recorded ship movements.

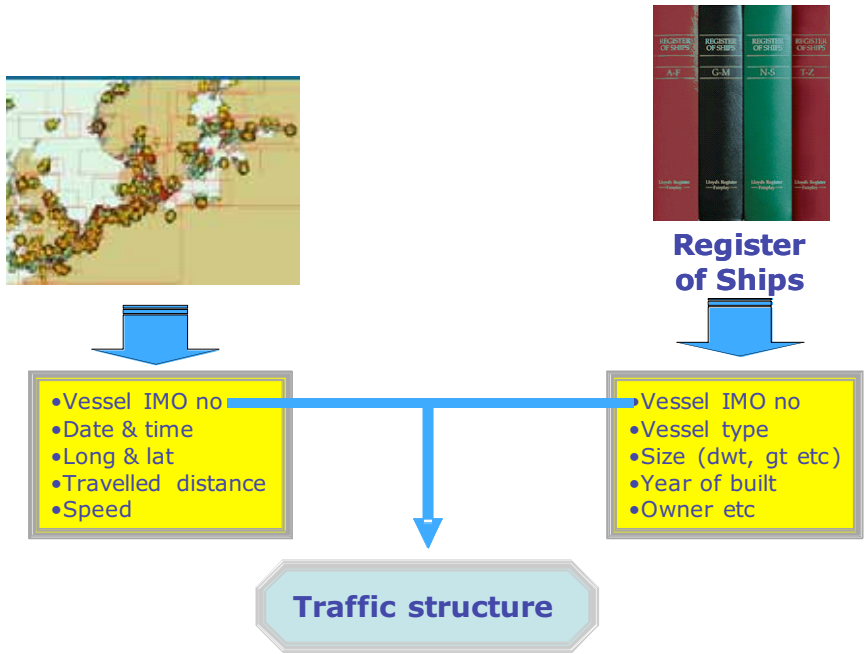
Data from AIS-Live have been used for January to August 2006, for all container vessels plus every general cargo and roro ships with a capacity above 100 TEU. This selection has thereafter been scrutinized and filtered where called for.

Figure 13: *AIS-live caption of ships in North Europe*



In Figure 14 the connection between AIS-live and Register of ships is illustrated. The information fields extracted from the Register of Ships are the ship TEU-capacities and the vessel operators to mention but a few.

Figure 14: *Schematic picture over the connection between AIS-Live and Lloyd's Register of Ships*



The number of ports has been reduced to the ones most relevant to this study. The more prominent of these are presented in Table 3 where the annual figures are estimated based on the first eight months of 2006.

Table 3: *Estimated traffic in the NSBHub region 2006*

Estimated traffic 2006		No		Avg Size/
Port Area	Port	calls	TEU '000	call
Baltic/Russia	St Petersburg	1,530	1,160	758
	Tallinn	340	236	694
	Riga	500	286	572
Baltic/Russia Total		2,370	1,683	710
Denmark/Baltic Germany	Aarhus	1,040	1,124	1,081
Denmark/Baltic Germany Total		1,040	1,124	1,081
Finland	Hamina	590	295	500
	Helsinki	1,480	886	599
	Kotka	980	696	710
Finland Total		3,050	1,877	615
Poland	Gdynia	1,240	674	544
	Gdansk	390	223	572
Poland Total		1,630	897	550
Sweden/Norway	Gavle	190	123	647
	Gothenburg	1,000	1,199	1,199
	Oslo	590	318	539
Sweden/Norway Total		1,780	1,640	921
Total NSBHub main market1		9,870	7,221	732
Continent	Antwerp	4,200	9,865	2,349
	Bremerhaven	5,100	8,504	1,667
	Hamburg	6,900	12,894	1,869
	Rotterdam	5,900	13,989	2,371
Continent Total (Current main Hubs)		22,100	45,251	2,048
Total		31,970	52,472	1,641

1. There is no data for Klaipeda, Liepaja.

Source: Lloyds Register - Fairplay, AIS Live

The table illustrates that the region for the NSBHub market is important with around 10,000 yearly calls which is actually almost half of the number in the four large continental ports. In aggregated TEU capacity visiting the ports, the corresponding figures are 7.2M TEU and 45M TEU which follows the high number of calls of large deep sea vessels in the continental ports.

The major communication to the area from the North European hubs is illustrated in the following figures. These are presented as the ships TEU capacity and frequency of calling the ports.

Table 4: *Container vessel calls per port over 8 months*

Number of calls January-August 2006		Month								Recorded	Total
Port Area	Port	Jan	Feb	Mar	Apr	May	June	Juli	Aug	m 1-8	2006 est.
Baltic/Russia	St Petersburg	101	132	123	126	131	128	145	132	1,018	**1,530**
	Tallinn	33	22	34	32	31	26	24	24	226	**340**
	Riga	43	39	41	40	41	42	45	40	331	**500**
Baltic/Russia Total		177	193	198	198	203	196	214	196	1,575	**2,370**
Denmark/Baltic Germany	Aarhus	79	55	94	95	96	97	91	86	693	**1,040**
Denmark/Baltic Germany Total		79	55	94	95	96	97	91	86	693	**1,040**
Finland	Hamina	11	34	65	57	55	53	56	62	393	**590**
	Helsinki	142	88	145	141	146	153	100	74	989	**1,480**
	Kotka	45	65	92	91	85	87	88	97	650	**980**
Finland Total		198	187	302	289	286	293	244	233	2,032	**3,050**
Poland	Gdynia							107	100	207	**1,240**
	Gdansk	39	23	31	28	25	32	40	40	258	**390**
Poland Total		44	24	32	28	26	59	147	140	500	**1,630**
Sweden/Norway	Gavle				13	17	20	17	14	81	**190**
	Gothenburg	98	57	93	77	84	85	84	91	669	**1,000**
	Oslo	57	31	59	49	52	47	49	49	393	**590**
Sweden/Norway Total		155	88	152	139	153	152	150	154	1,143	**1,780**
Total NSBHub main market		653	547	778	749	764	797	846	809	5,943	**9,870**
Continent	Antwerp	344	291	353	350	368	377	378	364	2,825	**4,200**
	Bremerhaven	396	278	454	422	433	437	490	468	3,378	**5,100**
	Hamburg	573	508	582	566	596	583	601	606	4,615	**6,900**
	Rotterdam	480	363	507	487	492	524	532	519	3,904	**5,900**
Continent Total (Current main Hubs)		1,793	1,440	1,896	1,825	1,889	1,921	2,001	1,957	14,722	**22,100**
Total		2,446	1,987	2,674	2,574	2,653	2,718	2,847	2,766	20,665	**31,970**

1. There is no data for Klaipeda, Liepaja. Gdynia and Gavle are not complete

Source: Lloyds Register - Fairplay, AIS Live

Table 4 illustrates the selected ports and the number of vessels calling those ports in the first eight months of 2006, but for Gdynia and Gävle where the AIS receivers were not operational in the beginning of the year.

A port's size is defined by the number of port calls and the size of ships calling the port. The latter is presented in the following table. The cargo turnover is yet another factor relating to the size criteria for a port.

Table 5 illustrates the aggregated TEU capacity visiting each port in the area. Normally a feeder loop contains four to five ports and thus the question could arise to what this is interesting for. The answer is that this is the fleet capacity the operators employ to meet with transportation demand as it is structured today, which all in all add up to 6M TEU turnover in region. If we are to meet with a scenario of say 10M TEU in the future there are many reasons to believe that the TEU-capacity of the fleet would have to increase as well. A comparison could be made to the bulker segment where changes in transport demand are recalculated to the corresponding dwt-demand.

The capacity requirements each and every port have to meet vary somewhat for different reasons. This has an impact on the proportion of vessel capacities vis-à-vis the handled TEU volume in the port. The lowest ratio has the end terminal St Petersburg to which most operators call directly from the hubs. After the discharge of full containers empties are loaded and carried to Kotka or Hamina where the ship is loaded before it heads back to the continental hub.

Table 5: *Aggregated TEU capacity of calling vessels*

Thousands of TEU cap January-August 2006		Month								Recorded	
Port Area	**Port**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**Juli**	**Aug**	**month 1-8**	**Total 2006 est.**
Baltic/Russia	St Petersburg	78	101	94	95	102	93	107	105	773	**1 160**
	Tallinn	24	17	24	21	22	18	15	16	158	**236**
	Riga	25	23	23	24	21	24	28	23	191	**286**
Baltic/Russia Total		126	141	141	140	145	135	150	144	1 122	**1 683**
Denmark/Baltic Germany	Aarhus	86	60	103	111	104	96	101	88	749	**1 124**
Denmark/Baltic Germany Total		86	60	103	111	104	96	101	88	749	**1 124**
Finland	Hamina	5	17	31	28	27	27	32	30	197	**295**
	Helsinki	84	55	86	84	84	90	60	47	591	**886**
	Kotka	32	49	67	63	60	64	63	68	464	**696**
Finland Total		120	121	184	175	172	180	154	145	1 251	**1 877**
Poland	Gdynia	0	0	0	0	0	0	59	53	112	**674**
	Gdansk	22	16	18	14	13	17	27	23	149	**223**
Poland Total		29	16	19	14	13	34	87	75	286	**897**
Sweden/Norway	Gavle	0	0	0	9	10	12	11	9	51	**123**
	Gothenburg	113	73	116	94	105	102	89	107	800	**1 199**
	Oslo	30	19	31	25	28	26	27	26	212	**318**
Sweden/Norway Total		143	92	147	128	143	141	127	142	1 063	**1 640**
Total NSBHub main market[1]		503	430	594	569	577	585	619	594	4 471	**7 221**
Continent	Antwerp	799	690	829	849	877	839	854	839	6 576	**9 865**
	Bremerhaven	696	520	790	695	713	721	776	759	5 669	**8 504**
	Hamburg	1 083	955	992	1 072	1 120	1 101	1 146	1 128	8 596	**12 894**
	Rotterdam	1 196	985	1 157	1 161	1 154	1 220	1 214	1 238	9 326	**13 989**
Continent Total (Current main Hubs)		3 773	3 151	3 768	3 777	3 864	3 881	3 991	3 964	30 167	**45 251**
Total		4 276	3 580	4 362	4 346	4 440	4 465	4 610	4 558	34 638	**52 472**

1. There is no data for Klaipeda, Liepaja. Gdynia and Gavle are not complete

Source: Lloyds Register - Fairplay, AIS Live

The type of ships calling a port gives an idea of the port's character. In Table 6 the vessel types calling the respective ports are presented in relation to each other both in number of calls and in TEU. A deep sea ship is here categorised as a container ship having a TEU capacity of 3,000 and above while the feeders are those below.

Aarhus and Göteborg are the only ports in the region with deep sea calls and the Finnish ports have a large share of roro ships. It is the Transfennica roro service between Hamina and Antwerp that carry containers in a feeder like operation. Finnlines also carry containers but that is mainly an intra-European service.

Table 6: *The type of ships calling the ports, per cent*

		In terms of calls			In terms of TEU		
Port Area	**Port**	**Feeder ships**	**Roro ships**	**Deep Sea ships**	**Feeder ships**	**Roro ships**	**Deep Sea ships**
Baltic/Russia	St Petersburg (Russia)	96%	4%	0%	98%	2%	0%
	Muuga-Port of Tallinn	95%	5%	0%	94%	6%	0%
	Riga	100%	0%	0%	100%	0%	0%
Baltic/Russia Total		97%	3%	0%	98%	2%	0%
Denmark/Baltic Germany	Aarhus	80%	15%	5%	57%	6%	36%
Denmark/Baltic Germany Total		80%	15%	5%	57%	6%	36%
Finland	Hamina	27%	73%	0%	40%	60%	0%
	Helsinki	52%	48%	0%	67%	33%	0%
	Kotka	84%	16%	0%	84%	16%	0%
Finland Total		57%	43%	0%	69%	31%	0%
Poland	Gdynia	64%	36%	0%	74%	23%	3%
	Gdansk	98%	2%	0%	96%	2%	2%
Poland Total		81%	18%	0%	85%	12%	3%
Sweden/Norway	Gavle	100%	0%	0%	100%	0%	0%
	Gothenburg	94%	0%	6%	65%	0%	35%
	Oslo	89%	11%	0%	94%	6%	0%
Sweden/Norway Total		93%	4%	3%	72%	1%	27%
Total		79%	19%	1%	76%	11%	13%
Continent	Antwerp	63%	7%	29%	35%	2%	63%
	Bremerhaven	80%	0%	20%	39%	0%	61%
	Hamburg	79%	0%	21%	37%	0%	63%
	Rotterdam	68%	0%	31%	27%	0%	73%
Continent Total		73%	2%	25%	34%	0%	66%
Totalt		**75%**	**7%**	**18%**	**39%**	**2%**	**59%**

Source: Lloyds Register - Fairplay, AIS Live

The data above suggests that Antwerp is the only major hub to receive containers by roro.

The containers handled in Helsinki come from the West harbour if they are carried by container ships and "Sompa" or the North harbour if carried by roros. Similar identification can be made for Kotka.

Table 7: *Type of ship in the different ports in calls and aggregated ship TEU (1,000)*

Jan-Aug 2006		Number of calls				Capacity in TEU			
Port Area	Port	Feeder ships	Roro ships	Deep Sea ships	Total 8 month	Feeder ships	Roro ships	Deep Sea ships	Total 8 month
Baltic/Russia	St Petersburg (Russia)	982	36		**1,018**	761	12	0	**773**
	Muuga-Port of Tallinn	214	12		**226**	148	10	0	**158**
	Riga	331			**331**	191	0	0	**191**
Baltic/Russia Total		1,527	48		**1,575**	1,100	22	0	**1,122**
Denmark/Baltic Germany	Aarhus	556	101	36	**693**	429	48	272	**749**
Denmark/Baltic Germany Total		556	101	36	**693**	429	48	272	**749**
Finland	Hamina	106	287		**393**	78	118	0	**197**
	Helsinki	514	475		**989**	398	193	0	**591**
	Kotka	543	107		**650**	391	74	0	**464**
Finland Total		1,163	869		**2,032**	866	385	0	**1,251**
Poland	Gdynia	154	87	1	**242**	101	31	5	**137**
	Gdansk	252	5	1	**258**	143	3	3	**149**
Poland Total		406	92	2	**500**	244	34	8	**286**
Sweden/Norway	Gavle	81			**81**	51	0	0	**51**
	Gothenburg	631		38	**669**	517	0	283	**800**
	Oslo	350	43		**393**	199	13	0	**212**
Sweden/Norway Total		1,062	43	38	**1,143**	767	13	283	**1,063**
Total		4,714	1,153	76	**5,943**	3,405	503	562	**4,471**
Continent	Antwerp	1,790	202	833	**2,825**	2,284	118	4,174	**6,576**
	Bremerhaven	2,687	14	677	**3,378**	2,234	3	3,432	**5,669**
	Hamburg	3,654	3	958	**4,615**	3,154	1	5,441	**8,596**
	Rotterdam	2,674	7	1,223	**3,904**	2,480	2	6,844	**9,326**
Continent Total		10,805	226	3,691	**14,722**	10,152	125	19,891	**30,167**
Totalt		**15,519**	**1,379**	**3,767**	**20,665**	**13,557**	**628**	**20,453**	**34,638**

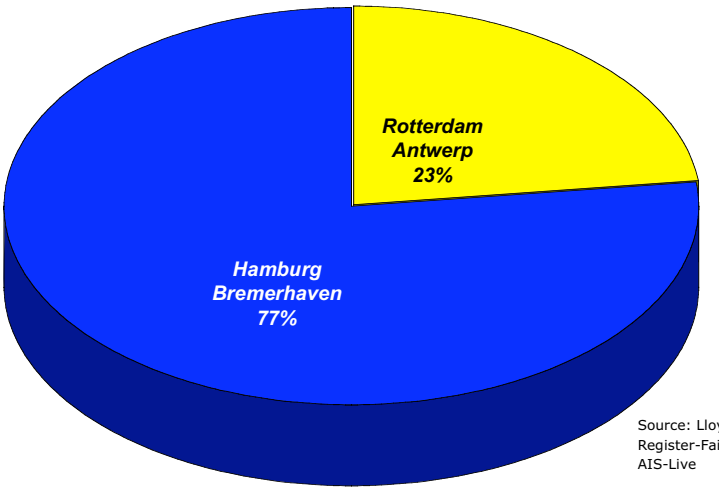
Source: Lloyds Register - Fairplay, AIS Live

The deep sea vessels are of course calling the continental hubs. The Port of Rotterdam is included in most of the carriers' North European deep sea container services, which also finds support in Table 7 above.

Feeder vessels perform intens short haul traffic with many port calls.

The majority of the container traffic to the area is coming from the German container hubs Hamburg and Bremerhaven.

Figure 15: *Share of containers to the Baltic Sea area from the two major hub areas*



Source: Lloyd's Register-Fairplay, AIS-Live

In the following the operators and their calls on the ports in the region have been categorised into three; feeder, roro or deep sea. The criterion for deep sea operators is of course that they are involved in deep sea operations. This does not however exclude them from feeder operations, quite the contrary. Most of

the deep sea operators run a feeder service as well. This is quite clear when studying Table 8 under, where the involvement of deep sea operators in the feedering activities is substantial. It is also evident that they tend to focus on the larger volumes such as in St Petersburg and supplementing their services by employing the dedicated feeder operators to/from the other ports.

Looking at the continental hub ports there is a clear difference between the two German ports and the other two. Hamburg and Bremerhaven have a substantially higher share of feeder calls than the other two, which supports the previous data suggesting that these two are the most active transhipment ports for the Baltic Sea Region.

Table 8: *Type of operator. Per cent distribution*

		In terms of calls			In terms of TEU		
Port Area	**Port**	**Feeder operator**	**Roro operator**	**Deep Sea operator**	**Feeder operator**	**Roro operato**	**Deep Sea operator**
Baltic/Russia	St Petersburg (Russia)	72%	3%	25%	63%	2%	34%
	Muuga-Port of Tallinn	65%	10%	25%	52%	8%	40%
	Riga	76%	0%	24%	54%	0%	46%
Baltic/Russia Total		72%	4%	25%	60%	3%	37%
Denmark/Baltic Germany	Aarhus	61%	15%	24%	36%	6%	58%
Denmark/Baltic Germany Total		61%	15%	24%	36%	6%	58%
Finland	Hamina	23%	73%	4%	31%	60%	9%
	Helsinki	42%	48%	10%	50%	33%	17%
	Kotka	61%	16%	23%	51%	16%	33%
Finland Total		44%	43%	13%	47%	31%	22%
Poland	Gdynia	40%	41%	19%	37%	26%	37%
	Gdansk	84%	2%	14%	73%	2%	24%
Poland Total		63%	21%	16%	56%	14%	30%
Sweden/Norway	Gavle	90%	0%	10%	86%	0%	14%
	Gothenburg	80%	0%	20%	50%	0%	50%
	Oslo	88%	11%	1%	92%	7%	1%
Sweden/Norway Total		84%	4%	13%	60%	1%	39%
Totalt		63%	20%	18%	52%	12%	36%
Continent	Antwerp	29%	10%	61%	9%	4%	88%
	Bremerhaven	59%	1%	40%	22%	0%	78%
	Hamburg	60%	0%	39%	21%	0%	79%
	Rotterdam	51%	0%	49%	13%	0%	87%
Continent Total		51%	2%	46%	16%	1%	83%
Totalt		**55%**	**7%**	**38%**	**21%**	**2%**	**77%**

Source: Lloyds Register - Fairplay, AIS Live

In the next table the same figures are shown in absolute numbers.

Table 9: *Type of operator. No of calls & aggregated TEU*

Jan-Aug 2006		Number of calls				Capacity in TEU			
Port Area	**Port**	**Feeder operator**	**Roro operator**	**Deep Sea operator**	**Total 8 month**	**Feeder operator**	**Roro operator**	**Deep Sea operator**	**Total 8 month**
Baltic/Russia	St Petersburg (Russia)	728	35	255	**1,018**	491	18	265	**773**
	Muuga-Port of Tallinn	148	22	56	**226**	82	13	62	**158**
	Riga	252		79	**331**	104	0	87	**191**
Baltic/Russia Total		1,128	57	390	**1,575**	677	31	414	**1,122**
Denmark/Baltic Germany	Aarhus	426	102	165	**693**	269	49	431	**749**
Denmark/Baltic Germany Total		426	102	165	**693**	269	49	431	**749**
Finland	Hamina	89	287	17	**393**	60	118	18	**197**
	Helsinki	416	475	98	**989**	296	193	102	**591**
	Kotka	394	107	149	**650**	236	74	154	**464**
Finland Total		899	869	264	**2,032**	592	385	274	**1,251**
Poland	Gdynia	96	99	47	**242**	51	36	50	**137**
	Gdansk	217	6	35	**258**	109	4	36	**149**
Poland Total		313	105	82	**500**	161	39	86	**286**
Sweden/Norway	Gavle	73		8	**81**	44	0	7	**51**
	Gothenburg	536		133	**669**	396	0	403	**800**
	Oslo	347	44	2	**393**	195	16	1	**212**
Sweden/Norway Total		956	44	143	**1,143**	636	16	411	**1,063**
Total		3,722	1,177	1,044	**5,943**	2,334	519	1,617	**4,471**
Continent	Antwerp	812	279	1,734	**1,734**	571	249	5,756	**6,576**
	Bremerhaven	2,000	17	1,361	**1,361**	1,253	7	4,410	**5,669**
	Hamburg	2,792	21	1,802	**1,802**	1,802	25	6,769	**8,596**
	Rotterdam	1,975	9	1,920	**1,920**	1,214	3	8,108	**9,326**
Continent Total		7,579	326	6,817	**6,817**	4,841	284	25,043	**30,167**
Totalt		**11,301**	**1,503**	**7,861**	**12,760**	**7,175**	**803**	**26,660**	**34,638**

Source: Lloyds Register - Fairplay, AIS Live

The two major feeder operators dominate the picture as could be expected. Looking at the average TEU capacity per call we can note the clear difference between deep sea and feeder operators. (Note: deep sea operator's calls in Aarhus and Göteborg include deeps sea vessel calls.)

Table 10: *Major feeder operators in the Baltic Sea Area*

Top 20 operators in BSA	Type of operator	No calls	Aggr TEU cap	Avg TEU cap/call	No ships in 8 month
Unifeeder AS	Feeder	1,412	853,454	604	39
Team Lines (Delphis)	Feeder	749	481,427	643	28
Finnlines	Roro	701	328,823	469	15
Maersk Line	Deep sea	424	1,008,575	2,379	28
MSC	Deep sea	263	323,124	1,229	14
Transfennica	Roro	238	111,481	468	13
ESF Euroservices	Feeder	198	164,584	831	7
Euroafrica Linie	Roro	164	53,912	329	8
Containerships Ltd OY	Feeder	163	142,945	877	5
OOCL	Deep sea	149	129,332	868	5
Eimskip (CTG, Kursiu I)	Feeder	125	113,910	911	7
Saimaa Lines	Feeder	115	53,499	465	4
DFDS (Lys I, Cont I BV)	Feeder	109	57,293	526	10
Baltic Container Lines	Feeder	91	46,645	513	5
CMA CGM	Deep sea	82	70,908	865	6
Delta Shipping Lines	Feeder	76	63,346	834	3
Medstar Shipmanagement Ltd	Deep sea	67	15,228	227	5
Kawasaki Kisen Kaisha	Feeder	67	45,787	683	2
Samskip	Feeder	62	43,108	695	6
Feederlines	Feeder	52	17,753	341	15
Other 34		**636**	**345,704**	**544**	**109**
Totalt		**5,943**	**4,470,838**	**752**	**334**

Source: Lloyd's Register-Fairplay, AIS-Live

Table 11: *UniFeeder: no of calls & aggr. TEU capacity*

Unifeeder 2006 01-08	Port	No calls	TEU cap	TEU cap/call
Baltic/Russia	St Petersburg (Russia)	224	173,855	776
	Muuga-Port of Tallinn	71	45,846	646
	Riga	29	17,591	607
Baltic/Russia Total		324	237,292	732
Denmark/Baltic Germany	Aarhus	295	148,031	502
Denmark/Baltic Germany Total		295	148,031	502
Finland	Hamina	28	19,340	691
	Helsinki	155	97,287	628
	Kotka	154	95,835	622
Finland Total		337	212,462	630
Poland	Gdansk	1	538	538
Poland Total		1	538	538
Sweden/Norway	Gothenburg	316	176,445	558
	Oslo	139	78,686	566
Sweden/Norway Total		455	255,131	561
Total		1,412	853,454	604

Source: Lloyds Register - Fairplay, AIS Live

UniFeeder operates a regular traffic system on fixed dates of call on all terminals in the system. The highest service level is in Göteborg (no of calls), where the aggregated TEU-capacity also the highest. The service level is also high in Aarhus.

The company operates larger vessels in the East Baltic Sea region (St Petersburg) and smaller in the West (Norway). Unifeeder is dominating the feeder traffic in the BSA.

Table 12: *Team Lines: no of calls & aggr. TEU capacity*

Team Lines 2006 01-08	Port	No calls	TEU cap	TEU cap/call
Baltic/Russia	St Petersburg (Russia)	121	93,644	774
	Muuga-Port of Tallinn	59	30,490	517
	Riga	39	25,217	647
Baltic/Russia Totalt		219	149,351	682
Denmark/Baltic Germany	Aarhus	5	2,718	544
Denmark/Baltic Germany Totalt		5	2,718	544
Finland	Hamina	23	17,022	740
	Helsinki	79	52,209	661
	Kotka	104	74,996	721
Finland Totalt		206	144,227	700
Poland	Gdynia	27	17,972	666
	Gdansk	45	25,640	570
Poland Totalt		72	43,612	606
Sweden/Norway	Gavle	47	33,148	705
	Gothenburg	100	48,771	488
	Oslo	100	59,600	596
Sweden/Norway Totalt		247	141,519	573
Totalt		**749**	**481,427**	**643**

Source: Lloyds Register - Fairplay, AIS Live

The same characteristics apply to Team Lines service in the BSA. The largest vessels call on St Petersburg. Other ports with high frequency of calls are Kotka, Göteborg and Oslo. The size of the vessels calling at Kotka and Hamina make the capacity figures high in these ports.

Table 13: *Finnlines: no of calls & aggr. TEU capacity*

Finnlines 2006 01-08	Port	No calls	TEU cap	TEU cap/call
Baltic/Russia	St Petersburg (Russia)	30	10,620	354
	Muuga-Port of Tallinn	12	9,600	800
Baltic/Russia Totalt		42	20,220	481
Denmark/Baltic Germany	Aarhus	99	47,349	478
Denmark/Baltic Germany Totalt		99	47,349	478
Finland	Hamina	57	19,971	350
	Helsinki	355	152,502	430
	Kotka	93	67,860	730
Finland Totalt		505	240,333	476
Poland	Gdynia	28	10,244	366
Poland Totalt		28	10,244	366
Sweden/Norway	Oslo	27	10,677	395
Sweden/Norway Totalt		27	10,677	395
Totalt		**701**	**328,823**	**469**

Source: Lloyds Register - Fairplay, AIS Live

Finnlines operates roro-ships in the Baltic Sea. Two new roros having a container capacity of 800 TEU provide service to the major ports in the Gulf of Finland. The other ports called in the area are run in a more conventional way and few containers are carried in these relations. Most of the cargo is shipped as roro units or in break stowage on deck.

Table 14: *Maersk Lines: no of calls & aggr. TEU capacity*

Maersk Line 2006 01-08	Port	No calls	TEU cap	TEU cap/call
Baltic/Russia	St Petersburg (Russia)	98	107,005	1,092
	Muuga-Port of Tallinn	7	7,134	1,019
	Riga	37	36,814	995
Baltic/Russia Totalt		142	150,953	1,063
Denmark/Baltic Germany	Aarhus	94	373,923	3,978
Denmark/Baltic Germany Totalt		94	373,923	3,978
Finland	Helsinki	33	32,370	981
	Kotka	69	72,702	1,054
Finland Totalt		102	105,072	1,030
Poland	Gdynia	14	20,355	1,454
Poland Totalt		14	20,355	1,454
Sweden/Norway	Gothenburg	72	358,272	4,976
Sweden/Norway Totalt		72	358,272	4,976
Totalt		**424**	**1,008,575**	**2,379**

Source: Lloyds Register - Fairplay, AIS Live

Maersk employs quite a lot of the free capacity supplied by the feeder operators. In ports with a substantial turnover Maersk usually run their own service. The size of vessels is generally higher than what is supplied by the feeder operators which is quite natural. The size of the deep sea operator's feeder vessels also indicates the size of the operator's turnover in the area. The highest capacity is however produced in Ports of Aarhus and Göteborg. This follows on the calls by larger transoceanic ships to these ports.


ANNEALED STEEL

3 North Europe container shipping profile

SUMMARY

- **High frequency services**
- **Destination decides choice of transhipment hub**
- **"Old habits die hard"**
- **Deep sea operators safe-guard feeder operations**
- **New hubs cannot afford cost disadvantages**

This part of the report will focus on the demands a port has to meet with in order to function as a competitive hub for deep sea calls. The conditions for direct calls to the continental hub ports will be compared with the conditions for direct calls to a NSBHub; primarily the Ports of Aarhus and Göteborg.

The liner container services calling at Northern European ports have been grouped into:

Deep-sea services

- **Gateway traffic:** import/export traffic moving between Northern European, Mediterranean and non-European ports (e.g. Asia, North America)
- **Hub & spoke transhipment:** the discharge of a container from a deep-sea vessel in a Northern European port for onward distribution by a feeder service (and vice versa)
- **Relay transhipment:** the discharge and loading movements associated with the transfer of containers between mainline services

Feeder services

- **Hub & spoke transhipment:** the loading of a container that has previously been discharged from a mainline vessel, to a smaller feeder vessel (and vice versa)

Intra-regional services

- **Gateway traffic:** import/export traffic moving between Northern European ports

The Northern European region is defined as follows:

- **Scandinavia** – all ports located in either Sweden, Norway, Denmark or Iceland
- **Baltic** – all ports located in the Baltic Sea (except Swedish ports and ports in Eastern Denmark)
- **Northwest Europe** – all continental ports located south of Denmark and north of Spain
- **UK&Eire** – all ports located in the United Kingdom or Ireland
- **Iberia** – all ports located on the Spanish and Portuguese Atlantic coast.

Looking at Figure 16 to Figure 20 it becomes apparent which ports in Northern Europe act as transhipment hubs, i.e. which are frequented by a large number of deep-sea and feeder services. In the main, these are Antwerp, Rotterdam, Hamburg, Le Havre, Bremerhaven and Felixstowe in the UK.

Although Rotterdam is the most important North European port in terms of annual container turnover, it is actually Antwerp which attracts the largest number of deep-sea calls, mainly owing to the fact that the port is the traditional call of choice for most smaller scale north-south operations. In addition, the ports of Hamburg and Bremerhaven command the largest number of feeder services as Northern German facilities are unrivalled hub ports for the Baltic spoke market. This would indicate that, although Rotterdam is still a major transhipment port for the UK and Irish and Iberian outports, it is, nonetheless, mainly a gateway port serving the vast central European hinterland.

Table 15: *Feeder and deep-sea port calls at major North European facilities*

	Deep-sea calls per week		Feeder calls per week
Scandinavia			
Aarhus	2	Aarhus	7
Gothenburg	3	Gothenburg	10
Baltic			
St Petersburg		St Petersburg	15
NW Europe			
Antwerp	67	Antwerp	20
Bremerhaven	32	Bremerhaven	43
Hamburg	54	Hamburg	47
Le Havre	41	Le Havre	8.5
Rotterdam	63	Rotterdam	31
Zeebrugge	9	Zeebrugge	3
UK & Eire			
Felixstowe	41	Felixstowe	19
London/Tilbury	16	London/Tilbury	2
Southampton	19	Southampton	5
Thamesport	6	Thamesport	

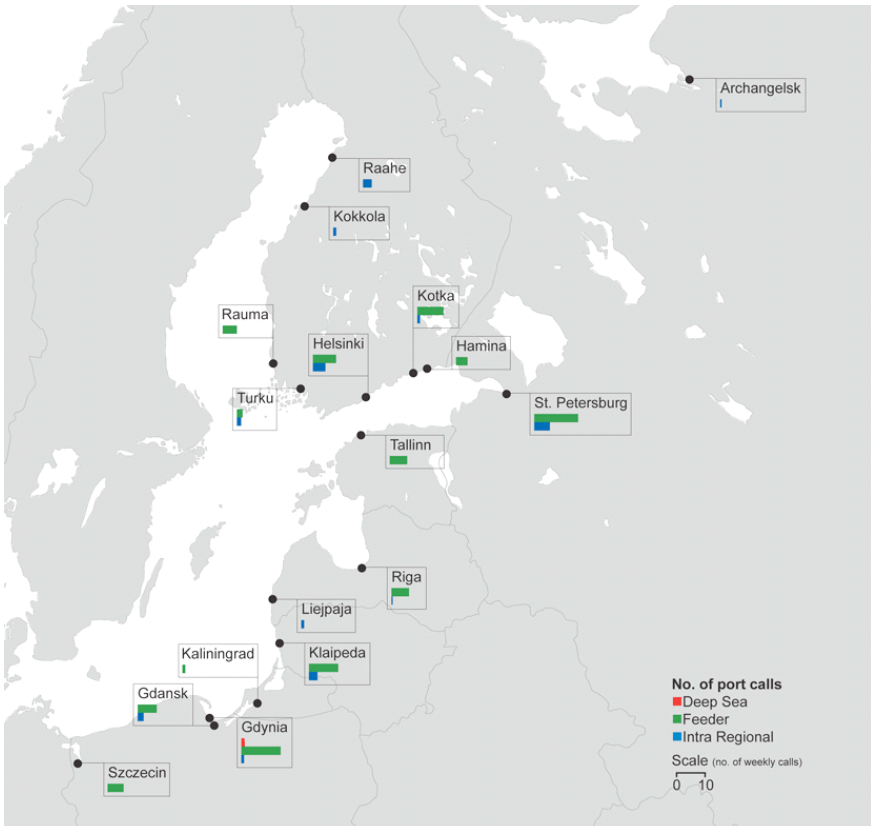
Note: Deep-sea calls include the Northern Europe/Mediterranean services

Source: Moffatt & Nichol

Figure 16: *North European shipping profile, January 2007 – Scandinavia*

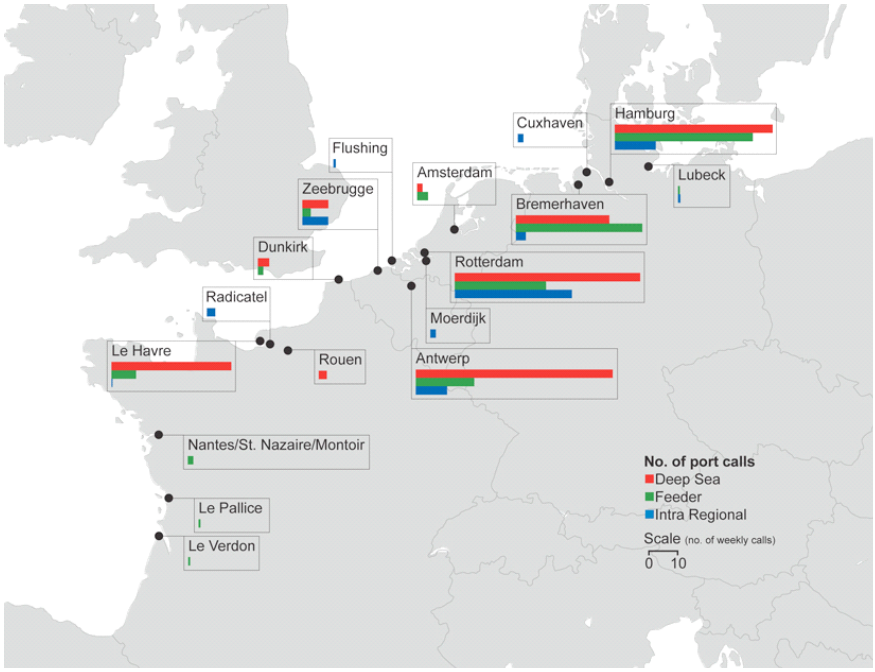
Source: Moffat & Nichol

Figure 17: *North European shipping profile, January 2007 – Baltic Sea*



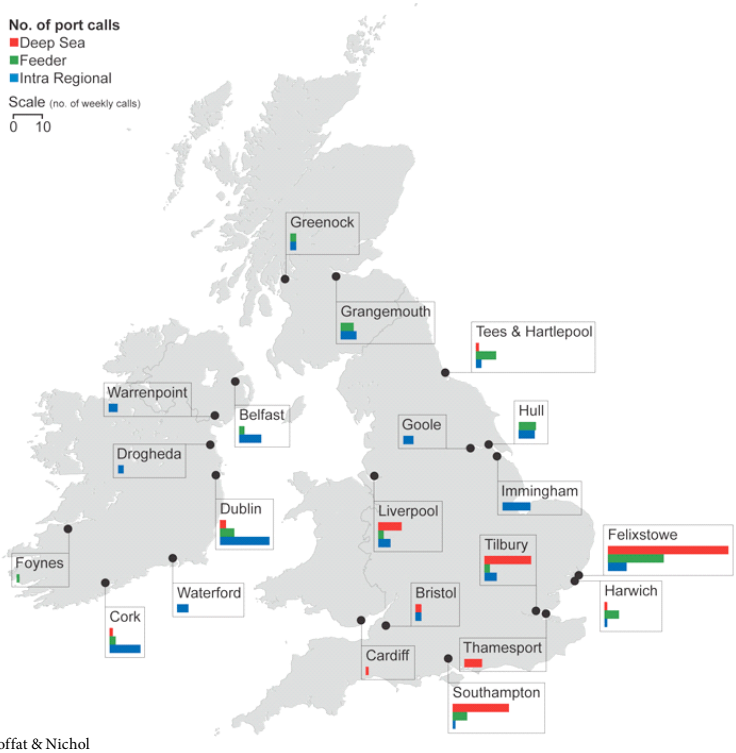
Source: Moffat & Nichol

Figure 18: *North European shipping profile, January 2007 – Northwest Europe*



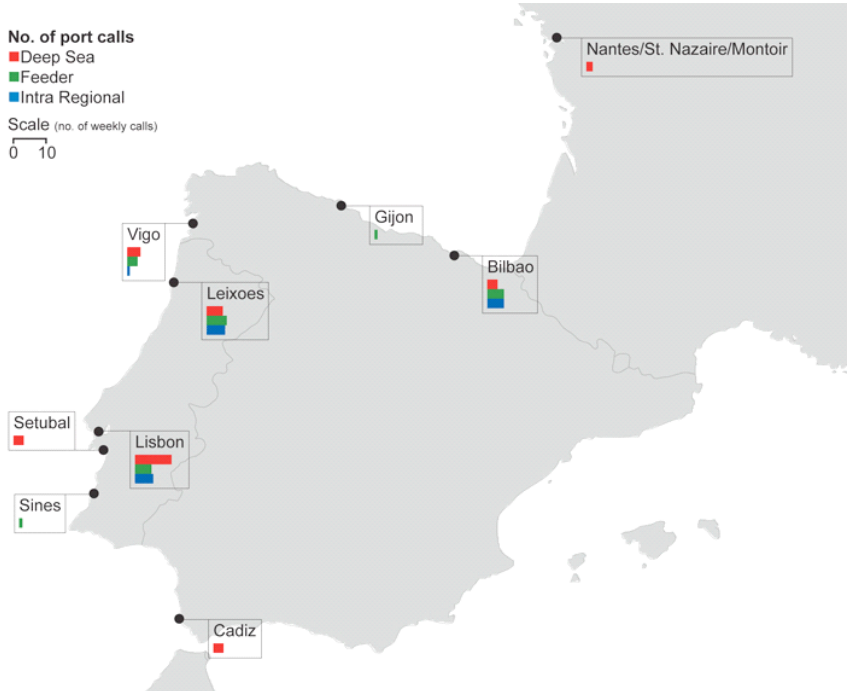
Source: Moffat & Nichol

Figure 19: *North European shipping profile, January 2007 – UK & Eire*



Source: Moffat & Nichol

Figure 20: *North European shipping profile, January 2007 – Iberia*



Source: Moffat & Nichol

3.1 **Deep-sea shipping services**

Table 16 and Table 17 summarise the main deep-sea services calling at North European ports. As at October 2006, a total of just over 120 deep-sea services called at Northern European ports (these include services to/from the Mediterranean, the Far East, North America, South Asia, South America, Africa and Oceania).

The largest ships deployed in Northern Europe are those, which are serving the North Europe/Far East market. Indeed, all ships deployed on this trade are of post-Panamax configurations, with the exception being the PIL/WanHai service, which is operated by relative newcomers in this trade. Some Europe/Far East cargo is also shipped on 'round the world' or 'pendulum' services going via the Panama Canal, where the maximum vessel size is determined by the measurements of the canal locks – though these operations are the exception rather than the rule.

The largest vessels – depending on criterion – currently calling in North Europe are Maersk Line's 'PS' class ships on the AE1 service and the CMA CGM&China Shipping vessels which are deployed on the jointly operated FAL2 service. The Maersk Line's 'PS' class is described at being 56 metres wide, 397 metres long, with a maximum draft of 16 metres and a nominal intake, which is rumoured to be around 13,000 to 15,000 TEU (8'6" high only). These ships stow 22 containers across and although Maersk Line mainly has in-house port facilities, most of the major multi-user facilities in Northwest Europe have now started to invest in super-post-Panamax cranes which can handle 20+ containers across. Indeed, the ability to handle 9,000+ TEU containerships is a pre-requisite for any hub port, given the fact that CMA CGM, ZIM, MSC, Hanjin Shipping, Maersk Line and Cosco all have +10,000 TEU ships on order.

The ship sizes on the Transatlantic trade are much smaller – usually of Panamax configuration. This is partially due to the fact that the Transatlantic trade is much smaller than the Europe/Far East trade, but also owing to the fact that all port facilities on the East coast of North America are draft restricted to about 13.7 metres (Halifax being the only exception).

Table 16: *Deep-sea calls at North European ports, October 2006*

Service	Europe/Far East & South Asia & Middle East		Transatlantic		North/South		Pendulums/RTW		Carrier
	Calls per week	Avg vessel size (teu)	Calls per week	Avg vessel size (teu)	Calls per week	Avg vessel size (teu)	Calls per week		
Scandinavia									
Aarhus	1	9,300							Maersk Line
Gothenburg	1	9,300	1	1,850					Maersk Line, ACL
NW Europe									
Zeebrugge	6	6,570	1	4,115	1	2,927	1	5,445	Evergreen, Maersk Line, CMA CGM, China Shipping, New World Alliance
Le Havre	12	6,368	11	3,199	13	2,897	2	4,564	CKHY, Evergreen, Maersk Line, CMA CGM, China Shipping, MSC, CSAV Norasia, New World Alliance, Grand Alliance, IRISL, Marfret, Hamburg Sud, Hapag-Lloyd, CSAV, Montemar, NYK, Delmas/OTAL, Grimaldi
Bremerhaven	8	6,899	14	3,000	4	3,427	3	4,453	Grand Alliance, New World Alliance, Evergreen, Maersk Line, MSC, ACL, CMA CGM, China Shipping, CKYH, Hamburg Sud, DAL, Mitsui OSK
Antwerp	15	5,381	17	2,726	17	2,288	2	4,463	Grand Alliance, New World Alliance, Evergreen, Maersk Line, MSC, ACL, CMA CGM, China Shipping, CKYH, Hamburg Sud, DAL, Mitsui OSK, CSAV Norasia, UASC, PIL, Wan Hai, Hapag-Lloyd, IRISL, Atlanticargo, ICL, Star Shipping, ZIM, Montemar, NYK, CCNI, MACS, Delmas/Otal, Grimaldi, Nile Dutch, Baco
Hamburg	28	5,959	3	2,670	10	2,130	3	4,506	CSAV Norasia, CKYH, Evergreen, Maersk Line, CMA CGM, China Shipping, MSC, UASC, New World Alliance, Grand Alliance, ZIM, PIL, Wan Hai, Hapag Lloyd, SCI, MISC, K Line, Yangming, IRISL, Marfret, Hamburg Sud, Montemar, NYK, CCNI, MACS, Delmas/OTAL, Mitsui OSK, Grimaldi, Baco
Rotterdam	26	6,523	10	2,750	13	2,662	6	4,479	CSAV Norasia, Grand Alliance, CKYH, New World Alliance, Evergreen, Maersk Line, CMA CGM, China Shipping, MSC, UASC, PIL, Wan Hai, SCI, Yangming, K Line, Atlanticargo, Hapag-Lloyd, Marfret, Hamburg Sud, Montemar, NYK, CCNI, DAL, Mitsui OSK, MACS, Portline
Dunkirk	1	8,431	1	2,195	2	1,824			Maersk Line, CMA CGM, Hapag-Lloyd, Marfret, CCNI, Delmas/OTAL
Amsterdam	2	6,329							Grand Alliance, Delmas/OTAL, Grimaldi, Nile Dutch
Rouen					3	1,395			Delmas, DAL, CMA CGM, Maersk Line, Nile Dutch, Baco
UK & Eire									
Southampton	11	6,716	5	2,928			1	4,712	Grand Alliance, Maersk Line, CMA CGM, New World Alliance, Hapag-Lloyd
Felixstowe	18	5,871	5	3,896	6	2,421	2	3,796	Maersk Line, MSC, CKYH, CMA CGM, Delmas/OTAL, China Shipping, New World Alliance, CSAV Norasia
Bristol					1	1,813			Maersk Line, DAL, Mitsui OSK (Saecs)
Liverpool			6	2,110	0	652			ACL, ICL, CMA CGM, China Shipping, Italia, ZIM, Hapag-Lloyd, MSC, Baco
Tilbury/London	1	4,173	4	2,355	10	2,703			Hapag-Lloyd, CMA CGM, Atlanticargo, Maersk Line, Hamburg Sud, Grimaldi, Baco, CSAV, Montemar, NYK, Mitsui OSK, DAL
Thamesport	3	5,445			1	4,300	1		Evergreen, UASC, New World Alliance, Maersk Line
Iberia									
Nantes/St. Nazaire/Montoir					2	1,950			CMA CGM, Delmas, DAL, OTAL, Mitsui OSK
Cadiz			1	1,228					Hapag-Lloyd, Senator
Bilbao					2	1,300			Grimaldi, CCNI
Vigo					4	2,529			Maersk Line, Delmas/OTAL, CCNI
Leixoes					4	953			Maersk Line, Delmas/OTAL, Transinsular, Portline
Lisbon			1	1,228	9	1,227			Hamburg Sud, CMA CGM, Maersk Line, DAL, Mitsui OSK, MACS, OTAL, Transinsular, Portline, Grimaldi, Nile Dutch, Hapag-Lloyd, Senator

Source: Moffatt & Nichol

Table 17: *North Europe – Mediterranean services, January 2007*

	Calls per week	Avg vessel size (teu)	Carriers
Scandinavia			
Gothenburg	1	2,328	Hamburg Sud, Maersk Line
Esbjerg	1	100	Grimaldi/ACL
Walhamn	1	100	Grimaldi/ACL
Aarhus	1	2,328	Hamburg Sud, Maersk Line
Baltic			
Gdynia	0.5	445	POL Levant
NW Europe			
Le Havre	2.8	2,263	MSC, Bulcon
Bremerhaven	4.3	2,139	Hamburg Sud, Maersk Line, NNC, Egyptian Navigation, Heliopolis, MSC
Antwerp	16	1,473	Grimaldi/ACL, Borchard, Gracechurch, Contaz, Hamburg, Senator,
			Maersk Line, Hapag-Lloyd, NYK, Italia, NNC, Turkon, Egyptian Navigation, K Line, Iscont, ZIM, MSC, Bulcon, Normed Container Line
Hamburg	9.8	1,611	Hamburg Sud, Senator, Hapag-Lloyd, NYK, Italia, POL Levant, Turkon,
			OPDR, Egyptian Navigation, K Line, Iscont, ZIM, Heliopolis, MSC, Bulcon, Normed
Rotterdam	8	1,553	Borchard Line, Gracechurch, Contaz, OPDR, Egyptian Navigation, Hamburg Sud, K line, Iscont, ZIM, Heliopolis Line, MSC, Bulcon, Normed
UK & Eire			
Southampton	2.8	150	Grimaldi/ACL
Felixstowe	9.5	2,020	Contaz, Hamburg Sud, Senator, Maersk Line, Turkon, OPDR, K Line, Iscont, ZIM, MSC, Bulcon
Cardiff	1.2	735	Gracechurch
Bristol	1.8	200	Grimaldi/ACL
Ipswich	0.3	170	Heliopolis
Hull	1.1	700	Egyptian Navigation, Bulcon
Liverpool	2	883	Gracechurch, Hamburg Sud, ZIM
London/Tilbury	1	880	Borchard Line, Gracechurch
Medway	1	2,000	Hapag-Lloyd, NYK, Italia
Tees&Hartlepool	0.7	798	Contaz
Cork	1	100	Grimaldi/ACL
Dublin	1.9	883	Gracechurch, Hamburg Sud, ZIM
Iberia			
Nantes/St. Nazaire/Mor	0.5	445	POL Levant
Cadiz	1.5	575	POL Levant, OPDR
Setubal	2.8	150	Grimaldi/ACL
Bilbao	0.7	374	NNC
Leixoes	1	735	Gracechurch
Lisbon	1	2,000	Hapag-Lloyd, NYK, Italia

Source: Moffatt & Nichol

The Northern European ports which receive the most deep-sea calls are – by number of weekly calls:

- Rotterdam, Antwerp, Hamburg, Le Havre, Felixstowe, Bremerhaven, Southampton, Tilbury, Lisbon and Zeebrugge

Rotterdam, being the largest European container port is also the most frequented, commanding an estimated 16.5% of all Northern European weekly calls. The port of Antwerp is the runner up with 51 major regular liner services, followed by Hamburg which receives 44 liner calls per week (these figures exclude the Northern Europe/Mediterranean services).

However, the picture is slightly skewed. Although Antwerp may boast more container service strings, these are partially Transatlantic or North/South niche operations. Hamburg's 44 deep-sea services, on the other hand, are mainly Europe/Far East operations and are deploying the largest ships, which are currently trading.

Ports, which are situated in relatively close proximity, e.g. Rotterdam/Antwerp or Hamburg/Bremerhaven tend to become gateways for particular regions. For instance, Rotterdam is traditionally regarded as the main Central European gateway to Asia, whilst the Transatlantic and North/South trades are more focused on the port of Antwerp. The same rationale applies to Hamburg and Bremerhaven and in the UK, Tilbury has developed into a 'North/South' facility, whilst Southampton is still regarded as a 'Far Eastern' port, versus Felixstowe being a Transatlantic gateway.

To a certain degree, this still holds true today and there are a number of factors at work here:

- In the 1970s and 1980s the Europe/North America trade was the main container market. Boxes were therefore shipped in and out of the most modern European container terminal at the time. This is particularly the case in the UK market.
- When the Asian trades started to develop, those ports which had developed new facilities (e.g. the Rotterdam Maasvlakte or Southampton Container Terminal) were able to offer spare capacity.
- "Old habits die hard". There are many operational reasons why shipper/receiver engaged in a particular trade prefer to maintain the "status quo" – e.g. established warehouses, packing stations or customs agents, to name but a few of the reasons. A change of gateway must provide sufficient financial incentives to off-set indirect as well a direct costs of switching ports.
- Port ownership – For instance, DPW have a shareholding in the ports of Southampton and Tilbury Container Services (TCS). Therefore, the terminal operator is able to channel the larger Europe/Asia operations at its deep water facility in Southampton, whilst the North/South services, which are operated with much smaller ships, are handled at the draft restricted port of Tilbury.
- Port facilities, in particular draft restrictions. Ships deployed on the largest trades will only call at port facilities, which can accommodate the largest ships and the volumes of cargo.

However, traditional service patterns are only part of a carrier's consideration, when opting for a particular North European port over the other. In recent years, deep-sea lines have heavily invested in North European port facilities in order to keep cost and berthing rights under control. Table 1.4 details the preferred ports of call for some of the largest liner companies.

Table 18: *North European port preferences by major carrier*

Carrier	Preferred port Multi-user facility	Dedicated terminal/stake holding
Maersk Line/APM Terminals	Felixstowe, Gothenburg,	Rotterdam, Zeebrugge, Bremerhaven, Aarhu Le Havre (development phase)
MSC	Felixstowe	Antwerp, Bremerhaven, Le Havre, Bilbao
CMA CGM	Bremerhaven, Hamburg, Southampton, Felixstowe	Le Havre, Zeebrugge, Dunkirk, Antwerp
Hapag-Lloyd	Southampton, Rotterdam, Le Havre, Amsterdam, Tilbury (north/south)	Hamburg
Cosco/Cosco Pacific	Rotterdam, Hamburg, Le Havre, Felixstowe	Antwerp
China Shipping	Bremerhaven, Felixstowe, Hamburg, Antwerp, Rotterdam	
Evergreen	Thamesport, Rotterdam, Hamburg, Havre	

Source: Moffatt & Nichol

Although some Scandinavian ports are renowned for their high productivity and their ability to handle the latest class of super post-Panamax ships, the vast majority of deep-sea lines still prefer to serve this market by feeder.

The only major liner service, which calls at Scandinavian ports directly is Maersk Line, calling at Göteborg and Aarhus on a weekly basis. The AE1 service string deploys the largest containerships in existence and it is rumoured that the carrier has a weekly exchange of in excess of 2,000 TEU at the Port of Göteborg.

The Mediterranean is another important market for Northern European ports, although this end-to-end route faces strong competition from both overland transport as well as way-port calls on the North Europe – Asia route. It is for this reason that all of the dedicated North Europe/Mediterranean operators sail

all the way to the Eastern Mediterranean, where freight rates there are estimated to be higher and overland/wayport competition is less fierce than in the Western Mediterranean shipping sector.

The main players here are Grimaldi/ACL, Hamburg Sud, Mediterranean Shipping Company (MSC) and smaller niche players such as Turkon or Gracechurch Line. The ports of choice tend to be Hamburg, Antwerp, Felixstowe and Rotterdam.

3.1.1 The development of large container ships

The strong development of deep sea transports over the past two decades has accelerated the strive for economies of scale in the vessels. The vessels have grown in all dimensions, but particularly in length.

Yet, the draught is a delimiter for the Baltic Sea region as the Baltic max is 15.4 metres. Another delimiter is the Malacca Strait where max draught is 16.5 metres. The new Maersk series is close to Malacca max.

Table 19: *Ships' draught sorted by TEU classes*

No of ships	TEU					
Draught m	6,500-7,000	7,000-8,000	8,000-9,000	9,000-10,000	>12,000	Total
12	2					2
13		1	3	4		8
14-14.5	21	5	5			31
14.5	18	30	68	13		129
15		15		5		20
>16					3	3
Total	41	51	76	22	3	193

The size of new ships is also increasing which gives higher transport capacity.

Table 20: *Relation TEU capacity and DWT*

No of ships	TEU					
DWT group	6,500-7,000	7,000-8,000	8,000-9,000	9,000-10,000	>12,000	Total
78,000-80,000	3	5				8
80,000-85,000	16		1			17
85,000-90,000	22		2			24
90,000-95,000		10				10
95,000-100,000			20			20
100,000-105,000		21	42	1		64
105,000-110,000		6	11	13		30
110,000-115,000		3		8		11
115,700		6				6
157,000					3	3
Total	41	51	76	22	3	193

The newbuildings of ships are increasing both in number and in size of ships.

Table 21: *The delivery of larger container ships over the past decade*

No of ships	TEU					
Year of Built	6,500-7,000	7,000-8,000	8,000-9,000	9,000-10,000	>12,000	Total
1997		2				2
1998	4	4				8
1999		4				4
2000		4				4
2001	13	2				15
2002	2	6				8
2003	8	5	2			15
2004	2	7	13			22
2005		11	25	4		40
2006	12	6	36	18	2	74
2007					1	1

The TEU 14 capacity of a container ship is the number of TEU the ship is capable of carrying if each container is loaded with 14 tonnes cargo. The increase in size is obvious looking at the newly built vessels in later years. The TEU capacity and the TEU 14 capacity differ somewhat between yards and operators for the ships. The DWT and the TEU 14 capacity should be closely related as both represents the carrying capacity in weight. The following table shows that this is not all that simple.

Table 22: *The ships' DWT related to TEU 14*

No of ships	TEU							
DWT group	4,500-5,000	5,000-5,500	5,500-6,000	6,000-6,500	6,500-7,000	7,000-9,000	9,000-9,250	Total
78,000-80,000	3							3
80,000-85,000	9	4						13
85,000-90,000		14	8					22
90,000-95,000			10					10
95,000-100,000				20				20
100,000-105,000				44	17			61
105,000-110,000				2	19	4		25
110,000-115,000					8	1		9
115,000					6			6
> 150,000							3	3
Total	12	18	18	66	50	5	3	172

Table 23: *The relation between GT and DWT for larger container ships*

No of ships	GT/DWT						
DWT group	80-90 %	90-95 %	95-100 %	100-105 %	105-110 %	> 135 %	Total
78,000-80,000		3	5				8
80,000-85,000		16			1		17
85,000-90,000	14	8				2	24
90,000-95,000	10						10
95,000-100,000	10	4	6				20
100,000-105,000	49	14			1		64
105,000-110,000	17		9	4			30
110,000-115,000	3	1	7				11
115,000	6						6
> 150,000					3		3
Total	109	46	27	4	5	2	193

The relation between TEU 14 and the dwt (Table 22) is almost linear, but the relation between the gt and the dwt varies substantially (Table 23).

The more modern vessels tend to be more voluminous in relation to the carrying capacity. At first, this is a bit strange as the accommodation and other superstructures should have less influence on the volume of the vessel in relation to the volume of the hull.

On the other hand it may be just a result of how the gt is measured as the larger vessel has to support the containers in height as the height of the room is more than 9 containers high. By this the hull of the ships is quite voluminous.

Figure 21: "Eleonora Maersk" on her maiden voyage

The current orderbook contains a huge number of large container ships. By the beginning of 2007, it amounted to 53M dwt, whereof 27M dwt were ships of 5,000 TEU and above.

These are impressive figures. In order to get a perspective to the numbers, the numbers and the TEU-capacity of the current orderbook have been put in relation to the existing fleet for each size category (Table 24).

An average vessel life expectancy of 25 years would call for an orderbook of four per cent over time. If the vessels are remaining in the orderbook for two years, then the orderbook would have to be eight per cent.

Add to this a market expansion, which for the sake of argument could be set to ten per cent per annum (which is extraordinary in most cases). An expansion of ten per cent p.a. for two years adds up to another 21 per cent. Following this line of reasoning, the orderbook would thus have to be around 29 per cent of the existing fleet.

- The figures below clearly indicate that the trade routes for the large vessels would significantly have to be reshuffled in order to absorb these massive deliveries in the near time.

Table 24: Container ships on order vs existing fleet

	% in order	
Size category	**Number**	**TEU capacity**
8,000+ teu	135%	145%
5'-7,999 teu	44%	44%
3'-4,999 teu	38%	40%
2'-2,999 teu	22%	22%
1'-1,999 teu	27%	27%
-999 teu	17%	24%
GC, 10'+ dwt, 100+ teu	6%	8%
GC, <10' dwt, 100+ teu	5%	7%

The following figures illustrate the current fleet and orderbook situation, both in numbers and TEU.

Figure 22: The total container fleet and the ships on order in numbers

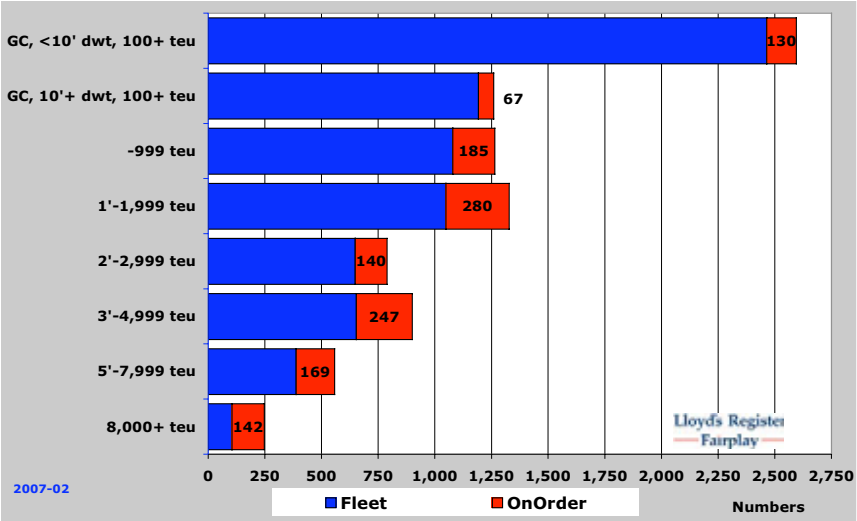
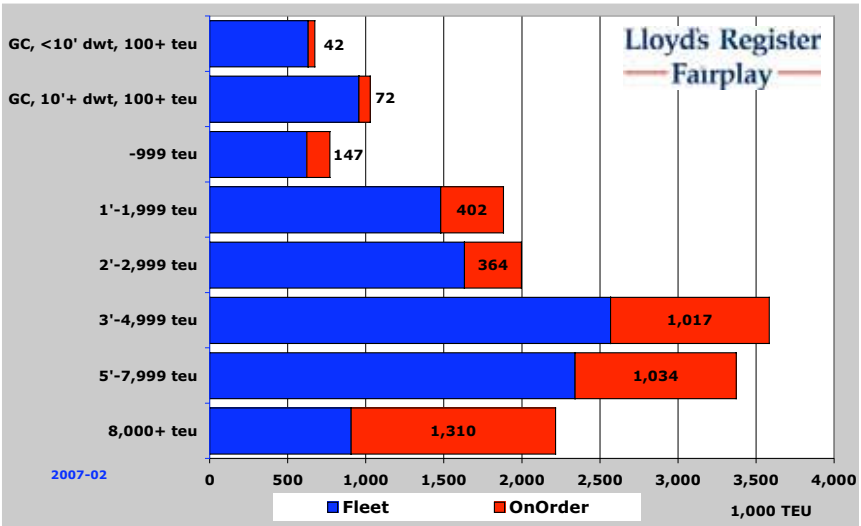


Figure 22 shows the numerous vessels on order in the mid-size to large segments. When compared with Figure 23, the quest for economies of scale becomes evident. More TEU will be delivered to the 8,000+TEU category than in the smaller categories. Conversely, investments in smaller vessels are modest.

- Over the next five years, the fierce competition between operators is ensured and as a result, long haul freight costs per TEU will remain low. This will in turn lead to a high degree of capacity utilisation of the container vessel fleet, as containerisation remains a competitive alternative to other seaborne alternatives.

Figure 23: The existing fleet and ships on order measured in TEU capacity



3.2 **Feeder & intra-regional shipping services**

The monitoring of the container vessel movements in the Baltic Sea region over an eight month period has led to the following conclusions:

- Following the ships' activities in the major 11 ports within the area the ships do about 1,000 calls per month
- The highest number of calls in one month during the period was in St. Petersburg followed by Helsinki, Göteborg and Aarhus

- Out of the 7 most frequent ships, 4 ships having the highest port call frequency in the Baltic Sea are roro ships calling Helsinki. No 5 in order is a container ship calling Göteborg, Aarhus and Bremerhaven/Hamburg. No 6 is another roro ship trading in pendulum Helsinki – Poland and the seventh ship is a containership that distribute containers between Hamburg, Helsinki, Kotka and Hamina in a continuous service.

The most frequent roro ships stay within the Baltic Sea in pendulum services, such as the one between Helsinki and Aarhus. It is quite natural that ships running in a pendulum service within the Baltic reach quite high frequencies.

The frequency in ports also illustrates the container feedering service. The feeder vessels are used not as individuals but as a resource in not one but several systems. The operators use the vessels to produce as efficient service as possible considering the demand and size of vessels and ports to be included in a schedule. Each operator runs his own schedule often in parallel of other operators.

3.2.1 **Feeder lines and carrier transhipment strategy**

At present, the main transhipment ports via which Scandinavia, the Baltic Sea, Iberia, Ireland and Northern UK ports are being served are Hamburg, Bremerhaven, Rotterdam, Antwerp, Felixstowe and, to a lesser degree, Le Havre.

Although the likes of Maersk Line, MSC, CMA CGM, OOCL and K Line have in-house North European feeder networks in place, the majority of feeder services are operated by independent (common user) carriers.

There are a few common user operators which dominate the picture: Unifeeder and Team Lines (now Delphis) in the Baltic Sea/Scandinavia, OPDR/Delphis on Iberia, the relative newcomer in Europe, Xpress Container Line (Seaconsortium) on the Irish Sea and Iberia. In addition, there are slightly smaller feeder operators such as Feederlink (part of the rather large Irish Continental Group) which serve the northern UK market or ESF Euroservices trading in the Baltic Sea.

Most of the deep-sea lines in Northern Europe have a distinct feeder policy in place, which revolves around the use of in-house port facilities.

As in other parts of the world, this is mainly due to:

- Cost control – transhipment handling cost need to be kept to a minimum, as most liner services are unable to recuperate the entire additional cost (feeder freight rate and double handling at the hub port) from their shippers
- Berthing windows – most Northern European multi-user facilities are heavily congested and feeder ships are relatively low on the list of priorities owing to their smaller container exchange. Apart from the additional cost to the feeder operator, deep-sea lines need to ensure that their transhipment cargo connects reliably as otherwise their cargo can be delayed by up to a week. For instance, Southampton is no longer a major North European transhipment hub due to the port's inability to promptly berth feeder vessels.

As such, Maersk Line prefers to tranship its Baltic Sea cargo at Bremerhaven, whilst Iberian, Irish and Scottish cargo is mainly handled via the carrier's in-house facility at Rotterdam.

MSC, on the other hand, transhipps almost all its Northern European cargo in Antwerp, apart from the Biscay relay, which is fed via Le Havre.

Another important consideration is the relative distance between hub and spoke port. Feeder shipping is a very low margin business and common user feeders need to be able to offer weekly sailing frequencies – preferably with one vessel only. It is for this reason, that Scandinavia and the Baltic Sea are mainly fed via Hamburg/Bremerhaven, the Irish Sea and the UK via Rotterdam/Antwerp, whilst Iberia is best handled by ports within either the Rotterdam/Le Havre range or via a Southeast UK port.

Some Scandinavian ports, Aarhus and Göteborg in particular, are very keen to capture a slice of the lucrative Northern European transhipment business. Although both ports are able to accommodate the latest generation of ultra large containerships and although both ports work very productively, it is the lack of direct deep-sea calls, which mainly hamper their aspirations.

The vast majority of carriers have so far shied away from serving the Scandinavian market directly with their main-line vessels. However, a direct deep-sea call is an absolute pre-requisite for an aspiring hub port as "double transhipping" (i.e. at two hub ports within the same region) is prohibitively expensive. In addition, handling costs at aspiring hub ports need to at least match, if not undercut, those of established hub port facilities.

Table 25: *Carrier transhipment strategies (as at January 2007)*

Operator	Market	Current strategy
Maersk Line	Iberia, Irish Sea and Scotland	Rotterdam is Maersk Line's main North European transhipment hub.
Maersk Line	Baltic Sea and Scandinavia	Bremerhaven is the preferred transhipment hub. Five in-house feeder operations to the Sea and Western Norway in place. Common feeders, mainly Unifeeder are utilised as well
Evergreen	Iberia and Irish Sea	Rotterdam is Evergreen's preferred transhipment hub, with four in-house feeder joint ventures/slot charter agreements with Xpress in place
Evergreen	Scandinavia and Baltic Sea	Use of common user feeders via Hamburg in the main
CMA CGM	Scandinavia and Baltic Sea	Use of common user feeders via Hamburg in the main, one in-house service to Poland in
CMA CGM	Irish Sea and Iberia	Zeebrugge is the preferred option on the Europe/Asia trades. One joint venture with Eu the Ireland. Otherwise Le Havre with one in-house Atlantic French feeder in place
MSC	Baltic Sea, Scandinavia, Irish Sea and Iberia	Mainly via Antwerp, Northern Spain partially via Le Havre. A total of 10 in-house feeder services in place
Grand Alliance (Hapag-Lloyd, OOCL, NYK, MISC)	Baltic Sea and Scandinavia	Mostly via Hamburg. OOCL has 2 in-house Baltic feeders in place, connecting at Hamburg Antwerp, Rotterdam and Amsterdam.
Grand Alliance (Hapag-Lloyd, OOCL, NYK, MISC)	Iberia and Irish Sea	Mainly via Rotterdam, limited transhipment activity via Amsterdam
CKHY	Baltic Sea, Scandinavia, Irish Sea and Iberia	No in-house feeder network in place (except K Line's Ibesco service between Scandinavi Iberia). Common feeders are mainly used for Scandinavia and Baltic Sea (via Hamburg) or Iberia/Irish Sea (via Felixstowe and Antwerp)
New World Alliance (APL, HMM, MOL)	Baltic Sea, Scandinavia, Irish Sea and Iberia	No in-house feeder network in place. Common feeders are used for all destinations (via Hamburg, Rotterdam and Bremerhaven

Source: Moffatt & Nichol

Table 26: *Feeder calls at Northern European ports, January 2007*

	Calls per week	Avg vessel size (teu)	Carriers
Scandinavia			
Gothenburg	18.0	784	Xpress, Hatsu, Kline, MSC, Team Lines, Unifeeder
Helsingborg	3.0	800	MSC, Unifeeder
Kristiansand	4.0	656	Maersk Line, MSC, Team Lines
Gavle	2.0	685	OOCL, Gavle
Oslo	7.0	695	Unifeeder, Team Lines
Moss	5.0	618	MSC, Team Lines, Unifeeder
Larvik	3.0	670	MSC, Unifeeder
Aarhus	14.0	695	K Line, Maersk Line, MSC, Unifeeder
Copenhagen	2.0	750	Unifeeder
Tanager	1.0	341	Euro Container Line
Bergen	3.0	519	Euro Container Line, Maersk Line, North-Sea Container Line
Aalesund	3.0	519	Euro Container Line, Maersk Line, North-Sea Container Line
Sodertalje	2.0	618	OOCL, Transatlantic European Services
Stockholm	2.7	625	Saimaa, Team Lines
Stavanger	2.0	1,210	Maersk Line, North-Sea Container Line
Maaloy	2.0	1,210	Maersk Line, North-Sea Container Line
Trondheim	3.0	519	Euro Container Line, Maersk Line, North-Sea Container Line
Baltic			
St Petersburg	15.0	979	ESF Euroservices, FAS, Maersk Line, MSC, OOCL, Swan Container Line, Team Lines, Unifeeder
Kaliningrad	1.0	980	Maersk Line
Klaipeda	10.0	806	Baltic Container Lines, ESF Euroservices, MSC, OOCL, Team Lines, Unifeeder
Tallinn	6.0	1,032	MSC, Team Lines, Unifeeder
Riga	6.0	921	ESF Euroservices, Maersk Line, MSC, Team Lines, Unifeeder
Gdansk	6.5	503	Baltic Container Lines, Inter Marine Container Line, OOCL
Gdynia	13.5	696	Baltic Container Lines, Delphis, MacAndrews Euroafrica, FAS, CMA CGM, Inter Marine ContainerLine, MaerskLine, MSC, Team Lines
Szczecin	3.5	450	Baltic Container Lines
Hamina	4.0	625	Unifeeder, Team Lines
Helsinki	9.0	913	Maersk Line, MSC, OOCL, Team Lines, Unifeeder, CMA CGM
Rauma	5.0	831	Maersk Line, MSC, OOCL, Team Lines
Turku	2.0	500	Turku
Kotka	9.0	1,028	ESF Euroservices, Maersk Line, MSC, OOCL, Team Lines, Unifeeder
NW Europe			
Zeebrugge	3.0	589	FAS, Eucon, Xpress, Hatsu, APL
Le Havre	8.5	685	CMA CGM, Delphis, FAS, Eucon, Hatsu, Xpress, NYK, MSC, OPDR, IMTC, Comanav
Bremerhaven	43.0	790	Baltic Container Line, Euro Container Line, Inter Marine Container Line, Maersk Line, MSC, North-SeaContainer Line, OPDR, IMTC, Comanav, Saimaa, Swan Container Line, Team Lines, Transatlantic European Services Unifeeder
Antwerp	20.0	894	Delphis, OPDR, ESF Euroservices, FAS, MSC, IMTC, Comanav, OOCL, UFS, MCL, Unifeeder
Amsterdam	4.0	526	Dutch Feeder Lines, Hatsu, Xpress, NYK, OOCL
Hamburg	47.0	639	Baltic Container Line, DutchFeeder Lines, ESF Euroservices, FAS, Euro Container Line, CMA CGM, MacAndrews Inter Marine Container Line, K Line, Maersk Line, MSC, North-SeaContainer Line, OPDR, IMTC, Comanav, OOCL, Saimaa, Swan Container Line, Team Lines, Transatlantic European Services, Unifeeder
Lubeck	0.7	750	Saimaa
Rotterdam	31.0	684	Clydeport Feeder Services, Delphis, OPDR, ESF Euroservices, FAS, CMA CGM, Feederlink, Hatsu, Xpress, NYK, APL, Inter Marine Container Line, IMTC, Comanav, OOCL, Teamlines, UFS, MCL, Unifeeder
Dunkirk	2.0	463	CMA CGM, Delphis
La Pallice	1.0	560	CMA CGM
Bordey	1.0	560	CMA CGM
Le Verdon	1.0	1,584	MSC
Nantes/St. Nazaire/Montoir	2.0	1,000	CMA CGM, MSC
UK & Eire			
Southampton	5.0	477	Clydeport Feeder Services, Hatsu, Xpress, NYK, OPDR, OOCL
Felixstowe	19.0	545	Delphis, OPDR, FAS, CMA CGM, MacAndrews, Feederlink, Xpress Container Line, K Line, IMTC, Comanav, Unifeeder
Belfast	2.0	545	Xpress
Greenock	2.0	250	Clydeport Feeder Services
Grangemouth	4.5	425	Feederlink, OOCL
Foynes	1.0	300	Team Lines
Immingham	6.0	367	FAS, CMA CGM, Feederlink, North-Sea Container Line
Hull	5.0	573	ESF Euroservices, FAS, Delphis, MacAndrews, Euroafrica, OOCL
Liverpool	2.0	800	FAS, Eucon, MSC
London/Tilbury	2.0	900	MSC, UFS, MCL
Tees&Hartlepool	7.0	708	FAS, CMA CGM, Feederlink, K Line, MSC
Cork	2.0	510	Xpress
Dublin	5.0	800	FAS, Eucon, Xpress, Hatsu, APL, MSC
Iberia			
Sines	1.0	1,200	MSC
Bilbao	5.0	733	Delphis, OPDR, Hatsu, Xpress, MSC
Gijon	1.0	448	Xpress, Hatsu
Vigo	3.0	703	Hatsu, Xpress, NYK, MSC, UFS, MCL
Leixoes	6.0	683	Delphis, OPDR, Hatsu, Xpress, NYK, K Line, MSC, UFS, MCL
Lisbon	5.0	497	Delphis, OPDR, Hatsu, Xpress, NYK, K Line, UFS, MCL

Source: Moffatt & Nichol

3.2.2 **Intra-regional shipping services**

Europe's geography, its extended coastline, the many islands and peninsulas, naturally promote intra-regional shipping. In addition, the EU transport policy is promoting short-sea shipping as a competitive alternative to road between member countries. As well as the "pull" factor of potential EU subsidies, there is also a number of other push factors promoting the movement of freight via

sea – driver's hours legislation, restrictions on foreign lorries transiting France during the weekend, rising fuel prices, etc.

There are a large number of intra European container services calling at UK ports, typically operating high frequency services and utilizing smaller ro-ro/container vessels (below 1,000 TEU capacity).

Some of the most prominent intra-regional players are BG Freightline, Eucon, DFDS Container Line, Eimskip/Containerships and Samskip. However, it should be noted that many feeder operations serve the intra-regional market, too, and vice versa. For instance, the extensive feeder network of MSC is partially utilised for intra-Northern European gateway traffic and the likes of Delphis/OPDR, Eucon, BG Freightline and FAS/MacAndrews are all active both in the feeder as well as the intra-regional gateway sector.

Both the North European feeder as well as the intra-regional markets are highly competitive. Most feeder and regional services can be maintained on a 7-day roundtrip basis, e.g. Scandinavia can be served via Hamburg/Bremerhaven, the Irish Sea via Rotterdam/Antwerp and Northern Spain via Rotterdam/Le Havre. In practice, this means that a newcomer in the North European feeder market can start trading immediately by chartering just one small-sized containership. As a result, feeder rates have been eroded over the past decades, newcomers have entered the market and others have ceased trading.

There has also been an increased level of M&A activity over the past years. For example, the Irish Continental Group now operates under the brand names of Irish Ferries, Eucon, Feederlink and Eurofeeders in addition to operating the Dublin DFT terminal. The second-largest Scandinavian and Baltic Sea feeder, Teamlines, was recently acquired by Belgian based Delphis from its previous owner, Finnlines.

In addition, some port operators, particularly in UK outports, have acquired regional shipping brandnames in order to safeguard and, potentially, subsidise continuous port calls at their facilities. One prime example is the Mersey Docks and Harbour Company (itself having been acquired by Peel Holdings in 2005) which owns Coastal Container Lines, BG Freightline and Clydeport Feeder Services. Indeed, the investment of port operators into small scale regional shipping operations is a trend which is set to continue, rendering the Northern European regional and feeder market even more competitive.

In terms of ports of call, Rotterdam also attracts the largest number of regional weekly calls as the main gateway for the Central European market. The ports of Dublin and Cork on the other hand handle the substantial container LoLo traffic to/from Ireland and there is very little competition from ferry operators for the Continent/Ireland cargo flows. Regional lolo traffic between Ireland and Dublin, however, is mainly shipped by ferry on accompanied trucks and trailers.

Because the intra-regional services deploy smaller vessels, operators have a much greater choice of ports. Equally, because intra-regional operators are smaller than their deep-sea equivalents, they usually are unable to negotiate as favourable conditions at the main North European deep-sea facilities. Therefore, regional operators can and will call at facilities such as Radicatel, Dartford or Moerdijk, whilst deep-sea lines would rather call at Le Havre, Felixstowe and Rotterdam.

Short sea movements offer a greater modal choice than deep-sea movements, with LoLo services competing with RoRo operations, ferries and the Channel Tunnel.

A large proportion of intra-regional/inner-European cargo is transported by trailers and as a consequence, there are a vast number of passenger & freight services as well as pure roro freight services in place.

Table 27: *Intra-regional services at Northern European ports, January 2007*

	Calls per week	Average vessel size (teu)	Carriers
Scandinavia			
Gothenburg	1.0	1,457	Eimskip, Faro Ship
Helsingborg	5.5	300	Samskip, Transatlantic European Services
Kristiansand	1.0	775	DFDS Lys Line, Samskip
Frederikstad	1.0	1,457	Eimskip, Faro Ship
Oslo	6.5	258	DFDS Lys Line, Samskip
Lysekil	2.0	47	DFDS Lys Line
Esbjerg	2.0	215	Atlantsskip, DFDS Lys Line
Aarhus	4.0	695	Eimskip, Faroe Ship, Samskip, Teco, Containerships
Brevik	1.0	775	DFDS Lys Line, Samskip
Larvik	1.0	775	DFDS Lys Line, Samskip
Bergen	0.5	300	Baltic Line
Fredericia	0.5	300	Baltic Line
Sodertalje	4.5	400	Containerships, Transatlantic European Services
Reykjavik	5.0	832	Eimskip, Samskip, Atlantsskip
Ventspils	1.0	300	Samskip
Baltic			
St Petersburg	5.5	412	AGS Shipping, Containerships, Delta Shipping Lines, NSC Archangelsk, Transrussia Express
Archangelsk	0.5	173	NSC Archangelsk
Klaipeda	3.0	400	Containerships, Samskip
Liejpaja	1.0	374	Containerships
Riga	0.5	300	Baltic Line
Gdansk	2.0	500	Containerships, Delphis
Gdynia	1.0	500	Delphis
Raahe	1.0	300	Bridge Baltic Line
Kokkola	1.0	300	Bridge Baltic Line
Turku	1.5	375	Baltic Line, Mann Lines
Muuga	3.0	266	Teco, Samskip
Helsinki	4.3	260	OY Hacklin, Teco lines, Containerships
Kotka	1.0	508	Yellow Star Line
NW Europe			
Zeebrugge	9.0	525	C2C, Dartline
Le Havre	0.5	173	NSC Archangelsk
Bremerhaven	3.4	410	Containerships, Mann Lines, NSC Archangelsk, Yellow Star Line
Antwerp	11.5	390	AGS, BG Freight, Eucon, NSC Archangelsk, Teco, Samskip
Amsterdam			
Moerdijk	2.0	240	AGS, Holland Maas
Flushing	1.0	373	Atlantsskip
Hamburg	13.2	490	Containerships, Delphis, Delta Shipping Lines, DFDS Lys Line, Eimskip, Faro Ship, OY Hacklin, NSC Archangelsk, Teco, Samskip, Yellow Star Line
Cuxhaven	2.0	650	Mann Lines, Samskip
Lubeck	1.0	550	Transrussia Express
Rotterdam	40.0	549	BG Freight, Bridge Baltic Line, Containership, Delphis, OPDR, Delta Shipping Lines, DFDS Lys Line, Samskip, Eimskip, Faro Ship, Eucon, Europe Lines, Holland Maas, DFDS Container Line, Teco
Radicatel	3.0	525	C2C, Eucon
UK & Eire			
Southampton	1.0	508	BG Freight
Felixstowe	6.5	385	BG Freight, Delphis, OPDR, Holland Maas, Teco, Samskip
Belfast	7.5	361	BG Freight, DFDS Lys Line, Eucon Shipping, Samskip
Bristol	2.0	625	DFDS Lys Line, Vapores Suardiaz, MacAndrews
Dartford	7.0	753	Dart Line
Goole	3.5	300	Transatlantic European Services
Greenock	2.0	625	DFDS Lys Line, Vapores Suardiaz, MacAndrews
Grangemouth	5.5	325	BG Freight, Samskip
Harwich	1.0	450	Mann Lines
Immingham	9.5	468	Atlantsskip, Containerships, DFDS Lys Line, Eimskip, Samskip
Hull	5.5	300	Samskip
Liverpool	4.0	400	Coastal, MacAndrews
London/Tilbury	4.5	300	Samskip
Tees&Hartlepool	2.0	350	BG Freight
Drogheda	2.0	200	DFDS Lys Line, Europe Lines
Cork	10.5		BG Freight, DFDS Lys Line, Eucon, Samskip
Dublin	17.0	564	BG Freight, Coastal Container Line, DFDS Lys Line, Vapores Suardiaz, Eucon, MacAndrews, DFDS Container Line, Samskip
Warrenpoint	3.0	405	C2C, Eucon
Waterford	4.0	550	C2C, DFDS Container Line
Iberia			
Bilbao	5.0		DFDS Lys Line, Vapores Suardiaz, Samskip, MacAndrews
Vigo	1.0	350	Holland Maas
Leixoes	5.5	360	Delphis, OPDR, Holland Maas, Portline
Lisbon	5.5	360	Delphis, OPDR, Holland Maas, Portline

Source: Moffatt & Nichol, ports, operators

3.2.3 **Frequencies and volumes**

Using the records of the ships' activities in the Baltic Sea during 8 first months in the year 2006, the following records are registered.

Table 28: *Individual ships calling the Baltic Sea Area*

Individual ships	Port Gdansk	Gdynia	Göteborg	Hamina	Helsinki	Kotka	Riga	St Petersburg	Tallinn	Århus
General cargo	60	25	35	9	10	34	77	102	53	50
Container	32	19	64	24	52	55	38	67	38	72
Roro	6	10	2	23	21	11	1	10	3	6
Total	98	54	101	56	83	100	116	179	94	128

The containers are mainly carried by container carriers but there are also many general cargo vessels trading as containerships as they are flexible in that respect.

The roro vessels are carrying containers but at a very low percentage of the carrying capacity. The main form of trading is break stowage of forest products and trailers in service between Scandinavia and the Continent.

Table 29: *Number of calls at the ports*

Number of calls	Port Gdansk	Gdynia	Göteborg	Hamina	Helsinki	Kotka	Riga	St Petersburg	Tallinn	Århus	Grand Total
General cargo	136	83	229	26	46	143	307	738	166	236	2,110
Container	194	91	787	93	683	519	241	884	232	578	4,302
Roro	6	89	26	311	690	131	4	84	27	148	1,516
Grand Total	336	263	1,042	430	1,419	793	552	1,706	425	962	7,928

Table 29 shows the number of calls over the 8 month period in the different ports. From this the character of the port is clearly visible. It should be noticed that the roro traffic in the Port of Göteborg is excluded, but for the traffic in relation to other ports in the Baltic Area. The high frequency of calls in St Petersburg, Helsinki and Göteborg/Aarhus is clearly visible.

Table 30: *The container carrying capacity by the ships call in port*

No of TEU Capacity	Port Gdansk	Gdynia	Göteborg	Hamina	Helsinki	Kotka	Riga	St Petersburg	Tallinn	Århus	Grand Total
General cargo	13,426	7,121	6,735	2,046	2,812	9,263	12,797	16,678	9,304	18,431	98,613
Container	27,121	20,238	155,045	19,037	41,183	44,678	27,469	59,037	30,472	148,323	572,603
Roro	3,334	3,629	608	8,223	8,848	4,265	0	2,791	1,600	1,880	35,178
Grand total	43,881	30,988	162,388	29,306	52,843	58,206	40,266	78,506	41,376	168,634	706,394

The activity and service level is more visible if the container carrying capacity of the ships is displayed, as in Table 30. The huge capacity in Göteborg and Aarhus refers to the calls of the deep sea container vessels. The corresponding volumes of actual containers are reported in section 2.1.

3.2.4 **Ships dimensions**

The fleet of vessels currently trading in the Baltic Sea region are of course adapted to the trading conditions in this region. This chapter will highlight some of the characteristics of these vessels and further on in the report these characteristics will be put into perspective of the development scenarios.

Table 31 under presents average figures for the 20 most frequent ships in some of the ports. The figures include roro and general cargo ships and the inclusion of the roros give the figures a special touch. The powerful vessels roro vessels calling Hamina and Helsinki have high engine power, but still only average dwt

capacity. The speed is among the top ones and all vessels have 1A Super Ice Class. Thus are the average speed and kW figures for Hamina and Helsinki higher than for other ports.

Table 31: *Character of the 20 most frequent ships in each port*

	Avg No calls	Avg TEU	Avg DWT	Avg Speed	Avg kW
Århus	30.4	706	9,279	16.9	6,807
Gdansk	11.5	577	7,581	15.3	5,910
Gdynia	10.5	577	7,823	16.8	6,308
Gothenburg	30.9	666	8,097	16.7	5,940
Hamina	18.0	517	8,964	18.2	12,104
Helsinki	43.0	561	8,610	18.3	9,695
Kotka	22.3	742	9,421	17.9	8,679
Riga	15.9	529	8,030	14.9	5,647
St Petersburg	30.3	740	10,127	17.6	7,667
Tallinn	13.3	685	9,039	17.5	8,222

The largest vessels in dwt are found in St Petersburg as could be expected. However, the size is not tremendously higher than in the neighbouring ports in the Gulf of Finland. The reason for this is that many of the vessels that call on St Petersburg also call the Finnish ports en route.

The highest frequency is found in Helsinki, but if the roros are disregarded Göteborg, Aarhus and St Petersburg are frequented the most.

Other important factors are the size of the vessels as this is designing the port capacity to accept a call. Especially the beam of the vessel should be possible to be serviced by the port gantry crane. This is also reflected by the size of the vessels call at the ports.

Table 32: *Number of ship calls by beam range & port*

Ships' Beam	Port										
No of calls	Gdansk	Gdynia	Göteborg	Hamina	Helsinki	Kotka	Riga	St Petersburg	Tallinn	Århus	Grand Total
< 15 m	37	14	52	5		15	173	311	65	20	692
15 - 20 m	99	81	573	75	380	241	173	313	146	361	2,442
20 - 25 m	64	46	2	200	521	163	51	435	33	215	1,730
25 - 30 m	2	10	80	54	163	125	44	49	65	68	660
Panamax	4		95	3						44	146
42,9 m			2							1	3

The feeder traffic is heavily concentrated at a ships beam ranging from 15 to 25 m. Here we find almost 75 % of the ship calls.

Table 33: *Number of ship calls by beam range & vessel type*

Calls in the Baltic Sea			
Beam	General cargo	Container	Roro
< 15 m	670		22
15 - 20 m	794	1,487	161
20 - 25 m	83	913	734
25 - 30 m	2	346	312
Panamax		144	2
42,9 m		3	

The discrepancy between the numbers of vessels presented in each assessment is because of lack of information for some ships.

Finally the draught of a ship is also an essential figure for calling the port.

Table 34: The number of ships in each range of max draught

Calls in the Baltic Sea			
Draught	General cargo	Container	Roro
< 5 m	738	68	31
5 - 6 m	755	5	31
6 - 7 m	302	1,073	860
7 - 8 m	144	1,387	515
8 - 9 m	53	1,038	77
9 - 10 m	68	470	
10 - 11 m	37	3	2
11 - 12 m	1	59	
12 - 13 m	2	88	
13 - 14 m		2	
14 - 15 m		109	

The draught of the ships is also concentrated to a certain range. The deepest vessels are the container vessels and the 6-9 meter range is highly frequented.

3.3 Ships ice class in the Baltic Sea

The ice conditions in the Baltic Sea call for ice classed vessels for a safe navigation in winter time, at least in the Bay of Bothnia, the Quark, the Sea of Bothnia, the Sea of Archipelago and the Gulf of Finland.

The Finnish and Swedish Maritime Administrations have set up ice class regulations that impose restrictions on ships calling the area during winter time. The restrictions require that the vessels are suitable for ice navigation, which comprise the strength of the hull, rudder, gears, shafts and outfit of the vessels, as well as certain details of the design and the construction of the vessels. Depending on the degree of fulfilment, the vessels are assigned a Finnish Swedish ice class (FS).

The Finnish fairway dues are differentiated for FS ice classes. This differentiation applies all year round, not only during the winter season. Since the differentiation markedly benefits vessels with high ice class (almost twice as high for 1A over 1A Super), the majority of the frequent trade on Finland is ice-classed and thereby also significant parts of the trade in the region.

Table 35: Ice class distribution of calls in selected port

St Petersburg	
Ice class	% of calls
Non	33
FS II	<1
FS 1C	1
FS 1B	1
FS 1A	65
FS 1A Super	1

Göteborg	
Ice class	% of calls
Non	21
FS II	27
FS 1C	5
FS 1B	1
FS 1A	45
FS 1A Super	2

Riga	
Ice class	% of calls
Non	23
FS II	3
FS 1C	1
FS 1B	10
FS 1A	61
FS 1A Super	0

Helsinki	
Ice class	% of calls
Non	17
FS II	None
FS 1C	1
FS 1B	None
FS 1A	61
FS 1A Super	21

Tallin	
Ice class	% of calls
Non	15
FS II	None
FS 1C	2
FS 1B	3
FS 1A	76
FS 1A Super	3

Aarhus	
Ice class	% of calls
Non	24
FS II	26
FS 1C	1
FS 1B	1
FS 1A	48
FS 1A Super	None

The tables above shows the ice class distribution of vessel calls in selected ports. Ice class 1A is clearly the most common and for vessels calling the port of Helsinki ice class 1A Super dominates. A substantial part of these vessels are roro ships.

The maritime administrations in the Baltic Sea region have found a way to cooperate to ensure the risk of accidents is minimised and to give assistance to the merchant fleet. This form of cooperation runs under the name Baltic Icebreaking Management (BIM). The BIM partners have set up a joint communication system, IB-net, in which the status of the vessels and the ice situation are broadcasted on the internet. All ice-offices and icebreakers receive this information and can by this plan the assistance.

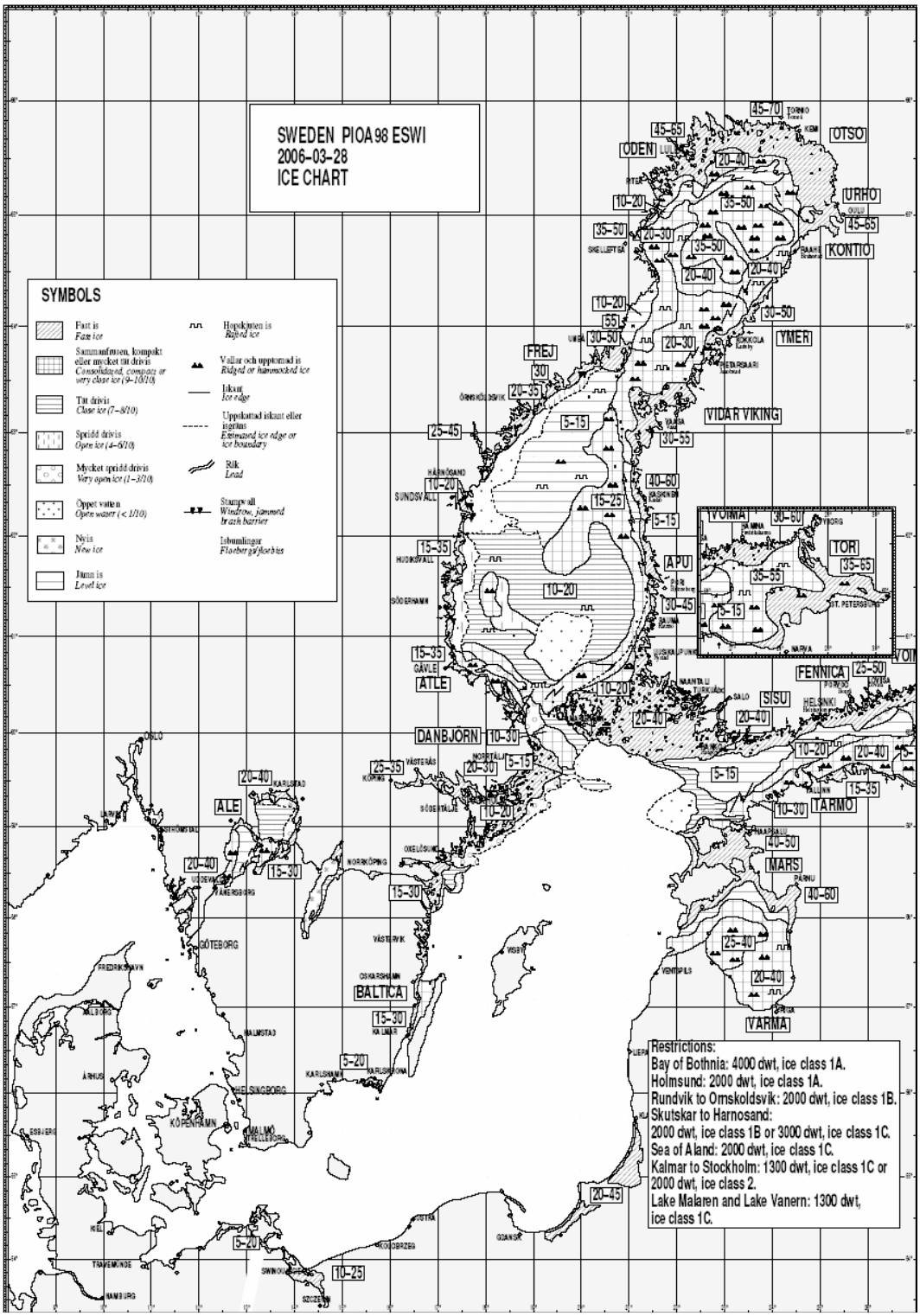
Through the agreement, the administrations also share icebreakers. This ensures better use of the larger icebreakers in areas with severe ice conditions. It also enables the replacement of resources that need to be maintained or repaired.

The organisation is presented on the website www.baltice.org where ice maps, satellite images and other relevant information are at hand for ship owners, agents, shippers and others concerned.

Figure 24 shows an ice chart that also states the requirements on ships to enter areas with ice restrictions. Ships are to report to the joint ice breaker office in the area. The ship identity and route are to be presented well ahead of estimated entrance in to the area. Restrictions are updated continuously and set the minimum requirements of FS ice class, dwt and power that the vessels have to meet to be assisted when entering the area.

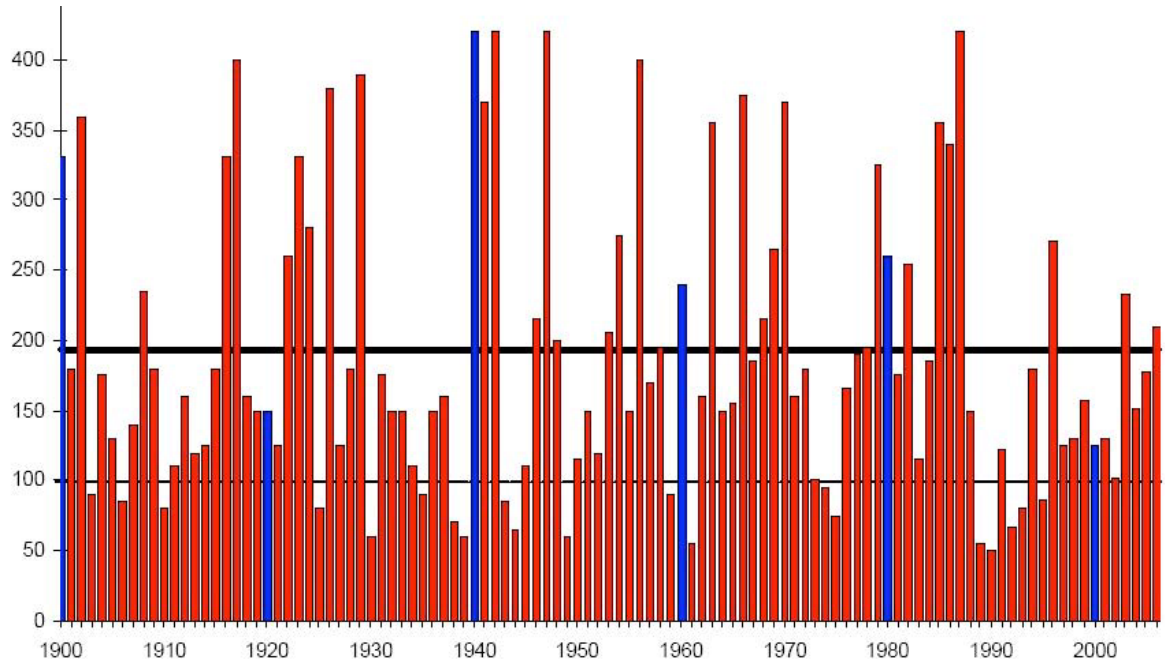
If a ship does not fulfil the set requirements and it ends up in distress, icebreakers will come to assistance in case of danger and risk of lives, but at full expense of the owner.

Figure 24: *Ice map 2007-03-25 from www.baltice.org*



The ice cover varies a lot over the years. Figure 25 shows the coverage over the past century. The really severe winters start in October/November. When the water cools down as early as that, a long and hard winter is normally to be expected. The strong winter in 1987, the ice even covered Kattegatt.

Figure 25: *Ice coverage over the past century (ref. Baltic Icebreaking Management)*



Severe winter ice conditions are not only a matter of the thickness of the ice. The real danger comes when the ice starts to move because of hard wind. Larger ships fare better in those types of conditions. However, the force itself can be so strong that it sinks the ship.

3.4 **Environmental and socio-economic impact**

The container sea terminal is in most cases situated in the vicinity to a larger city or town and large trucks have to pass urban areas to reach the terminals, resulting in noise and emissions all day round.

Rail operation also produces noise. The emissions can be very low using electric locomotives, but the most common is diesel engines. The noise from rail operation is more difficult to reduce, but there are ways to support the rail tracks which give a reduction of the disturbing sound and of vibration, although the latter is not of major importance when trains move at low speed.

The container operation offers a very versatile and flexible way of shipping cargo over long and short distances using the most suitable mode of transport for each movement.

Large infrastructural investments have been made over a period of thirty years to allow for the handling and use of containers in the worlds commodity trading. The use of containers has triggered global trading, which from an environmental point of view has led to increased transports, but from a social point of view has increased the wealth and communication between people and thereby enforced stability and peace in the world.

The outstanding benefit of a container is its ability to carry almost all kinds of goods. In this way the transport will become very efficient although the speed of the ships is on the high side. The historical increase of the container traffic is presented in previously. From an environmental point of view the container traffic is almost unrelated to the size of the ships. The reason for this has been that the ships in deep sea traffic are bound to a fixed schedule. When increasing

the ship size the power must be increased to compensate for the larger hull but also for the longer lay time in ports to allow for the handling of containers.

This situation is definitely broken for the new largest ships where the speed is constant but the size of vessel is increased. The effect is that the fuel consumption per container has been reduced by 67 % which is extremely beneficial for the reduced consumption of natural resources and the reduction of the CO_2 emissions.

Table 36: *Fuel consumption per container for different size of container ships*

Name	Main engine kW	Specific Fuel Cons.	Cons/day tons/day	TEU 14	Consumption per cont. kg/TEU*day
Emma Maersk	80,080	173	283	9,225	30.7
Axel Maersk	63,036	173	222	6,600	33.6
Ankara	33,686	180	119	1,732	68.7
Anke Ehler	6,100	190	23	333	69.1

The level of utilisation of the container vessels in the Baltic area is extremely high and the vessels are frequently fully loaded on the voyage.

The pricing of the container traffic is pro-active in the meaning that the deep sea operator prices the transport to utilise the containers as much as possible. In this way the low value forest product can find a market in the Far East or in the US using the containers that in other cases would go empty back. The freight gives the container operators a marginal coverage of the return cost.

The marginal cost in way of fuel consumption, emissions and running cost will in this way be reduced.

3.4.1 Container operation in the Baltic

The shipping activities in the Baltic are very high. The average size of a General Cargo ship in the Baltic is between 3,500–4,000 dwt. These vessels are the workhorses of the Baltic Sea transporting everything from free flowing dry bulk to the most expensive industrial components. Many of these General Cargo vessels are operating as container ships. The difference between a modern general cargo ship and a container ship is mainly the volume of the enclosed space in the hold. While the general cargo vessel needs this space for alternative transports the dedicated container vessel prefers to carry the containers above the hold towering the containers as high as possible. By this the container vessel can carry much more cargo per GT which saves cost in port and berth dues.

Figure 26: *Typical container ship having a tower as accommodation and low freeboard*

Figure 27: *A general cargo vessel prioritise the volume in the hold and is often geared*

The result is high carrying capacity under all conditions to keep down the costs. As a result of this the environmental performance will also benefit as the sea transport will be less expensive and can compete in the intra European distribution of containers.

One example of the flexible use of ships is the container operating system built up by SCA Transforest Sweden.

Figure 28: *SCA Time chartered ships in a regular service on the North Sea to the companies own terminals in Rotterdam and Tilbury*

The SCA ships are of 11.500 dwt and they carries cassettes aboard loaded with pulp and paper. Each cassette carries products of 40–60 ton. On the return voyage the SCA-vessels carries empty and some partly loaded containers to Holmsund

and Sundsvall. These containers are a part of a transport system that carries primarily sawn timber and other products in a service from Rotterdam. The trip from the north of Sweden to Rotterdam with the containers is carried out by chartered General Cargo ships which carry pulpwood from the Baltic countries to the mills in Holmsund and Sundsvall on its North bound trip. In this way high utilisation and good productivity can be delivered using a combination of ships, to the benefit of competitive costs and healthy environment.

In Finland the industry in the Bothnia Bay also charters its own tonnage for the distribution of the steel and forest products to the terminals in UK an on the Continent. These vessels, which to a large extent are roro vessels, carry containers on weather deck. These containers are used as much as possible to supply the industry with the needed supplies for the production. However the demand of containers for the distribution of the production gives a low utilisation of these north bound containers. These unbalanced transports are the major problem for the Northern Scandinavia. It is possible to utilise container that comes in to the more populated southern regions but then these units have to be transferred to the north which is costly and it demands resources.

3.4.2 **The emissions**

The new restrictions in bunker quality apply to the Baltic Sea since spring 2006. The implementation has come without any problems for the industry and the sea operators. Further restrictions can be expected.

In Sweden an agreement was signed in the 1990:s between the forest industry and the Swedish Maritime Administration stating that all ships which enters the service for the forest industry shall run on fuel containing max 1 % sulphur. The agreement also states that all ships shall have a NOx certificate and most of the vessels are today using SCR NOx equipment that reduces the NOx content in the emissions to less than 2 g/kWh shaft power.

The socio-economic savings in the reduction of sulphur are huge and difficult to estimate without thorough measurements and calculations. An estimate based on the year 2003 Baltic Sea emissions presented by the Swedish Maritime Administration gives a reduction of the SOx level of 56,000 tons per year based on the reduction of sulphur from about 2.4 % to 1 %. Corresponding cost using Externe socio-economic cost per kg SOx gives a socio-economic saving in the region of 444.375.000 € per year.

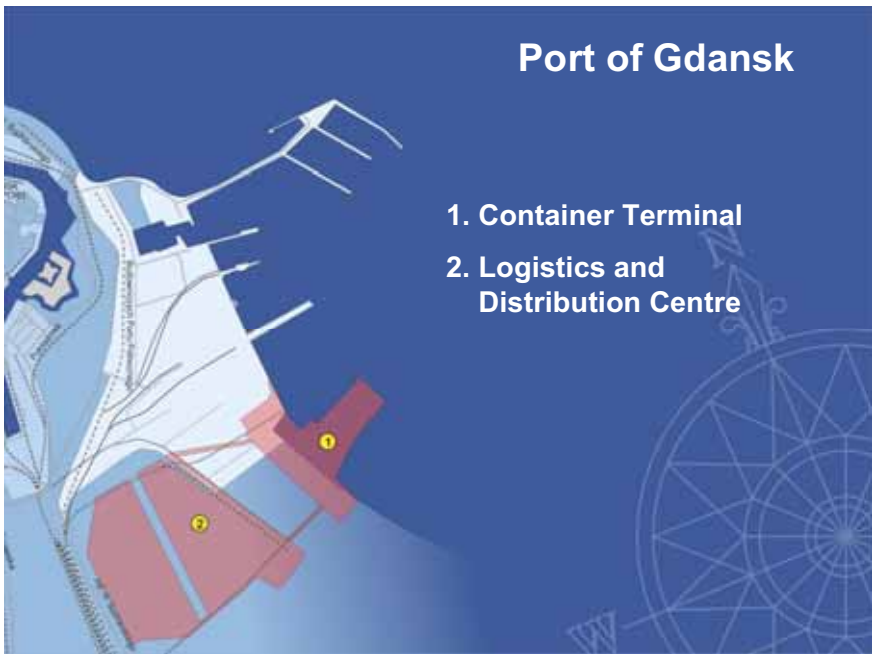
3.4.3 **The sea bridge**

One of the major benefits of the container operation is that the majority of the units are distributed in the Baltic Area by ship. The operation is built up without of EU funds or programs on purely commercial basis in full competition not only between the container operators, but also with other means of transports.

Some of the containers are discharged in continental ports such as Hamburg, to be broken for further distribution by road and ferry services. The reason for this type of service is that lots of cargo and products are stored in Germany and then distributed to Poland and Scandinavia by truck/trailer or by rail. Container seeks the return cargo either by shifting them around the industry in the port where they landed or by shipping them to other ports.

Today most of the new built container terminals are design and constructed with an adjacent “Logistic area”.

Figure 29: *Example of modern container terminal with a logistic area*



In Figure 29 the new terminal of Gdansk shows an allocation of the logistic centres that has rail and road connections to support the quay front and the container terminal.

The support of rail and road infrastructure to the container sea port enhances the use of the port as an option for landing the containers. From the port high frequent regular rail pendulums can communicate the containers between inland container terminals and the container port. These kinds of fast and regular transport systems reduces the road transports and have all the possibilities to be competitive both in frequency and in cost in comparison to road haulage. As a result the port will increase its competitiveness in the area.

A result should be decreasing ferry transports and increased intra European shipments using containers. There are all possibilities to achieve this as the supply of containers that is to be relocated in the area is numerous. The system presenting the best service level at the lowest cost is the winner of any system.

The most productive and cost efficient operation is also the most environmentally friendly with very few exceptions.

4 Spoke ports and key factors

SUMMARY

- **Highest port dues in St Petersburg**
- **Ice differentiated national fairway dues put Finland in the high end**

Looking at the present feeder services given to the major spoke ports in the Baltic Sea by the major feeder operators, it can be concluded that no service has less than one call per week and the maximum lead time from the port to a major hub port is six days. This requires first of all a number of sailing schedules and a limitation of the port calls on each feeder service. The higher the turnover in the ports, the fewer the number of ports on the schedule.

4.1 Volumes

The new Baltic EU member countries have established trade relations with other EU members and containerisation of the Baltic is developing fast. The container turnover in the ports (Table 37) illustrates this well.

Table 37: *Container turnover in selected ports in the Baltic*

Turnover in TEU	2004	2005	2006	growth
Hamburg	7,003,729	8,087,545	9,300,000	15%
Bremerhaven *	3,501,276	3,735,000	3,985,000	7%
St Petersburg	690,600	1,064,081	1,290,000	21%
Tallinn	159,576	127,585	150,000	18%
Riga	87,712	168,978	200,000	18%
Aarhus**	341,335	396,000	459,420	16%
Hamina	143,186	159,783	178,304	12%
Helsinki**	499,889	460,000	414,000	-10%
Kotka	326,364	366,667	455,000	32%
Gdynia*	140,504	400,165	461,170	15%
Gdansk**	17,922	70,014	77,473	11%
Gavle*	46,614	48,000	98,000	104%
Gothenburg	722,206	771,679	820,000	6%
Oslo*	177,292	170,506	172,065	1%

*Major restructure

** New terminal opens 2007/8

The capacity of the concerned ports are in several cases in the midst of development projects and to some of the involved parties container handling means that the infrastructure, the operation and the handling equipment all have to be adapted to the new structure.

The shipments out from the Baltic Sea region are dominated by the voluminous steel and forestry products. The containerised alternative has gained ground and there is a shortage of empty containers in both Finland and Sweden. These markets have to be furnished from surplus regions such as St Petersburg, the Baltic countries and the Continental hubs.

Substantial volumes of steel and forestry products are shipped to continental ports where they are stored for further distribution by rail or road. The use of containers is largely for the handling of vulnerable and difficult products like

sack and medical paper, since the number of handlings of individual products are minimised. This reduces the potential damage of the products and secures its freshness when reaching the destination. Containers are mostly used for inter-continental shipments though.

The production process demands to run each quality in large batches. This gives less rejects and a homogeneous and better quality of the products. The large batches are either stored at the mill or in local distribution centres close to the customers. Each individual reel or sheet is produced for a specific client and is tagged by his identity and the size and quality of the product.

The products are often handled as break bulk in as large batches as possible. Some industries have developed a containerised system of their own though. One concept that has attracted a lot of attention is StoraEnso's SECU (Stora Enso Container Unit), a large unit measuring LxBxH, 13,5 x 3,6 x 3,6 m. The idea behind the unit is;

- to enable an automatic loading/discharge of the box
- to ensure an efficient transport system in the Baltic from mill to port by rail at a low cost
- to enable efficient transfers to roro vessels for further transport to a continental hub port.

4.2 **Lead times and frequency**

The total lead time is often regarded as most important, but for the cost, i.e. how many days will it take for the container to reach its destination if it is presented in the spoke port a certain day. The service between the Baltic and Far East is about 30 days, spanning from 29 to 40 days depending on location at both ends.

The volumes in the port decide the frequency of calls. The minimum frequency of call is in most cases once a week. Few ports are exclusively called on only by one feeder operator.

As mentioned previously, the major deep sea container operators also run their own feeder systems. Examples of a deep sea container operator's own feeder routes are shown in Figure 30 and Figure 31 under.

Major ports have a call every 1-3 days. All ports have a service connection to a continental hub port at least once a week. The majority of the spoke ports has a frequency of 2-3 calls per week to the major hub ports each with a lead time of 2-3 days. Minor ports with a call once a week may have widely varying lead times depending on its position in the schedule. Very few ports have lead times that exceed 4 days.

Figure 30: *OOCL's major volume Baltic feeder service*

Figure 31: *OOCL's minor volume port feeder service*

The two schedules above shows quite explicitly the difference in major spoke ports (SBX1) and minor spoke ports (SBX2). The sailing schedules allows the operator to position the containers from the major spoke ports in three different hubs and in the minor in two hubs or use the feeder operators in the area to position them in other hubs if that suits the container service better.

The scheduling is dynamic which shows on the websites of the operators. The operator can choose the best option for the client by either using a port call of his own or the service of a feeder operator. The own feeder vessels will only call a port if there is a turnover in the port of such magnitude that justifies a service. Otherwise a feeder operator is used to supply the service of taking the containers to a hub port.

4.3 **Reliability**

The measurement of reliability is difficult. No actual statistics are available. However, on the overall view of schedules kept by the deep sea vessels in the ports and the feeder vessels calling at the ports the standard seems to be very good. As the different services are interconnected and the time slots of the berth is very narrow in the occasionally congested European hub ports, the time table has to be met. The requirement of productivity is in this respect mainly addressing the ports and the port operation. In a situation of full competition this is a discipline that fall back on the port itself. If the port is not able to produce the required service on time the operators will seek the service at another location if this is at all feasible. In this respect there is no port which has a position to be exclusive. The major hub ports on the North Sea coast have experienced this the hard way. Trying to raise the handling rates the ports find themselves losing service to other ports in the area.

This concerns not only the time slots at berth but also the total handling efficiency and cost of operation. The competition between the deep sea container operators is fierce which means that the lowest cost available will have the order of the shipment.

As a conclusion the container shipping market is fragmented on a number of levels where full competition is at hand on each level. This is one of the reasons for the success of the containerised system.

A general impression among brokers is that the large deep sea container operators offer the best prices, while the smaller ones are more flexible and provide better service. The reliability in the overall performance is however good and does not differ between the operators.

4.4 **Benchmarking between the ports**

Some of the figures given in table may just be an indication as the method of handling and storage may change using the present infrastructure. The depth of the entrance channel will however be limiting of the size of vessel that may call on the port. The world's presently largest container vessels, the "Emma Maersk" type, have a maximum draught of 16 m. As the maximum draught in the Baltic is about 15.4 m she cannot enter the Baltic Sea on the full draught. This is however a situation that rarely occurs in a 10-15 year perspective as the ships normally discharge a high number of containers on its way up in Europe before turning into the Baltic area.

Table 38: *Key port data*

Country	Port	Calls 06	Quay	Quay depth	Cranes	Area	Stor. cap.
		cont.ships	metre	metre	No	ha	TEU
Russia	St Petersburg	1,530	1,700	12.5 - 13	>14		
Estonia	Tallinn	340	219	12	1		
Latvia	Riga	500	450	10	3		
Denmark	Aarhus	1,040	1,298	14	6	41	800,000
Finland	Hamina	590	609	10	3	55	500,000
Finland	Helsinki	1,480	820	12	6	42	450,000
Finland	Helsinki Vousaari	-	1,500	15	8	150	1,500,000
Finland	Kotka	980	1,436	10 - 12	7	150	900,000
Poland	Gdynia	1,240	1,250	10	6	65	1,000,000
Poland	Gdansk	390	650	16.5	4	36	1 M cap*
Sweden	Gavle	190	350	11	2	7	150,000
Sweden	Gothenburg	1,000	1,735	12 - 14.2	11	70	3 M cap*
Norway	Oslo	590	665	10	2	3	
							* handling capacity

Should ships of this size be of interest in the future for shipments it is more likely that new vessels are built to match the Baltic Sea criterion; possibly bother wider and longer. Such ships would then likely require new cranes, but we are now way into the future.

The cost of the operation can be divided into the cost of the ships feeder service and the port service cost. Many of these costs are bound in contract between the port, port operator (stevedore) and the container deep sea operator or the feeder operator. These contracts are kept secret as they are part of the competition between the services.

Looking at the published costs presented by the ports on the web gives a hint of the level of cost for a vessel calling at the port. In this study only the fairway due and the berth due (port due) is considered. The calculation has been produced for two feeder ships of the following details:

Table 39: *Ships used for the benchmarking of costs*

		IMO	Ice	GT	NT	L	B	D	V	TEU	DWT
Ship1	Anke Ehler	9208459	1A	5,067	2,530	118	18.2	9.2	19,808	658	6,850
Ship2	ENDURANCE	8204626	1A	32,152	14,183	222	32.2	15.0	107,081	1,952	32,424

Table 40: *Port call costs*

	Fairway dues, $	Based on	Port dues, $	Based on	Ship 1, $	Ship 2, $	Index
Aarhus	-	-	0.9775	GT	1,143	7,253	100
Gdansk	0.22	GT	0.11	GT	1,672	10,610	146
Gdynia	0.31	GT	0.11	GT	2,128	13,504	186
Helsinki	0.48	NT	0.32	NT	2,611	14,639	205
Riga	0.38	GT	0.011	GT	2,547	16,163	223
Hamina	0.48	NT	0.49	NT	3,158	17,702	248
Kotka	0.48	NT	0.5	NT	3,190	17,885	251
Gavle	2.45	GT	2.90	GT	2,918	18,514	255
Gothenburg	2.45	GT	3.34	GT	3,171	20,124	277
Tallinn		GT	0.65	GT	4,235	23,976	336
St Petersburg	9 different rates	M^3			15,544	78,202	1,117

Cost per call. One ship, 52 calls/year. Rebates on port dues not publicly available not taken into account.

Source: Lloyds Register-Fairplay.

The cost of calling a port is widely spread and there is no common system for the charges. In Sweden and Finland the Maritime Administrations charge fairway dues, whereas there, for historical reasons, is no such due in Denmark. The port charge in Vousaari is assumed to be the same as for Helsinki today. The charges in St Petersburg are complicated to calculate, but having checked with a ship owner the presented figure is at least at a representative level. As can be seen in the indexed column the range of fees varies widely. The most expensive cost is seven times higher than the lowest cost. The newly accessed EU countries are keeping a low level of the charges, most likely to attract Russian cargo volumes.

Discounts for multiple calls are in frequent use. Levels of up to 80-90 % are heard of. Container ships are also charged very low rates compared to other types of vessels, where tankers are on the high side.

Most of the ports also charge a fixed fee per container regardless of size and content, while others like the Port of Göteborg charge different fees for 40 and 20 ft containers.


255

5 North Sea Baltic Hub System – Model

SUMMARY

- **Cost effective to extend the deep sea liner network to the Baltic**

The existing system for distributing containers around the BSR has been developed and grown over many years. This process has been market driven and is ongoing.

There is no reason to believe this will be discontinued, but governmental and other bodies are trying to influence the process by lowering various barriers to increased efficiency in the system.

Therefore this part of the study takes an aggregate view of the work done previously in Actions 1 and 2 and ties this together. The modelling of the hub and spoke ports is integrated into one NSBHub System model.

The model has been created to simulate different shipping systems in the Baltic Sea area in order to understand the cost effects and the cost components related to different feasible set-ups. In this way it is possible to calculate the cost effect of using different size of ships using various set ups of hub – spoke port configuration.

The structure of the container traffic in the Baltic Sea container terminals is based on the present size and schedule of ships and the related turnover. This information is remotely collected by registering the vessels when they call at the ports. Most of the container systems and their schedules are presented by the deep sea and feeder operators on the Internet. The ships used in the service are also presented on the Internet.

The cost of operation is derived from records of Time Charter rates paid for container vessels of different size. From these rates a function of cost per day as a function of the registered TEU 14 capacity is used. The ship's particulars and performance are derived from the ships' register which also gives the installed power which is used to calculate the power consumption of main and auxiliary engines.

Port costs are based on the fairway and the berth dues. These dues are assessed for each call. Almost every port offer special dues for ships only carrying containers. They have also substantial reductions for ships calling multiple times over the year or month. However it is quite normal that liner services have an undisclosed agreement with the port why the actual contract price seldom is known. For this reason the basic rate for a port call is used as the study rather focus on comparing the cost between shipping systems than the actual level of the cost for one operation. A large number of different routes have been calculated.

5.1 Port turn around times

To benchmark and have representative values for port turn around times we have measured the actual times for ships in some ports during October 2006 (Table 41 and Table 42).

The turn around time is measured from when the ship enters the port to when it exits the port. This time reflects how much cargo that is handled in the port and thus the figures are thus not directly comparative between ports.

Ships do sometimes spend excess time in ports for reasons other than just loading and discharging, such as matching time schedules. In some cases this could skew the data. It should also be underlined that in some cases, there are only a few observations behind the averages. Yet this is what actually has taken place – representative or not. It is the use of this information that requires an extended insight before any conclusions are drawn.

However, some general conclusions clearly could be made and for instance Hamburg showed high figures, especially for feeder tonnage below 1,000 TEU capacity. Rumours have it that the Hamburg times have come down since. This has however not been checked.

The averages vary quite substantially between the ports and it seems like having more or less cargo to load or discharge is not the only explanation for this. Some ports seem to have performed better than others, at least this observation period.

Table 41: *Port turn around times in the NSBH area*

	Aarhus			Gothenburg			Helsinki			St Petersburg		
Size class	Avg hours	Avg teu size	No obs	Avg hours	Avg teu size	No obs	Avg hours	Avg teu size	No obs	Avg hours	Avg teu size	No obs
8,000+ teu												
5'-7,999 teu	18.0	7,445	4	28.0	7,370	3						
3'-4,999 teu												
2'-2,999 teu	9.3	2,328	3	12.2	2,328	4				50.0	2,824	1
1'-1,999 teu	13.1	1,356	7	10.0	1,457	3	19.7	1,237	9	37.6	1,316	15
-999 teu	11.0	641	43	15.2	600	60	13.9	755	58	40.6	815	91
GC, 10'+ dwt, 100+ teu	88.7	748	4							99.5	838	11
GC, <10' dwt, 100+ teu	21.3	312	27	13.7	287	12	7.1	293	14	53.1	218	125

Source: AIS LIVE and Lloyds Register-Fairplay. Data from October 2006.

Table 42: *Port turn around times in four major hubs*

	Antwerp			Bremerhaven			Hamburg			Rotterdam		
Size class	Avg hours	Avg teu size	No obs	Avg hours	Avg teu size	No obs	Avg hours	Avg teu size	No obs	Avg hours	Avg teu size	No obs
8,000+ teu	31.6	8,769	12	26.4	8,434	7	40.1	8,627	26	34.0	8,610	31
5'-7,999 teu	31.7	5,662	41	24.9	6,665	32	37.0	5,928	76	27.9	6,253	75
3'-4,999 teu	25.6	3,802	73	20.2	4,088	58	24.0	3,883	32	20.4	4,075	66
2'-2,999 teu	28.4	2,516	68	23.1	2,666	30	25.0	2,542	43	18.5	2,586	61
1'-1,999 teu	27.8	1,432	83	22.6	1,328	38	20.9	1,413	35	22.3	1,439	22
-999 teu	19.8	724	58	13.0	663	206	27.8	667	357	25.9	666	354
GC, 10'+ dwt, 100+ teu	79.8	1,021	89				74.6	1,195	18	58.5	1,202	34
GC, <10' dwt, 100+ teu	40.5	263	230	21.4	366	95	28.2	278	215	36.0	285	375

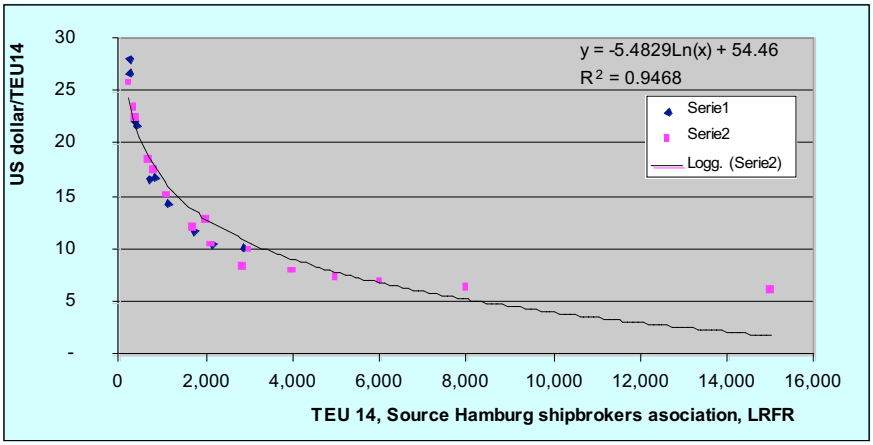
Source: AIS LIVE and Lloyds Register-Fairplay. Data from October 2006.

5.2 **Time charter costs**

The time charter costs for the vessels are based on the Hamburg Index (published by the German Shipbroker Association), from which the daily T/C cost is derived as a function of the container ships in carrying capacity TEU 14.

The illustration gives an idea of the clear relationship between the two. As a counter check, another method has been used based on the investment cost. The two methods arrive at similar results.

Figure 32: *Illustration of the T/C cost/TEU14 relation*



5.3 **Bunker costs**

The use of fuels is considered to be HFO IF 380 1.5 % S consumed by main propulsion in service and MDO 1 % for the Auxiliary engines at all time.

The fuel cost calculations are based on the specific fuel consumption for the vessels multiplied by the effect of the installed engines, reduced for slow steaming at certain passages, multiplied by the time at sea and last by the fuel price.

Figure 33: *Calculation of HFO cost*

SFC * kWh * reduction [1] * time@sea * HFO price
[1] higher reduction in canals, certain passages & some fairways

The cost calculation for the use of auxiliary engines is a fairly simple approach based on a consumption ranging from 1.0 to 3.5 tonnes per day, multiplied by time in port and by the fuel price. In some cases, where shaft generators are assumed to be used, then time at sea is also brought into the calculation.

Figure 34: *Calculation of MDO cost*

1.0-3.5 t/day * time in port
[+time@sea] * MDO price

5.4 **Deep sea & feeder costs**

Deep sea operations depend on a regular service and a fixed schedule. The feedering systems are more flexible in this respect. The number of vessels in the service makes it less complicated to maintain the service level even when the schedule is altered.

The ice restrictions in the Baltic Sea are limit the options. The deep sea vessels do not carry any form of ice class and will consequently not consider entering a sea area having a potential ice situation.

A typical route is Bremerhaven, St. Petersburg, Hamina, Helsinki, Bremerhaven, which covers the distribution of incoming containers and repositioning of containers to the industrial market and finally shipping of the loaded containers to the North sea port to be shipped world wide.

An alternative is to feeder the products using a larger vessel in a distribution system from a central port in the Mediterranean area.

Vessels with at least Finnish Swedish Ice class 1B make it possible to fulfil the operation, but calling the Finnish ports with such a vessel is expensive (cost for ice breaker assistance in the Gulf of Finland is not included). Overall, the costs of calling ports in the Gulf of Finland are high, up to seven times as high as in the North Sea ports.

In Finland and Sweden the fairway dues raise the port call cost to a level that is higher than in other ports in the Baltic Sea area. The differences vary between sizes of vessels. St Petersburg prioritises larger vessels why the cost is increasing less by size in St Petersburg although the cost still is high. The cost factor and the ice conditions eliminate any idea of having a container hub in the Gulf of Finland.

Various factors decide the final costs of the operation. Among these the utilisation of the vessel in the different parts of the route is essential but difficult to consider without having a more detailed knowledge of the market split and demand of containers. These factors vary between markets and container operators. In this study the flows can only be followed on a macro level.

For a vast number of routes, the cost per TEU has been calculated. The basis for the cost calculation is:

- Ship's cost of port fairway dues
- Ship's cost of port berth dues
- Carrying capacity TEU 14
- Speed
- Speed reduction as per regulation in fairways
- Bunker consumption
- Diesel consumption
- Finnish Swedish Ice Class
- The ships are considered not to use tugs.

The cost has been calculated for specific loop services. The canal dues for passing the Kiel Canal have been added. These costs include:

- Kiel fjord pilotage dues
- Kiel fjord pilotage fees
- Kiel fjord pilot's travelling expenses
- Kiel canal dues
- Kiel canal pilotage dues
- Kiel canal pilotage fees
- Kiel canal pilots' travelling expenses
- Kiel canal helmsmen

- River Elbe pilotage dues
- River Elbe pilotage fees
- River Elbe pilot's expenses.

Kiel Canal dues have been calculated for 13 different container vessels, ranging from about 4,000 gt to a good 50,000 gt. The total dues therefore range from €4,000 to €14,000 depending on the vessel characteristics.

The information is used to model existing and specific services to the Baltic ports from Antwerp, Rotterdam, Hamburg and Bremerhaven and the hub ports Göteborg and Aarhus.

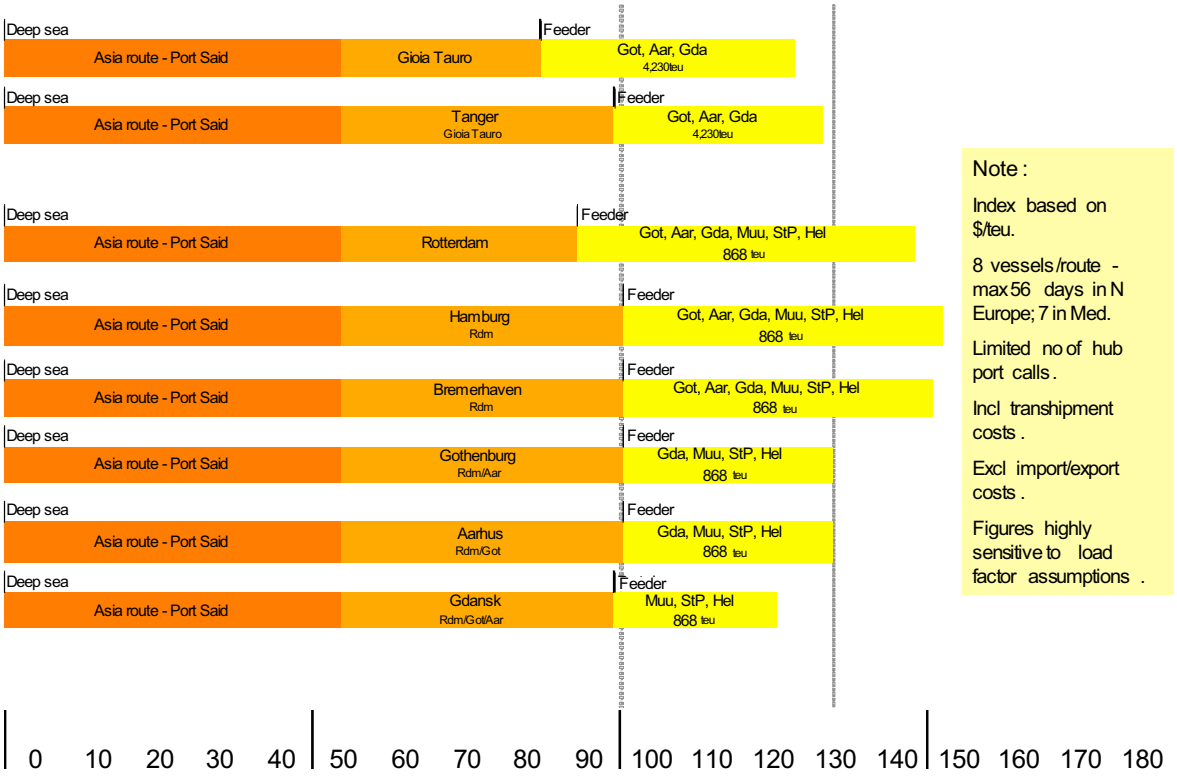
Figure 35 illustrates the relative differences between some of the alternatives. The orange coloured bars represent the deep sea part of the trip, where the deep orange is the Asian route up to a point in Port Said, these are common to all calculations.

The lighter orange illustrates the continued deep sea route up to the transhipment port. In the illustration the transhipment ports have been Gioia Tauro in Italy, Tanger in Marocco, Rotterdam in the Netherlands, Bremerhaven in Germany, Göteborg in Sweden, Aarhus in Denmark and Gdansk in Poland.

The yellow bars represent feedering from the transhipment port to Muuga, St Petersburg and Helsinki and in those cases where the deep sea liner stops outside the Baltic also Göteborg, Aarhus and Gdansk.

Two different sized feeder vessels have been used; 4,230 TEU and 868 TEU. The former is exceptionally large for a feeder and has been included as in interesting comparison, primarily due to the expected reshuffling of routes following the hefty new vessel deliveries to the world fleet.

Figure 35: *Indexed comparison of route costs*



Transhipments costs have been added for the cargo assumed to be transhipped at the hub port. Export and import charges in ports have not been included.

The illustration clearly indicates the advantage of continuing with the deep sea liner vis-à-vis feedering over longer distances. This is however strongly dependent on the volume of transhipment cargo that is remaining onboard up to the transhipment port. If the volumes are there, the conditions for deep sea vessel calls in the Baltic Sea region improve immensely. The following chapter deals with the expected volume development.

The Gioia Tauro and Tanger transhipment alternatives on top should first and foremost be compared with the Gdansk one since feedering from Italy and Marocco is assumed to turn in Gdansk.

The same result is obtained for the other options; it is cost efficient to continue with the deep sea vessel. A possible drawback to the conclusion above could be the difficulty in setting up attracting sailing schedules.

6 Growth assumptions – 2020

SUMMARY

- **20M TEU by 2020**

The basis for the following is the report Baltic Maritime Outlook 2006, which is Work Package 1 of the Master Plan Studies for the Development of the Baltic Sea.

The reasoning in sub-chapters could be regarded as a base scenario on which the forecasts are built.

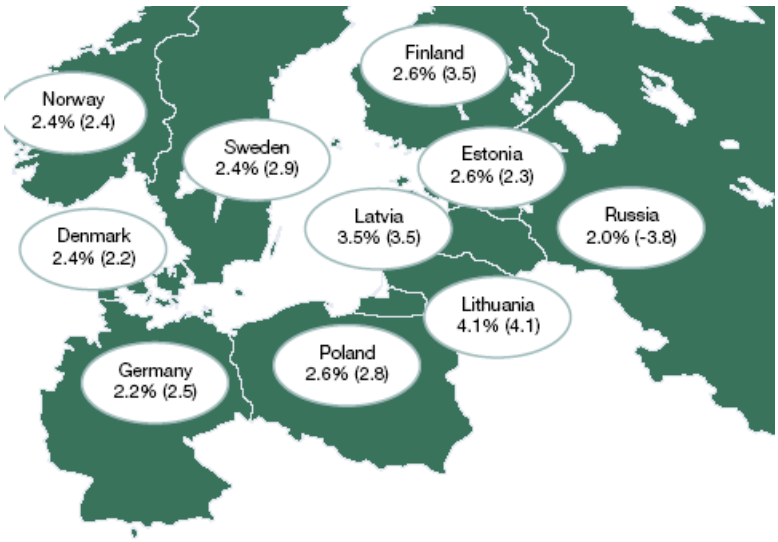
6.1 Economy & trade

The Baltic Sea Region, despite its socio-economic differences, difficulties and growth obstacles, is a region with unique possibilities in the enlarged Europe. The region's geographical position is close to large markets in both east and west.

Since May 2004, eight out of the ten countries in the Baltic Sea Region (BSR) have been EU member states. The two non-member states are EU-associated Norway and the non-associated Russia. A major benefit from an EU membership is that it removes trade barriers and reduces transaction costs for the member states. Some of these potential gains have already been felt in the run-up to membership, but it has the capacity to further stimulate economic growth.

One of the most significant results of economic co-operation in the BSR to date is the development of bilateral trade between the countries in the region. Due to this the BSR economies are growing faster than the EU average.

Figure 36: *GDP average growth rates per year 2006-2020*



Russia has seen a strong economic growth due to strong increases in incomes from oil and gas exports, while the personal incomes for workers have seen minor improvements. As the Russian population is expected to decline due to low birth rates the economic growth will remain dependant on further strong oil prices. Since the oil price is clearly above historic trend the average for the whole forecast period is expected to fall, which is reflected in the above forecast. In its International Energy Outlook 2006, EIA (Energy Information Administration) forecast a 4.3 percent average annual growth in Russia, which is substantially higher.

The BRS region is increasingly involved in the international trade system and its dependence on foreign trade in goods is generally high compared to the EU average. As the BSR countries trade integration in the EU grow, their share of EU´s total trade is therefore likely to increase.

Between 2003 and 2020 the trade within the BSR region is expected to increase 180 Mtonnes, while the trade between the BSR countries and countries outside the BSR is expected to grow approximately 40 percent or 450 M tonnes from 2003 to 2020; exports by 325 M tonnes and imports by 125. This increase represents 71 percent of the total 630 Mtonnes in both intra- and extra-BSR trade.

While exports to countries outside the BSR are expected to increase by 46 percent to 2020, and imports by 31 percent, the intra BSR trade volumes are expected to grow faster, by 55 percent. The highest dynamics in intra-BSR trade development can be identified in the eastern countries of the BSR.

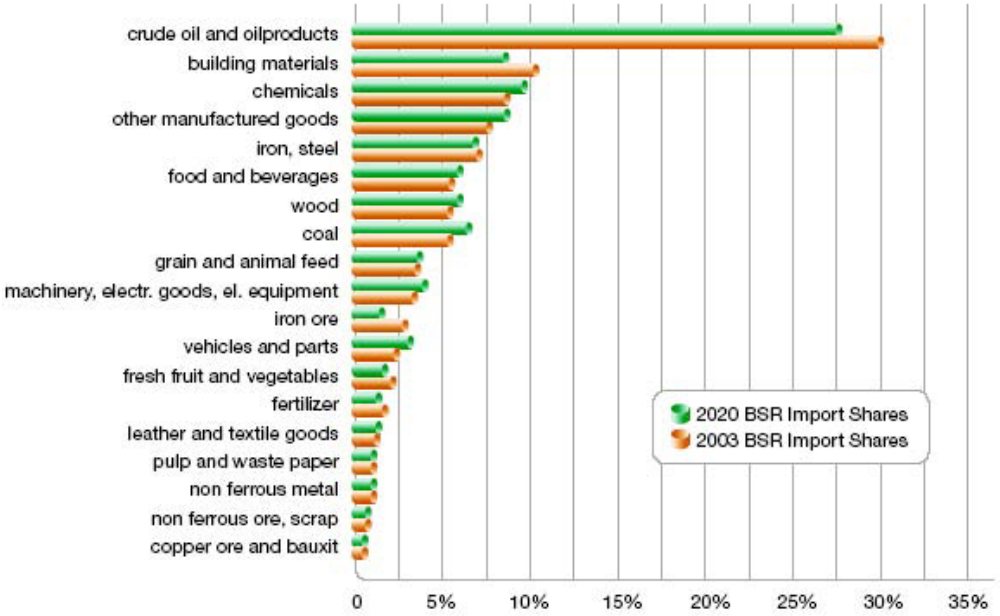
Depending on its size and high rate of growth, Russia and Poland will play an important role in the total trade development, followed by Finland, Denmark and Sweden.

The development of the total trade volumes of the BSR countries, based on 19 SITC commodity groups, shows that all commodity groups are expected to increase in both export and import volumes until 2020, with the exception of iron ore imports.

Oil and oil products will dominate the growth in trade and their share of total exports is expected to increase, while their share of imports is expected to decrease to 28 percent of the total. Still oil and oil products together with manufactured goods, building materials and chemicals will remain the most important commodity groups, accounting for more than 50 percent of the import volumes of BSR countries. However, the relative importance of high value and/or time-sensitive goods, such as vehicles and parts, machinery, electronic goods and electrical equipment, and other manufactured goods, is forecast to increase at higher rates than lower value goods (except for coal).

The imports share of high value and/or time-sensitive cargo is expected to increase from 13.2 percent to 15.6 percent between 2003 and 2020, and their volume is expected to increase 69 percent from or 97.7 to 164.2 Mtonnes.

Figure 37: *The BSR imports and exports shares*

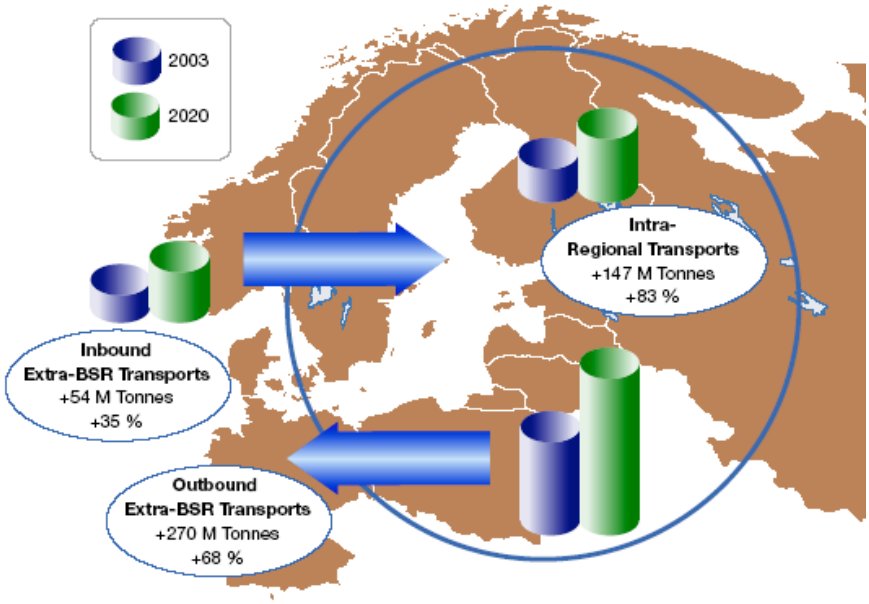


The countries east of the Baltic Sea are expected to see the highest growth rates in imports particularly for manufactured goods, machinery, chemicals, and food. Their share in imports is expected to increase from 24 to 29 percent, representing a 74 percent or 130 Mtonnes increase.

6.2 **Maritime transport**

The growth in maritime transport shows a similar growth pattern as the BSR trade. Outbound transport by sea from the BSR thus shows the strongest growth.

Figure 38: *Maritime transport development 2003-2020*



Between 2003 and 2020 maritime transport is expected to grow by 64 percent or measured in M tonnes 471. The maritime transport volume to/from the region is expected to grow by 324 M tonnes and the intra-BSR volume by 147 M tonnes.

The Skagerack/Kattegatt Sea area represents a gateway to the entire Baltic Sea Region, while sub-regional gateways are emerging in for instance Poland and the Gulf of Finland, through which goods find more efficient routes to and from their destination or source areas. Ports in Germany, Poland and the Gulf of Finland are expected to experience most of the growth in calls.

6.3 **Container transport**

Container transport the Baltic Sea Region (excluding Germany) totalled 6 Million TEU in 2005.

The annual average growth rate for the entire 2000-2005 period was 490,000 TEU or 11 percent per year.

More than 40 percent of the total growth was related to the container traffic at Russian ports. The Russian port container volumes increased by an average of 185,000 TEU or 42 percent per year. In 2000 the total volume was 196,000 TEU. In 2003 it had reached 684,000 TEU and in 2005 an estimated 1,119,000 TEU.

Based on the forecasts in the Baltic Maritime Outlook 2006, and additions related to the Russian foreign trade the container volumes handled in the ports in the Baltic Sea Ports neighbouring countries is estimated to total 19.9 million TEU, a 301 percent increase from 5 million TEU in 2003.

Table 43: *Percent share of total TEU volumes 2003 and 2020*

1,000 TEU						Change in %	
	2003	Distr 2020	2020	Distr 2020	Delta	of total	% per year
Poland	551	11.1%	2,418	12.1%	1,867	339%	9.1%
Russia	684	13.7%	6,136	30.7%	5,452	797%	13.8%
Estonia	100	2.0%	444	2.2%	344	344%	9.2%
Latvia	138	2.8%	500	2.5%	362	262%	7.9%
Lithuania	118	2.4%	544	2.7%	426	361%	9.4%
East BSR	1,591	32.0%	10,042	50.3%	8,451	531%	11.4%
Denmark	638	12.8%	2,306	11.6%	1,668	261%	7.9%
Finland	1,176	23.6%	3,539	17.7%	2,363	201%	6.7%
Sweden	971	19.5%	2,510	12.6%	1,539	158%	5.7%
Norway	603	12.1%	1,562	7.8%	959	159%	5.8%
West BSR	3,388	68.0%	9,917	49.7%	6,529	193%	6.5%
Total	**4,979**	**100.0%**	**19,959**	**100.0%**	**14,980**	**301%**	**8.5%**

Source: Lloyds Register-Fairplay

The average annual growth rate is estimated at 8.5 percent per year, compared to 7.3 percent between 2000 and 2005.

In the countries east of the Baltic Sea the growth is estimated at 11.4 percent per year, compared to 28 percent per year between 2000 and 2005.

The average annual growth in the other countries is estimated at 3.9 percent, compared to 6.5 percent between 2000 and 2005.

In the countries situated closest to the North Sea continental ports, Denmark and Poland, the share of land borne containers are expected to fall in favour of an increased share of seaborne containers.

Due to a relatively stronger growth the countries east of the Baltic Sea will increase their share of the total volume from 32 percent in 2003 to 50 percent in 2020, while the share for the other countries is expected to fall from 68 percent to 50 percent.

As Russia will answer for 36 percent of the total growth between 2003 and 2020 it will continue to dominate the container trade. By 2020 it will answer for 31 percent of the total followed by Finland 18 percent, and Sweden, Denmark and Poland with 12-13 percent each.

As approximately 90 percent of the Russian volumes in the Baltic Sea are transited through the European continental ports they will be heavily influenced by the increased imports to Russia.

The transit of Russian containers through Finland will continue to increase and is expected to exceed 1 Million TEU by 2020.

7 SWOT analysis

Making SWOT analyses for ports tend to produce similar outcomes, where factors such as location, hinterland connections and supporting industries are vital to each and everyone.

In the following, the Ports of Aarhus and Göteborg have been judged from a transhipment point of view and the Port of Helsinki from a feeder port point of view.

7.1 Strengths & Weaknesses

7.1.1 Port of Aarhus

Strengths	Weaknesses
Timely investments come on stream	Lack of import/export cargo
Expansion possibilities	Close to Hamburg
Strong relation with Maersk	Heavy exposure to direct calls materialising
Quick access to open sea	Bottlenecks in hinterland infrastructure
Seemingly favourable cost position	
Direct calls from Maersk	
Roro ramps in container terminal	
Competing terminal operators	

7.1.2 Port of Göteborg

Strengths	Weaknesses
Significant import/export cargo volumes	Reputation of being expensive
Ample capacity already in place	Reputation of being slow
Direct calls from Maersk & ACL	Storage and warehousing in short term
Located outside city centre	Only one terminal operator
Roro terminal close to container terminal	
Storage & warehousing expansion in medium term	
Rail shuttles	

7.1.3 Port of Helsinki

Strengths	Weaknesses
New port with favourable hinterland infrastructure, storage and warehousing facilities	Finnish ice class regulations disbenefits non-ice classed tonnage
Imports/Exports in balance	Larger vessel sizes call for further deepening of fairway & port

7.2 Opportunities & Threats

7.2.1 Port of Aarhus

Opportunities	Threats
Rotterdam as a deep sea partner port	Hamburg
All transhipment in Aarhus, repositioning of empties to Göteborg	Bremerhaven
	Wilhelmshaven
	Gdansk
	Meditterranean Ports
	All transhipment in Göteborg

7.2.2 Port of Göteborg

Opportunities	Threats
Rotterdam as a deep sea partner port	Hamburg
All transhipment in Göteborg, nothing in Aarhus (for other operators than Maersk)	Bremerhaven
	Wilhelmshaven
	Gdansk
	Meditterranean Ports
	All transhipment in Aarhus, repositioning of empties to Göteborg

7.2.3 Port of Helsinki

Opportunities	Threats
Increased transit via Kotka & Hamina leaves more room for imports/exports via Helsinki	Kotka competes for import/export cargo
Congestion in St Petersburg – transit via Helsinki	Hamina competes for import/export cargo
General growth prospects call for capacity everywhere	Increased transit via Uust Luuga, Muuga, Riga, Klaipeda reduces transit potential for Helsinki
	Customs clearance following political mood changes affects Helsinki's potential transit volumes
	Russian port operators investing in Baltic States' ports reduces Helsinki's potential transit volumes

8 Impact analysis

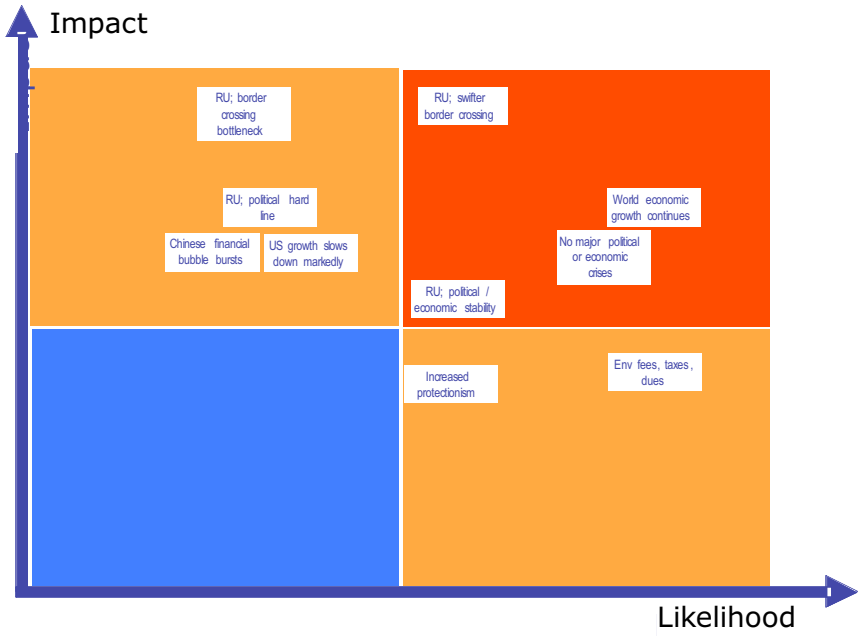
8.1 **Economic factors**

The scenario presented in Chapter 6 is based on some key assumptions on the expected development over the years up to 2020. In the illustration below these factors are allocated to the upper right box marked red. Factors positioned to this box are the ones believed to both have a high likelihood of happening and to have a high impact if/when they happen. Thus, factors positioned to this box are the ones to plan for.

Major factors positioned in the red box are;

- Russia:
  – continued political and economic stability
  – border crossing procedures improved to allow for more cargo to pass
  – the port in Ust Luga will add to port capacity in the St Petersburg vicinity
- World economic growth and trade continues to develop strongly
- No major political or economic/financial crises occur on a global scale

Figure 39: *Scenario factors*



Factors positioned to the two orange boxes are either considered to be highly likely to happen, but of limited impact if they do, or less likely to happen but of high impact if they do. These are factors for which there should be action plans in place so that you could react quickly should they happen.

Factors placed in the orange box are;

- Russia:
  – turn into political hardship, leading to strained relations with neighbouring European countries, the EU and the US
  – no alleviation of border crossing procedures
  – the port at Ust Luga does not come into existance

- The feared of Chinese financial bubble bursts
- The US economy slows down below current expectations
- Protectionism spreads, putting a cap on trade and the demand for transport and thereby slows down the globalisation process
- The introduction of environmental fees, taxes, dues on a larger scale, making transports costlier and thereby reducing the growth of trade.

Combined transport systems using dedicated and scheduled rail service is one of the intermodal land bridge feeder services that is required and demanded in all terminals that gives service to a specific region/area. Although the deep sea container operation is very cost efficient it is important that the numbers of handling and re-shuffling of containers are minimised as all handlings add costs and inflicts potential damage of the cargo.

High cost factors are long road haulage, ferry services and shifting the cargo between transport modes.

In order to reduce transhipment costs, a land bridge to the Baltic Sea has been established between Hamburg and Lübeck. The newest one is a rail service. This service is mainly used by Finnish roro operators and the cost of handling is kept down by rolling the units on and off the ship. The top deck of the ship is used for lolo-handling of containers.

Many industries and trading houses have their main warehousing function close to the major continental ports or in the continental cities. They distribute their products by road over Europe using road vehicles. The effect of this is clearly visible in the service to the Scandinavian countries. The roro services to these countries run on high frequency, but at high costs. The result is substantial traffic over the ferry services in the southern Baltic Sea area. In Lübeck the annual turnover, mainly in trailers, was abt 18M tons. This is roughly split in 50/50 incoming/outgoing. Most of the incoming is forest products from Finland while most of the outgoing is road trailers to Scandinavia.

The cost of a ferry transfer is about 5 000 SEK ($680) per trailer. If we compare this to a shipment from Bremerhaven to Gävle in Sweden passing through the Kiel canal we arrive at a cost that is in the region of $130 both ways, or $ 65 single way for a 660 TEU ship. Adding on THC which in total is about $300 we arrive at a cost in the region of $365 per TEU or $730 per 40' container which can be compared to a trailer. The difference would be to save some 500 km road one way in Sweden.

The difference in costs should justify the shipment by sea. However, it seems as flexibility and other factors result in a huge traffic on ferries and roros.

From both Finland and Sweden there are frequent industrial traffic by larger roro ships both to the UK and the continent. Some of these services takes trailers and unitised cargo as return cargo. Some services are in liner service to Södertälje with new cars from Germany.

8.2 **Transport quality**

The parties concerned by the quality of the transport and transport system are mainly the shipper and the consignee. Taking for granted that the physical transport is safe and sound and that the cargo is not affected by physical damage or exposed to other condition that reduces the quality of the product [1] the main concerns are the lead time of the shipment and the cost.

Considering the total transport route the following basic item can be listed and given priority depending on the party's interest.

Table 44: *Demands on quality, different actors*

	Demands	Control Route	Cost	Quality
Shipper	Quick and safe at lowest cost	None	Low cost	High quality
Consignee	Quick and safe at lowest cost	None	Low cost	High quality
Forwarder	Simple and efficient	As few shifts as possible	Low	Acc to the cost
Line operator	As high utilisation as possible	Full	Competitive	Competitive
Terminals	As high volume as possible	Like to influence	To take part	To have increasing volumes
Feeder operators	To give and option in service	Full control	To be competitive	As high as possible
Container owner	To keep the units in circulation	None	To be competitive	The best

The conclusion of the above will give a new situation where the shipper get the fastest service at the lowest cost without transfers between transport system or routes as this will keep down costs and give the fastest service. If it is not possible to ship the products all the way like this he would prefer a system that travels the fastest way between the port terminals that give service to the largest vessel from where the destination can be reached by as few handlings of the container as possible.

The less the port time the less the time for the products to be in the transport system. This would be arguing against large ships that spends long time in ports. However, the economy of scale for the large vessel and the transport quality gives the service level that satisfies the shippers.

Coordinated shifts in the port where the time slots between the large deep sea ships and the feeder vessels allows a short turnaround time of the cargo following a quick distribution to the final port the system is quite acceptable.

Ports having high costs and low service will always loose to better alternatives unless there is conditions that gives limited competition, like the situation in St Petersburg.

The shift between deep sea ship and feeder vessel may be anywhere where it suits the time table, gives low costs and a continuation of the route that is safe and of high quality. Where this position is doesn't matter for the contracting partners. The quality of the transport is taken for granted and the time of arrival is give by the deep sea operator weeks ahead. Most of the time delaying problems do not concerns the water transport system but the handling of documents and clearances in the ports.

8.3 **The hub ports**

The economy to use a hub port lies in the fact that the large ship cannot call all ports on the continent (that is Europe, in the Far East the ports are big enough). By splitting up the transport flow, the lead time to each port can be shorter.

The main reason why e.g. the Port of Göteborg or Aarhus has been unable to attract more calls from deep-sea lines is the nautical deviation from the core European market. Although the actual deviation from Hamburg and the

[1] The advantage of the container itself is that it protects the cargo.

additional port access time may only add up to 2 days, most carriers do not have this spare time in their schedule, whilst maintaining a weekly liner service with the same number of ships. Whilst a calculation purely based on actual deviation time may result in a breakeven level of about 500 TEU (weekly exchange), realistically a carrier needs to recuperate 1 week of additional vessel time. This line of reasoning however is based on an assumption that no calls to continental hubs are withdrawn in favour of call Göteborg and/or Aarhus.

Depending on the state of the charter market/vessel operating costs, the effective breakeven point is rather somewhere near or above a 1,300 TEU exchange based on the deployment of a post-Panamax ship. Given the fact that e.g. the Port of Göteborg handled about 650,000 laden TEU in 2006 (about 12,500 laden TEU per week), a carrier opting for a direct call would have to capture a market share of in excess of 10%.

8.3.1 **The Port of Aarhus**

The impact on the Port of Aarhus of the basic scenario and the forecast outlined in the previous chapter is in the following analysed. The opportunities and threats, described earlier, are put in relation to the scenario and forecast.

The OT-factors were:

- **Opportunities**
  - Rotterdam as a deep sea partner port
  - All transhipment in Aarhus, repositioning of empties to Göteborg
- **Threats**
  - Hamburg
  - Bremerhaven
  - Wilhelmshaven
  - Gdansk
  - Meditterranean Ports
  - All transhipment in Göteborg

The Port of Aarhus is in a position where it could attract more transhipment in a growing market scenario. The threats to this ambition come primarily from its rival transhipment ports on the continent.

The lack of import/export cargo of any significant magnitude makes it more important for the port to focus on its strengths, such as its (seemingly) favourable cost position, two terminal operators and quick access to the open sea.

Since Maersk's presence is in Aarhus is strong, it is of importance that there is an alternative to APM Terminals. The "Maersk-port" label, if it exists, could be a hindrance for the establishment of other deep sea operators. It is therefore of importance to the port to underline that is an open port with ample capacity and high efficiency, suitably located as a gateway to the Baltic Sea region.

The relation to the Port of Göteborg needs to be dealt with. The import/export volumes in Göteborg are attractive. On the other hand are those volumes largely already catered for by Maersk's AE1 service. For additional deep sea calls, the conditions are fairly similar for both Aarhus and Göteborg.

The need for repositioning empty containers is by the looks of it something that connects the two ports. The need for transhipping containers destined for the Baltic Sea region in both Aarhus and Göteborg is more a matter of the destination or origin of those containers. As an example; boxes destined for the Gulf

of Finland (incl St Petersburg) are feedered from Aarhus, while boxes destined or stemming from the North and South Baltic sea are handled via Göteborg or vice versa.

The Port of Gdansk is going to become an important player on this market. The strong hinterland with large potential import/export volumes makes the port a strong candidate for deep sea calls in the future.

Based on the reasoning above, in order for the port to promote its opportunities and limit the threats it is recommended that the following action points are considered.

- **Action point 1**; Highlight the competitiveness of the port; cost and efficiency wise
- **Action point 2**; Underline the supplementary features with the Port of Göteborg
- **Action point 3**; Stress the quick port turnaround times which enable an attractive schedule.
- **Action point 4**; Look for synergies including the Port of Gdansk.

8.3.2 **The Port of Göteborg**

The impact on the Port of Aarhus of the basic scenario and the forecast outlined in the previous chapter is in the following analysed. The opportunities and threats, described earlier, are put in relation to the scenario and forecast.

The OT-factors were:

- **Opportunities**
  – Rotterdam as a deep sea partner port
  – All transhipment in Göteborg, nothing in Aarhus (for other operators than Maersk)
- **Threats**
  – Hamburg
  – Bremerhaven
  – Wilhelmshaven
  – Gdansk
  – Meditterranean Ports
  – All transhipment in Aarhus, repositioning of empties to Göteborg

The Port of Göteborg's present situation, where Maersk call regularly to handle the import and export volumes in the port is a strong feature. However there needs to be more in place if new deep sea operators are to add Göteborg to their schedules.

The expected growth of import/export volumes follows the overall growth scenario. The port could improve the volume growth by attracting more cargo to Göteborg from further inland distances and from Norway. The rail network is a strong feature in such an ambition.

Further to the above, the Port of Göteborg share much of the challenges with the Port of Aarhus; repositioning of empties, different feedering networks, look for synergies with the Port of Gdansk.

Based on the reasoning above, in order for the port to promote its opportunities and limit the threats it is recommended that the following action points are considered.

- **Action point 1**; Allocate strong efforts to expand the rail network service.
- **Action point 2**; Review the pricing policy carefully.
- **Action point 3**; Work with efficiency to get a highly competitive record (externally monitored) to show.
- **Action point 4**; Look for synergies including the Port of Gdansk.
- **Action point 5**; Consider the landlord alternative.

8.4 The spoke ports

A strong feature for a spoke port, as well as a hub, is to have import and export cargo. The more the better, as it increases the interest and need to call the port. In Northern Europe we seldom find ports where the incoming cargo is balanced with outgoing. If so, the port is located in short distance from both a consuming and a manufacturing area. This is rare in the Baltic.

The spoke ports are the centre for the distribution of containers in the area of the port. In this respect the hinterland access plays an important role, as do logistic areas, where containers are stuffed or stripped. The use of rail systems in pendulum traffic becomes more and more important. The train service seldom exceeds a distance that can be covered in an overnight service. In rough terms that means max 800 km, depending on the condition of the railroad and the traffic.

8.4.1 The Port of Helsinki

The impact on the Port of Aarhus of the basic scenario and the forecast outlined in the previous chapter is in the following analysed. The opportunities and threats, described earlier, are put in relation to the scenario and forecast.

The OT-factors were:

- **Opportunities**
  – Increased transit via Kotka & Hamina leaves more room for imports/exports via Helsinki
  – Congestion in St. Petersburg – transit via Helsinki
  – General growth prospects call for capacity everywhere
- **Threats**
  – Kotka competes for import/export cargo
  – Hamina competes for import/export cargo
  – Increased transit via Uust Luuga, Muuga, Riga, Klaipeda reduces transit potential for Helsinki
  – Customs clearence following political mood changes affects Helsinki's potential transit volumes
  – Russian port operators investing in Baltic States' port reduces Helsinki's potential transit volumes

The Port of Helsinki is already established as one of the most important import/export ports in Finland. Sea-sea transhipment is today almost non-existent. The baseline scenario of strongly increasing volumes to Russia calls for a large expansion of port capacity in the Gulf of Finland and possibly also in Latvia and Lithuania.

The border crossing between Finland and Russia is today the largest hindrance to growth. The political will in Russia is the main solver to this problem, but so far the signals from Russia have mainly highlighted Ust Luga.

The main expectation is that the ports of Hamina and Kotka are going to be very busy with Russian cargo over the coming years. Border crossing procedures are expected to be alleviated and therefore are all capacities on the Finnish side going to be in demand.

At a first instance, it is expected that Helsinki is going to strengthen its position as an import/export port for Finnish goods. At a later stage, the demand for handling Russian cargo is foreseen to spread to Helsinki as well. In such a development, the ports in Estonia, Latvia and Lithuania form competition.

Based on the reasoning above, in order for the port to promote its opportunities and limit the threats it is recommended that the following action points are considered.

- **Action point 1**; Cement the relationship with the Finnish industry; make full use of the opportunities that the new hinterland connections from Vousaari offer to integrate into the industries' supply chains.
- **Action point 2**; Market the capabilities of the new logistic centre. Focus on major multi-national enterprises that are targeting the Russian market.
- **Action point 3**; Work with the Finnish authorities to lower the level of fairway dues.

Appendix 1: Presentation of regions and ports

SUMMARY

- **Large investments in many ports**
- **Border crossing to/from Russia is a major bottleneck**

8.5 **Finland**

The total amount of containers handled 2005 in Finland amounted to 0.73M containers or 1.21M TEU. The two illustrations under, Figure 41 and Figure 42 show the development in traffic flows. Noticeable is the change of focus from Lübeck to Hamburg, the entrance of St Petersburg and the increased importance of Antwerp.

Figure 41: *Total container traffic 2005 on Finland, destination ports in per cent*

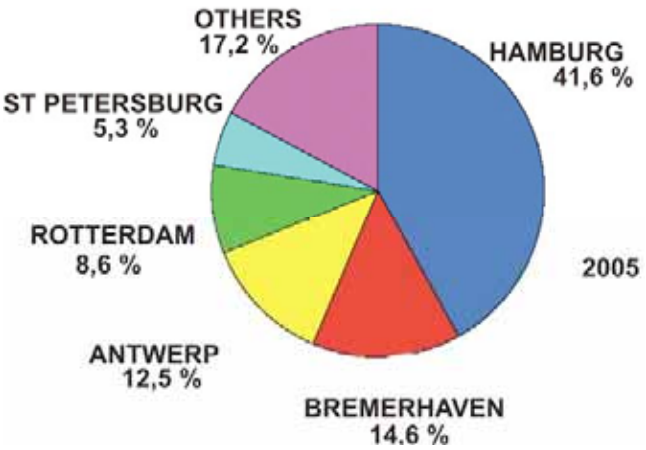
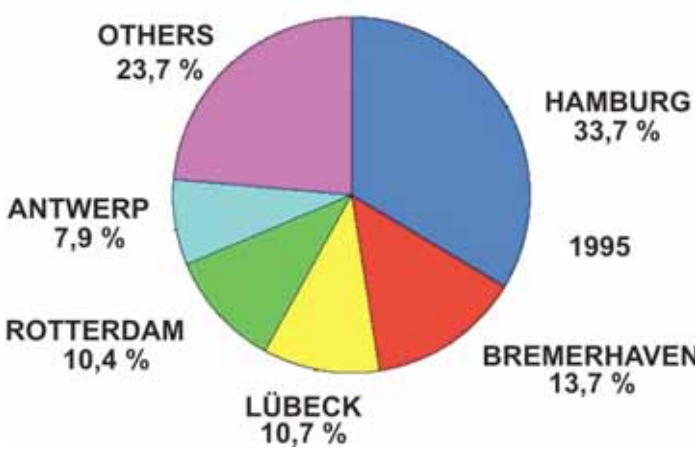


Figure 42: *Total container traffic 1995 on Finland, destination ports in per cent*



The Finnish industry is strongly dependant on a fast and regular sea transport service to the Continent and UK. This gives a unique situation for the transport intensive industry. The industry uses the incoming containers with the home-bound consumer products for the outbound distribution of their products. For this reason the Finnish container feeder transports are to some extent carried by the liner Ro/Ro vessels that operates between the Finnish ports on the south and west coast and the Continental port.

The ports Kotka and Hamina are situated close to each other about 50 km from the Russian border in the Gulf of Finland. In both ports forwarders and industries have established warehousing services for Russian consumer products. Incoming containers are normally stripped at these facilities for further transport by road or on rail to Russia depending on which type of customs clearance the cargo owner prefers.

The empty containers are preferably used for Finnish forest products in outbound service. The balance of containers is reasonably good in the ports. Not all containers are allowed to be used for outgoing products.

Other Finnish ports that have a regular container service are Turku, Hanko, Rauma and Oulu.

The relation between Finland and Russia is very close and the two countries are trying to sort out and facilitate for as smooth operation as possible. At the end of 2006, a delegation headed by Mr Putin met in Helsinki to among other issues discuss the transport and cargo flows in the Gulf of Finland. Mr Putin declared that the cooperation was mutually beneficial for Finland and Russia and that the review of the customs clearance was an urgent issue for Russia. Russia declared that it was an urgent matter to facilitate port capacity to take care of its own cargo. It was also declared that the service supplied by the Finnish ports was much appreciated and that the function and service given by the ports should continue as a spare capacity.

It has been said of Finland that in terms of transport, the country is an island. Road and rail cargo play a major role only in the trade with Russia, with which Finland has a long border, the trade with Sweden and Norway, its two other neighbours with common border goes overwhelmingly by sea. More than 80% of the volume and a bit less in terms of value of the Finnish foreign trade goes by sea.

However, when it comes to cargo coming from or going to the other Scandinavian countries, Germany, the Benelux countries and France, trailers dominate the business. Most of them are shipped on roro vessels, such as Finnlines' or Tallink's (after its recent acquisition of Superfast Ferries' Baltic business) to Travemünde or Rostock in Germany, from where they will be hauled to their final destination, says Petri Rouhiainen, sales manager at Varova Oy, a freight forwarding company with head office in Helsinki. "The cargo that is loaded this week should reach the customer on the continent the next (week). This is a reality of life," Rouhiainen says.

Trailers that go to a German port by sea and from there by road to the customer offer the best chances of meeting these criteria, he continued, adding that the introduction of a new series of fast ropax vessels by Finnlines enhances this further. The five Finnstar class vessels ordered at Fincantieri shipyard in Italy will have a cruising speed of 25 knots. Three of these ships will be employed on Finnlines' key trade between Helsinki and Travemunde, on which they will reduce the crossing time to 27 hours from 36 hours or by 25% compared with the four 21 knot Finnhansa class vessels they will replace. The new class will also offer 4,200 lane metres of freight capacity, a marked increase from 3,200 lane metres on the earlier vessels. Rouhiainen says the introduction of the new Finnlines vessels means "more focus on Travemunde" as a gateway for cargo that goes to Europe, with the main focus on Germany and Austria.

8.5.1 **Helsinki, FI**

The Port of Helsinki is the main port in Finland with high frequency connections to the continent, Scandinavia and the UK. The cargo traffic is oriented towards unitized cargo; 420,000 TEU was handled in 2006 and 430,000 trucks & trailers. Two per cent of the cargo is reported to be transit traffic to Russia.

Main import products are consumer, investment and intermediate goods. Main export products are paper, timber, metal goods, machinery, food stuff and chemicals.

Helsinki has about 1,480 calls per year of vessels with an aggregated container carrying capacity of 886,000 TEU.

The container traffic is dominated in capacity offered by the regular feeder operators UniFeeder and Team Lines. The regular cargo services between Finland and Europe is however mainly carried in the roro system supplemented by the passenger ferry services. The largest individual operator Finnlines represents a marked share of the total container capacity of vessels calling Helsinki, but the service is rarely used for shipping containers. TECO Lines, Hacklin, OOCL, Maersk Line, MSC and CMA-CGM call Helsinki 1-3 times per week.

The import/export balance is good and the handling of empty containers is said to be less than 15%. Some of the empty containers are transferred by train to the industry in Northern Finland where they are loaded with forest or steel products.

The roro operators dominate the feeder capacity in Helsinki in calls, shortly followed by the feeder operators. The deep sea operators have about 10% of the ship calls.

The feeder operators represent half of the total container capacity. The other half is shared two to one between the roro and the deep sea operators.

The port is constructing a new harbour in Vousaari, consisting of a new fairway, road and railroad connections and an adjacent logistic activity zone.

Figure 43: *Helsinki W & N harbour move to Vuosaari*

The Vuosaari port of Helsinki is an interesting project, where an entirely new port with associated infrastructure has been built close to a growing city. The environmental considerations have been extensive and the cost of the environment friendly constructions is high.

A new railway of 19 km length connects the port with the national railroad. For the new railway link a new 13.5 km tunnel had to be constructed. A new road is also constructed with a length of 3.5 km whereof 1.5 km in a tunnel. The road connects directly to the city ring road III and to the East West motorway E18 and to the north bound E75.

Figure 44: *The new Vuosaari port terminal*

Container quays can meet 13.5 m draught vessels and in the first phase, the fairway can serve 11 m draught vessels. If called for, deepening of the fairway is considered less of a problem.

The planned capacity in Vuosaari is in excess of one million TEU and over 700,000 wheeled units. The logistic zone is planned for a potential over 20 ha covered terminals.

8.5.2 **Kotka, FI**

The container traffic between the Continent and Finland is lead by the feeder operators representing about half of the container transport capacity. The services are dominated in capacity by the regular feeder operators UniFeeder and Team Lines. The roro services represent about 16% of the container transport capacity on Kotka. The deep sea operators that call the port with its own feeder tonnage represents a third of the container carrying capacity. These lines as well as Euroservices call Kotka with services that also call Helsinki. The service is addressing Hamburg.

Kotka has a level of 980 calls per year providing a carrying capacity of about 696,000 TEU.

Major investments have been made in Kotka to host the electronic industry, cars manufacturers and other trades of high value cargo that are transited via Finland to Russia. The bottleneck is the border crossing.

Figure 45: *The extended Kotka Hietanen port area having a 100 ha parking area for new cars to Russia*

Kotka is now planning for an expansion of the Mussalo terminal by increasing its logistic area for further development of warehousing. The focus is the Russian market.

Figure 46: *New logistic area in Kotka Mussalo Terminal*

Kotka is expanding and the port has an annual investment budget of around € 10 M. From having created a brand new port which was opened in the year 2001 the volumes have increased continuously. Today the container traffic has passed the 370,000 TEU level and continues to increase. 27% of the turnover is imports, 23% is in transit and 50% is exports. The largest domestic client is StoraEnso.

Kotka has developed a new service in transiting cars to Russia and is today the second largest after Hanko.

Figure 47: *Port of Hamina container terminal extension*

Hamina is the port closest to the Russian border. The port has a relatively new container terminal which also includes a marshalling yard for rail car operation. Here the containers can be lifted directly up on the railcars for transport to inland destinations in Finland or Russia.

The port area hosts a number of larger warehouses for products in transit to Russia. Some of the clients prefer to ship the containers back to South Korea empty. The roro operation is dominating where the vessels can be handled roro over the ramp and container gantry cranes on weather deck in a simultaneous operation. 60% of the handling capacity is provided by the roro services.

The largest roro vessels in the Baltic Sea, the Transfennica TIMCA class, are calling on Hamina. These ships are today in regular service on Antwerp and Transfennica has the same type of roro service on Tilbury and Lübeck. The two new TIMCA class vessels have a TEU capacity of 489. The arrangement of the service is to carry containers on weather deck in a way that makes them suitable to be handled by port gantry cranes. The vessel loads break-stowed Ro/Ro cargo (reels and pallets) in the hull together with rolling units. The services are partly handling overseas containers over the Multimodal terminal in Lübeck, which is directly linked to Hamburg via shuttle trains.

The rolling handling equipment is used for return cargo. In addition the ships also carry swap-bodies and trailers.

The Port of Hamina has about 590 annual calls that provide an aggregated container carrying capacity of about 295,000 TEU. The vast majority of the capacity is by roro operators (60%) and only nine per cent is provided by the deep sea container operators.

The Trans-Siberian railroad had a regular service on Hamina which ceased in Nov 05. The shippers that used the railroad service shifted to sea transport and saved 20% at the cost of a couple of more weeks in transport time. There is a purpose built arrangement of port and train operation for container transiting between ship and rail in the container terminal of Hamina.

8.5.4 **Other ports, FI**

The other container ports in Finland are mainly operating container for the industry. The containers are supplied by the feeders or from Helsinki.

Table 45: *Containers in other ports in Finland*

TEU handled 2005		
	Loaded	Empties
Turku	16,719	4,069
Rauma	12,234	38,214
Pori	61,048	11,745
Oulu	19,744	6,174
Hanko	58,589	-

The ports are often run by and/or owned by the industry. In Hanko the M-Real products for overseas destinations are stuffed in containers and shipped to the continent. At the end of 2005, M-Real moved their distribution to the Port of Helsinki. Port of Rauma is owned by UPM Kymmene and is mainly a roro port. Pori is the largest port for export of sawn timber and Oulu is servicing StoraEnso and Nokia.

8.6 **Russia & the Baltic states**

At present the container market is characterized by two features: growth rates above average and less political influence. Container trade in Russia grows by an average of 25-30% per annum. Yet the market is still young, far from being transparent and characterized by intense and still not quite civilized competition. For this reason all customer-related information is strictly confidential and the rates published are usually far from being true. THC rates of the liner operators are more indicative, yet liner operators include their own service and risks into the charge.

Political and social disputes between Russia and the Baltic States affect e.g. oil transit, but also container transit. Political risks are obviously hindering the development of the market. About a third of the container handling in the Baltic terminals are estimated to be for the Russian market, mostly imports. On the export side the Baltic terminals serve cargoes from as far away as Uzbekistan and Kazakhstan, such as cotton and cotton fabric to mention but a few.

Rail transport in Russia is operated by RZD OAO, a 100% state owned company. Rail transports partly competes with the container terminals, but the present tariffs do not work in favour of the rail alternative.

Most recently a complex structure reportedly is being formed which is to become the basis for a more efficient container transport system. Industrial Investors, a group controlled by a known oligarch; Deputy of the State Duma Sergey Generalov, is consolidating control over the largest operators which will allow to form a holding of a complete logistics cycle. The Group now controls Russian largest shipping company FESCO and is actively trying to take control of the largest rail operators. FESCO and the rail monopoly RZD OAO have set up a rail container operator Russian Troika. Recently the Group has gained control over the terminal holding National Container Company which operates container terminals in St.Petersburg (FCT, Industrial investors control 50%), Astrakhan (Olya), Novorossyisk, Far East and Ilyichevsk (Ukraine). NCC is also to operate the container terminal to be constructed in Ust Luga.

Transit to/from Russia and other CIS countries via the three Baltic States are subject to time-consuming and bureaucratic border crossing procedures. The smoothness of these procedures is largely the manifestation of the sensitive political climate.

In practice we are looking at measures such as number of staff, re-equipment, reconstruction etc, which have immediate effects on crossing times.

Customs clearance has an impact on the container transport system, mostly in terms of lead time, but to some extent also the transport pattern ie which port/terminal that will be used. The latter is more of a factor when differences in border crossing procedures and time become more significant in relation to the alternatives.

Russia's President Vladimir Putin told his economic, finance and transport ministers end of January 2007, to end their inter-agency rivalries, and produce a streamlined system of customs, tax and cargo clearance through Russia's ports. Too many government agencies impose charges on port operators.

This move may have a positive impact in border crossing procedures in the near future. The caveat is that these measures may be in effect only as long as Putin remains in office.

Feedering freight rates to the terminals in Estonia, Latvia and Lithuania are lower than those to the terminals in the Neva mouth, as are handling rates. In addition, customs procedures are simpler and service more efficient in these states, but even though the services provided by the ports in Estonia, Latvia and Lithuania are improving rapidly, the border crossings to/from Russia continue to form severe bottlenecks.

Most of the less-than-container-load (LCL) imports are delivered via the Baltic States because of the customs procedures. Onto the Russian territory they are imported separately.

The Baltic states handle mostly consumer goods destined for Russia. Klaipeda is attracting reefer containers destined to Moscow, although this reportedly has been hindered by the customs legislation of Lithuania. Thus imports of refrigerated cargoes for Russia are still mostly handled in St.Petersburg. Among exports out of St.Petersburg raw materials are significant such as cellulose, sawn timber, plywood, smaller volumes of the scrapped non-ferrous metals and aluminium foil.

8.6.1 **St Petersburg, RU**

St Petersburg is the largest container port inside the Baltic and is growing fast. The large feeder operators provide the major container carrying capacity to the port having 63% of the total carrying capacity. The deep sea operators represent 34% of the container capacity and only 2% of the capacity is roro operation.

The ports have about 130 calls per month giving 1,530 calls and a carrying capacity of 1.2M TEU on an annual basis.

Customs handling in the container terminals in the Neva river mouth is a severe problem. Dwell time was reportedly as high as 192 hours in 2005-06. Still, representatives of Baltic Customs in St Petersburg claim containers are cleared in a day on average. Involved parties are of another view.

Traffic jams and congestion are common features around the St Petersburg terminals. Infrastructure development seriously lags behind, and even the smallest of disturbances cause severe delays. Road accesses to the terminals located close

to the city center are insufficient. The fairway is only one-way and is also closed for cargo vessels when passenger ships are passing.

There are no "quick fixes" available. State-private partnership are behind many of the investments that are being made, where the private partner puts up most of the initial funds and the state compensates by lowering operational fees for the use of state-owned infrastructure.

Port berths are the property of the state and therefore need to be leased by the operators. The city owns the land and the region owns the water. Ownership of newbuilt berths is therefore a tricky issue.

After the collapse of the Soviet Union a methodology for calculating rent was developed. Now the governmental body in charge of the state property has taken the initiative to revise this methodology. At present there is no legislative basis for long-term lease contracts. This is planned to be provided by the new "Law on Sea Ports", which has been under revision for over 10 years. In most of the sea ports one year lease contracts are reportedly in effect.

Table 46: *St Petersburg: previous and next port*

Previous port	Calls	TEU capacity
Hamburg	292	237,250
Rotterdam	119	93,623
Bremerhaven	97	89,434
Kotka	92	66,172
Aarhus	36	40,373
Antwerp	45	33,125
Helsinki	23	22,311
Rauma	22	18,567
Gdansk	10	6,202
Amsterdam	6	5,208
Hamina	8	4,724
Gavle	5	3,114
Muuga-Port of Tallinn	3	1,787
Kaskinen	7	1,575
Copenhagen	2	1,575
Riga	5	1,151
Lubeck	3	1,062
Gothenburg	3	911
Oxelosund	3	730
Other ports	235	140,791
Grand Total	**1,016**	**769,685**

Next port	Calls	TEU capacity
Hamburg	257	204,276
Bremerhaven	146	134,401
Rotterdam	161	130,141
Antwerp	98	94,796
Gdansk	29	22,628
Kotka	42	17,865
Hamina	13	7,482
Aarhus	7	7,454
Grenaa	2	2,468
Felixstowe	1	2,207
Amsterdam	4	1,500
Riga	7	1,436
Rauma	2	1,127
Kaskinen	5	1,125
Lubeck	3	1,062
Helsinki	1	803
Gavle	1	700
Muuga-Port of Tallinn	1	660
Oslo	2	459
Other ports	231	138,633
Grand Total	**1,013**	**771,223**

The high container volumes destined to St Petersburg create demand for direct services from the larger ports. The main type of cargo in incoming containers is consumer products and only marginal volumes of Russian exports is container cargo, thus there is a need for repositioning of empties.

Containerships has constructed a container terminal in Kronstadt, on the island by the fairway entrance to St Petersburg. The port turnover is approaching the 200,000 TEU mark and a capacity level of 240,000 TEU is believed to be reached within the near future.

Figure 48: *Containerships' Moby Dick terminal*

8.6.2 **Other ports, RU**

Because of the geography the availability of port area is very limited in the St Petersburg and the Gulf of Finland area. A container port project has been on the agenda in Ust-Luga for several years. However, the total land infrastructure in, to and from the port needs to be developed in order for the port to offload St Petersburg. Kaliningrad offers only limited services.

8.6.3 **Tallinn, Muuga terminal EE**

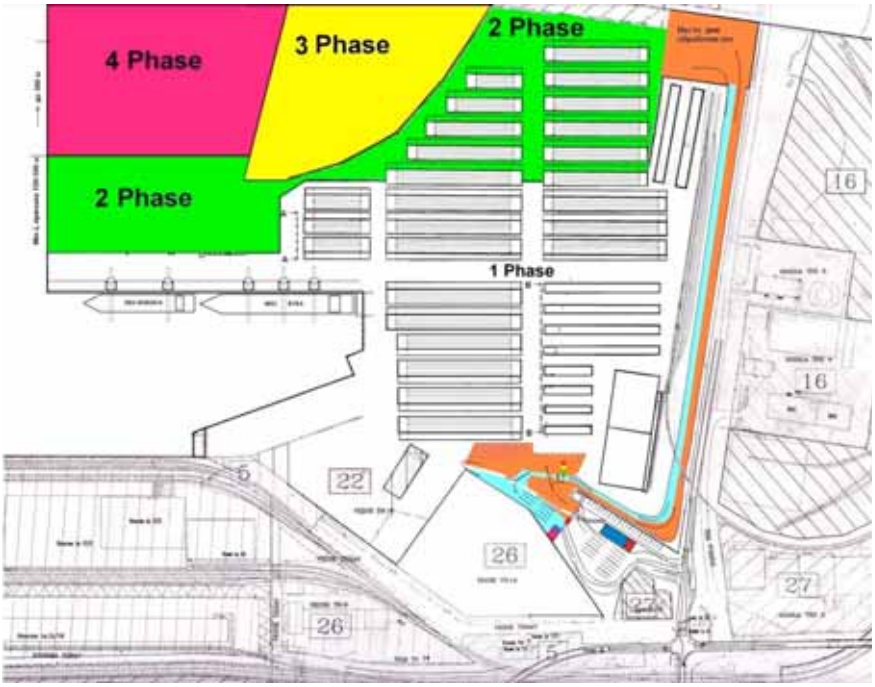
The Tallinn Port Authority is responsible for five harbours, namely Old City Harbour, Palijassaare Harbour (located 6km W of Old harbour in same bay), Paldiski South Harbour (located 50km W of the city), Muuga Harbour (located 17km E of the city) and Saaremaa (located 135nm SW of Tallinn). The port is practically ice-free with depths of 18.5 m. The bay is frozen over in severe winters only and is kept open all year round with ice breakers.

Paljassaare Harbour handles timber, oil products, coal, perishables and general cargo. Old City Harbour is the largest passenger harbour in the region, which also handles Ro-Ro and general cargo. Muuga Harbour mainly handles crude oil, oil products and dry bulk, but also containers.

The Ports of Tallinn fulfils a function of a transhipment gate for multi-modal transports of Russian cargo.

The Muuga Harbour is in focus of heavy investments in infrastructure such as breakwaters, quay constructions, reclamation of land, new berths, rail yards, shunting yards.

Figure 49: *Muuga, Port of Tallinn incl expansion*



In 2005, 126,000 TEU was handled in Muuga and early figures for 2006 point at 140,000 TEU. The quay lengths are 3*200 m with 12.5 m draft. They have fixed and lifting cargo ramps with 25 m and 30 m width. Muuga claims to have the capacity to serve vessels up to 3,000 TEU at a loading/discharging speed of 35-40 containers per hour.

In 2004, a development program was adopted aiming at raising throughput capacity to 500,000 TEU by year 2015.

Half of the container transport capacity is provided by the major feeder operators, UniFeeder and Team lines. The deep sea operator presence is dominated by Mediterranean Shipping Company and they have together with the other deep sea operators about 40% of the container carrying capacity. A number of smaller services are also calling at Muuga. One roro service representing 6% of the container carrying capacity calls on Muuga.

The port has about 340 calls per year representing a total carrying capacity of 236 500 TEU.

8.6.4 **Riga, LV**

The Baltic Sea port of Riga is situated at the mouth of the Daugava River. The port is open all year round, though ice-breaker assistance is usually required for about 1-4 months in winter. The bay of Riga allows for deep tonnage, but the port is generally shallow. The major terminals allow for deep tonnage though. Maximum permissible length over all is 250 m and draft is 12.2 m.

The major operators are mainly dependant on the feeder operators and minor services to call on Riga. 21% of the transport capacity is provided by the deep sea operators themselves. The major feeder operators cover some 38% of the total capacity and the remaining 40% are provided by several minor capacity services. In total around 25 different services are calling on Riga.

The annual number of calls in the port amount to about 500, giving a capacity of about 290,000 TEU.

Figure 50: *Container terminal at the Port of Riga*

Figure 51: *Freeport of Riga*

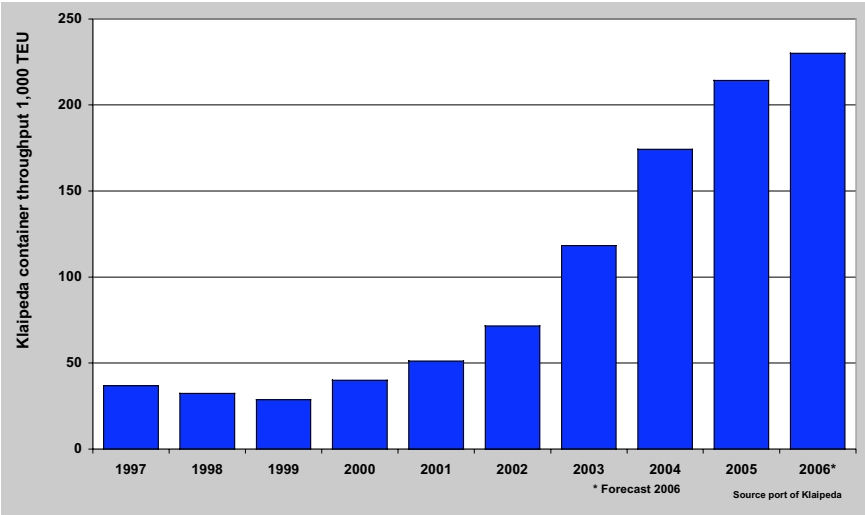
8.6.5 **Liepaja, LV**

Liepaja has developed to be a major bulk terminal growing fast mainly in grain shipments. In cargo units the major activity is in ro-ro handling, which reached 22,100 units in 2005 while the containers added up to 3,150 TEU in the same year.

8.6.6 **Klaipeda, LT**

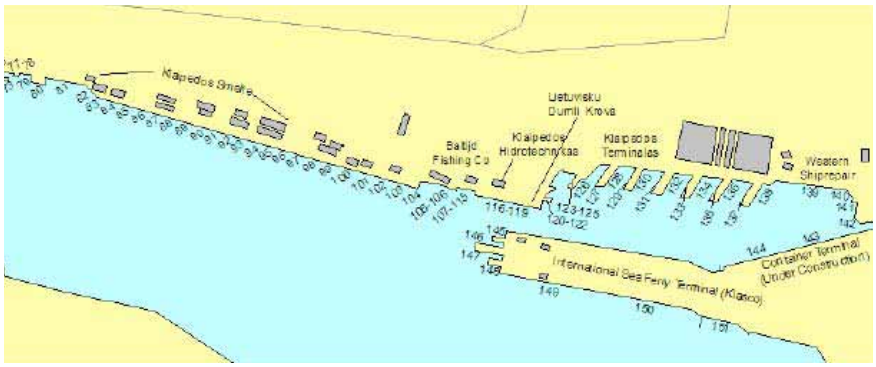
Klaipeda offers a good port with a short approach from sea, situated in the narrow strait called Juru Kanalas (Sea Canal) which connects Kursiu Marios (Kursiu Gulf) with the Baltic Sea. The port is ice free all year round.

Figure 52: *Teu development in the Port of Klaipeda*



Rumour claims the customs clearance works much better on some border passes than others. It can be that there is a higher trust between the customs and the shippers on some relations. It may also be that the type of products shipped is of another character, which makes the clearance less complicated.

Figure 53: *Port of Klaipeda*



8.7 **Poland**

The trading conditions in Poland were totally reconstructed after 1980-ties. The reconstruction, which followed on the liberalisation of the trade, led to the establishment of close contacts between German trading organisations and the Polish market. This was on the trading side as well as the industrial side. The German companies granted the trade by going through their established contacts and banks. Their established connections opened up deeper contacts to trading market for Poland. By this the trade flows took the route over Germany. Using the established warehousing and transport routines the cargo were transported to/from Poland by rail and road.

Even though Poland today has a stable economy and the trade grows, the main established trade patterns remain. However, sometime in the future Poland may

very well have direct trade links with other continents, which in turn would open up for direct deep sea container vessel calls and warehousing functions in Poland. Looking at the development in Polish ports this process might already be in the pipeline.

The increase in seaborne trade on Poland is clearly highlighted by the fast growth of container handling in the Gdynia-Gdansk area which provides service to the densily populated inner part of Poland, the Chech Republic and Slovakia. The container volumes have doubled over the past four years and the infrastructure projects in the two ports ensures continued growth.

Gdynia is today the second largest container port in the Baltic Sea basin after St Petersburg and the fourth largest in the Baltic Sea Area.

8.7.1 **Gdansk, PL**

The port of Gdansk consists of an inner and an outer harbour that together handles 22.4M tonnes a year of most any commodities. The outer, and deeper, harbour is currently used for LPG and bulk cargoes, mostly crude and coal.

Ownership is to 80% by the state and the rest of local government and selected staff.

The inner port container terminal is an eight ha large hardened area with a possibility to use an additional four that currently only is covered by gravel.

The current container terminal handles 70,000 TEU a year, but that could be increased to 120,000 according to the port, which might be a bit on the high side. A more realistic maximum is probably around the 100,000 TEU mark, given other capacity restraints in the area. Interestingly enough the internal European traffic were guesstimated to be 40% of the total container handling, with focus on exports of among other things furniture and melamin boards. This structure was explained by the "underdog" perspective the port had when it started from scratch eight years ago. They could not afford to visit the large liner operators at the time, but the Polish manufacturers and their forwarders all got visits.

The fairway to the inner container terminal is about a 30 minute ride since the maximum speed is set to six knots. The maximum draft is 10.2 meters.

Handling and operation is as good as it gets given the aged equipment. Custom clearance could be more efficient though. A new port gantry is ordered and will be in place in 2007 and the problems with the customs are being addressed.

The road and rail connections from the inner harbour pass through densily habited city areas.

The new deepwater container terminal, due to be in action by summer 2007, is 112 ha of claimed beach area. Furthermore is a logistic park of more or less unlimited size being prepared.

Three post-panamax cranes are ordered and the first one was installed in February 2007.

The terminal will be straddle operated. All agents and other similar functions to be performed outside the ISPS fence surrounding the port area.

Direct purpose built rail and road connections of approximately two kilometres length are being built through non habited areas to the TEN Corridor 6. Total original budget of the project were 200 million euros, but given this project size and the short time frame, it may very well be dearer in the end.

Figure 54: *New container terminal area in Gdansk*

For both the terminals (as well as for Gdynia) the hinterland is simply enormous with 100 million inhabitants still not counting Russia, Belarus, Ukraine or Hungary.

Figure 55: *Planned operation start mid 2007*

Large parts of the hinterland is reached by the TEN corridor number 6 (A1), passing Warsaw and onwards. The rail network is dense all through Poland and capable of carrying heavy loads, but lack in maintenance and traffic guidance.

The major feeder operators dominate as could be expected. Together they have 56% of the total capacity on the port whereof Team Lines is the largest operator.

The deep sea operators provide 20% of the capacity where OOCL is the major. A majority of the services address the Baltic States.

The number of calls is about 370 providing for a total container carrying capacity of 225,000 TEU on an annualised level.

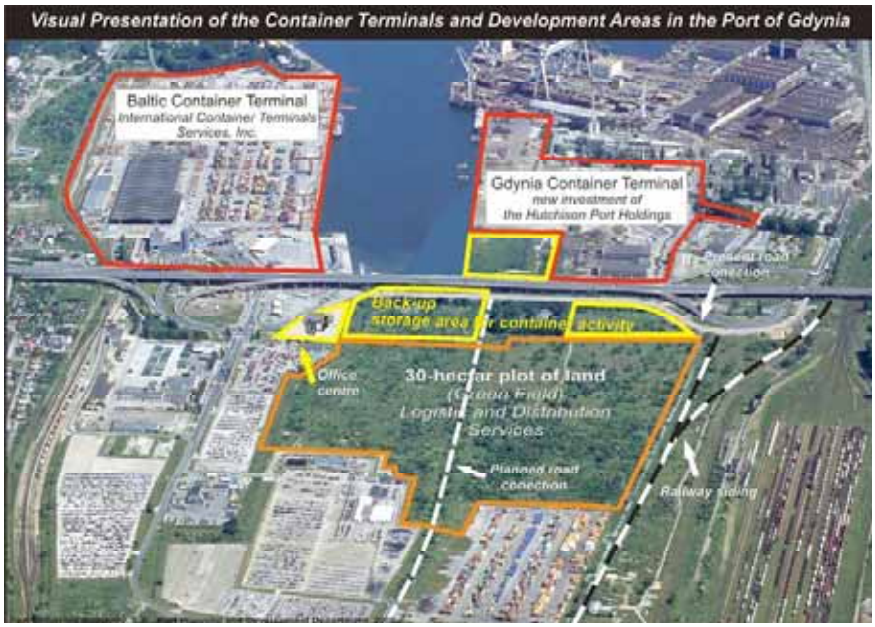
Considering the potential growth and the populated hinterland in the area, Gdansk is a strong candidate to reach container hub status sometime in the future.

8.7.2 **Gdynia, PL**

The port of Gdynia has two container ports ICTS -Baltic terminal and Hutchison.

The Hutchison terminal was inaugurated in March 2006 and the year end figure will most likely be around 50,000 TEU. So far just one feeder operator is using the terminal, equipped with 1 container gantry and one conventional crane.

Figure 56: *Reserved areas for expansion in Gdynia*



The Baltic terminal had a turnover of 400,165 TEU in 2005. The terminal has five container gantries and two additional on order. It is assumed that these two will replace the two oldest ones – both older than 25 years.

The key length in the Baltic Container Terminal is about 800 metres. The Bulgarian quay, where Gdynia Container Terminal is located, is of 365 m in length.

Both terminals are located in the city centre and thus the trucks have to pass dense areas before they engage on a three kilometre detour to reach a highway that eventually ends up at the TEN 6 corridor.

A project aiming at shortening this detour has been initiated, but when it is finalised the traffic will still pass through populated areas.

The trains have to pass both Sopot and Gdansk centres before connecting to the large TEN 6 corridor.

The port of Gdynia is one of the fastest growing ports in the BSR. There are two container terminals in the port. The major container operators dominate the service having 37% of the container transport capacity in the port. The major feeder operators provide 31% of the capacity and 23% of the capacity are on roro services, mainly to Finland.

The annual number of calls is around 1,300 providing for an annual carrying capacity of about 800,000 TEU.

8.7.3 **Other ports, PL**

Szczecin and Świnoujście Seaports are mainly for ferry traffic and for handling bulk products. The total turnover is around 21M tons whereof transit cargo to other boarding countries by land is around 3M tons. There is a container berth at Hutnikow Quay in Świnoujście equipped with a 35 ton gantry crane. The quay length is 328 m and the draught is 12.8 m. In Szczecin, the Czeskie quay is 375 m and up to 9 m draught. The berth has one container crane of 50 tons capacity.

8.8 **South west (Denmark, Baltic Germany)**

8.8.1 **Aarhus, DK**

The Port of Aarhus handles about 11M tonnes of cargo, whereof 3.6M tonnes liner cargo. The total TEU turnover 2005 was 876,000 including containers handled in the roro system and by land. The total lolo-handling by sea amounted to 396,000 TEU.

The focus of attention in the port is the construction of the new East Terminal. In 2007, the container handling in the North terminal will move to the East Terminal.

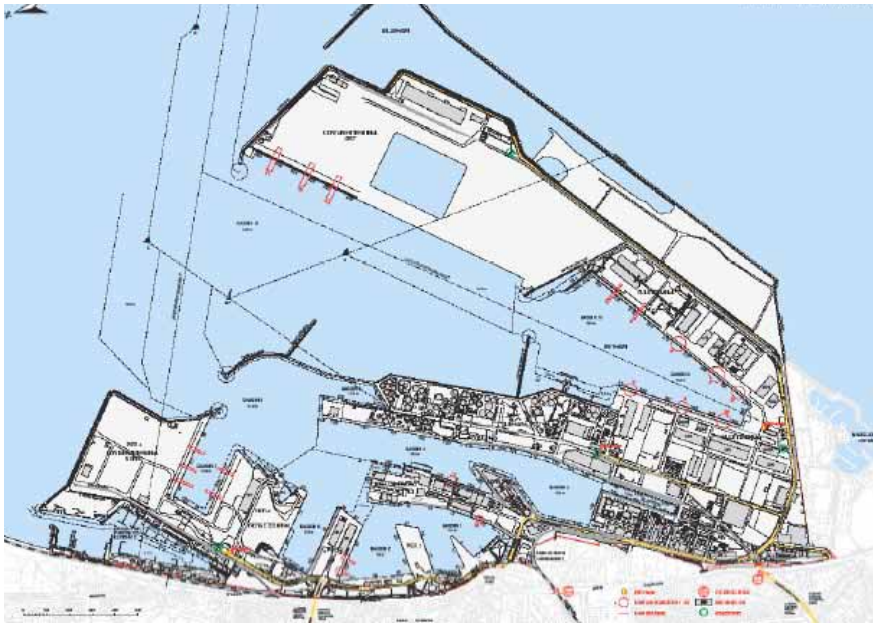
Figure 57: *The Port of Aarhus*

The new East Terminal, currently at 20 ha, will soon reach 50 ha. The quay length is 800 m, to be served by five Post-Panamax cranes, whereof two are super-PPX. From the North Terminal five Panamax cranes will be moved. APM Terminals and the FAA-group are the two terminal operators in the East Terminal. The direct FAA-group operator is Århus Stevedore Kompagni (ÅSK).

Further investments in storage facilities and warehousing supplement the expansion in the East Terminal.

There are further grand scale expansion plans approved and in place. When these are realised, which may be some 10-15 years ahead, the total port area will have expanded to 360 ha and water depth increased to 15.5 m (currently 14 m at the new East Terminal).

Figure 58: *Port plan of the Port of Aarhus*



The Port of Aarhus is the domestic port of Maersk and UniFeeder. To the surprise of no one, these two operators are showing a high presence in the port.

Several of the other major container operators call on the port as well, but only Maersk has direct calls with deep sea vessels. 57% of the calling capacity is performed by the overseas container operators and 31% of the feeder capacity is done by the major feeder operators. The remaining 12% are roro operators. UniFeeder has as expected the highest frequency of calls on the port – more than 24 per month. Finnlines roro service had some eight calls per month and most of the other major operators had about one call per week.

Aarhus has around 1,050 calls providing an aggregated carrying capacity of 1,125,000 TEU.

8.8.2 **Other ports, DK**

Copenhagen – Malmö port CHMP, has a total turnover of 167,000 TEUs in the two ports. In Copenhagen 132,000 TEUs are handled. Copenhagen is by this the second largest container port in Denmark.

Aalborg havn has a turnover of 61,000 TEU. The main container traffic is in the direction of the North Atlantic area and it is growing fast.

Esbjerg havn is mainly a ferry terminal, but the port also handles containers with regular calls by LYS-line and Atlantskip. In 2005, the turnover was 11,000 TEU.

Fredericia Havn is an industrial port that handles sawn timber and other industrial supplies. The container turnover was 12,000 TEU in 2005.

8.8.3 **Other ports, DE**

Lübeck is the major roro-ferry port in the Baltic Sea. Regular ferry services and roro lines meet in Lübeck as a main hub for further distribution between the Baltic Sea Region and the European Continent.

The Hamburg port operator HHLA has built the Lübeck Container Terminal, a multimodal terminal which has been designed and built for the sole purpose to tranship containers by rail between the Baltic area and the port of Hamburg. The development of volumes has not been what was expected, much to the reason that the railway service has had capacity problems. The railroad will now be electrified which will improve the environmental account of the service.

8.9 **Scandinavian Peninsula (Sweden, Norway)**

In Sweden there are a number of container ports around the coast, whereof Lysekil, Göteborg, Varberg, Halmstad, Helsingborg, Copenhagen-Malmö port, Åhus, Norrköping, Södertälje, Stockholm and Gävle are called on by feeder ship services. The majority of containers to Sweden are shipped over the Port of Göteborg.

On the Gulf of Bothnia the industry containerisation has been achieved by utilising the vessels in liner service distributing paper products to the continent to carry empty containers to the ports Holmsund (Umeå) and Sundsvall. The containers are stuffed with wood products for the US or Japanese markets. The transport system was originally set up by SCA Timber and Assi-Domän on the purpose to open up the Japanese market and the access of low cost container transports by using the regular shipping service to Rotterdam. The service has today a turnover of about 11,000 TEU per year.

An unknown quantity of containers are discharged in the major European container hubs and trucked up to Sweden. Some years ago, an estimate was made saying that one fifth of all container cargo to Sweden was carried by truck by road and ferry through the south of Sweden. The growth of truck traffic via Southern Sweden was around 7-8% per year until the year 2000. It has since declined to an annual growth of about 5%. A part of this is traffic to/from Norway.

The way of distribution has to do with the location of the warehouses and how the products that come to Europe by the transoceanic ships are handled. The way of distribution is decided by the logistic system used by the manufacturer. The containers may be stripped in the warehouses and the products shipped to the different markets by road or distributed as a whole container to a national or Scandinavian warehouse from where the products are distributed.

In Sweden the warehouses have found location in areas around the cities of Jönköping, Örebro, Västerås and Eskilstuna.

In Norway the major industrial and trading centre for consumer products is around the Oslo fjord. In this area we also find the major container terminals. All of them are of minor size but there are numerous.

Port of Göteborg focuses on three production areas, Container service, Ro/Ro ferry service and petroleum. The port has an annual turnover of a bit more than 800,000 TEU and 600,000 rolling units. The petroleum will have a turnover of around 20 milj tons in 2006.

A number of regular feeder services calls on Göteborg. StoraEnso uses the port as a hub terminal for shifting SECUs between services. Finnish SECUs from Kotka and Ajos are landed in the Älvsborgs terminal to be shifted to Immingham, Tilbury or Zeebrügge.

The port has today been dredged to safeguard better navigation space for ships calling at the port. The container port has a depth of 14.2 m and is equipped with five post panamax heavy lifting container cranes and six cranes with 35m outreach.

Figure 59: *Shuttle services with the Port of Göteborg*

The rail bridge system is a strong feature of the port and the rail tracks to and from the port area are the most frequently used tracks in Sweden and the port is one of the main rail cargo terminals. Everyday trains depart from and arrive to the Port of Göteborg with overnight services to all major cities in Sweden and Norway.

The rail bridge system presently comprises 19 lines. It allows the port to extend the container depot to reach out to the shippers and thus offer cost efficient and environmentally friendly transports at low cost. Today almost 40% of the containers are moved in and out of the port by rail. The percentage of new containers that are addressed to the rail service is even higher. The capacity in the port to service more trains is presently a bottleneck. Figure 59 shows the route system 2006. The network is ever growing and changing depending on the market and availability of train sets.

The Port of Göteborg receives deep sea calls once a week by Maersk's AE1 Far East service as well as by ACL Transatlantic service to/from the US. Deep sea car carrier services to the Far East, Oceania and South America are also frequent in the port.

Port of Göteborg Rail Center has Sweden´s best conditions regarding weight and profile for rail transportation.

In co-operation with rail operators, new destinations are to be introduced:

- Malmö
- Östersund/Ånge
- Fredrikstad/Sarpsborg/Moss (Norway)
- Hallsberg
- Örnsköldsvik
- Jönköping
- Kristianstad/Karlshamn/Åhus
- Copenhagen (Denmark)

The traffic on Göteborg is mainly feeders apart from the weekly call by Maersk in the Asian Europe 1 trade and ACL (Grimaldis) weekly call with container roro ships in the Atlantic trade. The most frequent visitor is Unifeeder with more than one call a day, followed by Team Lines (Delphis) with three calls per week. The largest feeder operating the port is the weekly arrival by Maersk with an approximate 2,000 TEU sized ship. Eimship and Kawasaki have a weekly call and X-press Container Lines one and a half per week. MSC have a call every tenth day and Iran shipping one per month. Apart from this there are an additional six operators with calls in january to August in 2006 making the total 15. Together these operators have about 980 annual calls providing a capacity on their ships of about 800,000 TEU which gives that their inbound/outbound capacity are 1.6M TEU in eight months – way larger capacity than the currently uses.

60% of the transport capacity is supplied by the major transocean services. 37% is by the major feeder operators and the rest 3% by others.

8.9.2 **Other, SE**

Gävle, located north of Stockholm is the northern most situated port with regular feeder services. The port is growing rapidly as it is situated close to the industrial area. In mid 2006 the port opened a new container terminal having two port gantries. The annual volume 2006 is expected to exceed 100,000 TEU. The port has a direct rail pendulum service on Göteborg and Southern Sweden. Team Lines and OOCL frequent the port.

Figure 60: *OOCL vessel in the container terminal*

Halmstad, on the Swedish west coast, had 2005 a turnover of about 22,000 TEU. The port handles mainly roro, metals and the Icelandic feeder vessels.

Helsingborg is the second largest container port in Sweden. The port is strategically located in the northern part of the Oresound. The port had in 2005 a turnover of 107,000 containers. The location in an industrialised part of Southern Sweden with a close vicinity to the Continent makes it interesting for certain consumer products and some industries.

Malmö port is operated by Copenhagen-Malmo Port (CMP). The port of Malmö had a container turnover of 35,000 TEU in 2005 which was about half of its sister in Copenhagen.

Mälarhamnar, located in Lake Mälaren. The services calling at Västerås ship mainly supplies to the steel mills and other industries in the area. Agricultural and forest products carried as return cargo. The port had a turnover of 35,000 TEU year 2005.

Stockholm, the container terminal is located in the city centre, but is planned to be moved, probably to the southern part of the area in Nynäshamn (Norvik). The annual turnover is around 35,000 TEU, mostly consumer goods. This gives an outgoing flow of empties which are repositioned to Gävle and other services in the Baltic.

Södertälje, is located south of Stockholm at the fairway to Lake Mälaren. The port is investing in its container terminal and it is expected to grow. The port has regular rail shuttle service from Göteborg and Gävle. The annual turnover is around 18,000 TEU.

8.9.3 **Other, NO**

Port of Oslo, the port is in bad need of increased capacity and has for this reason started a project of upgrading the container terminal. Fillings are made in Sjursøya, see Figure 61, and the first stage will be ready in 2007. In 2008 the new terminal will resume the full container handling capacity in the port. The port has a turnover of around 170,000 TEU. UniFeeder, Team Lines and Lys Line are calling the port.

Figure 61: *Sydhavna container port project in Oslo*

The rest of the Oslo fjord area includes **Moss** 37,000 TEU, Fredrikstad/Sarpsborg named **Borgs havn** 40,000 TEU and **Larvik** 44,000. In conclusion, there is a total turnover of around 300,000 TEU in the **Oslofjord area**.

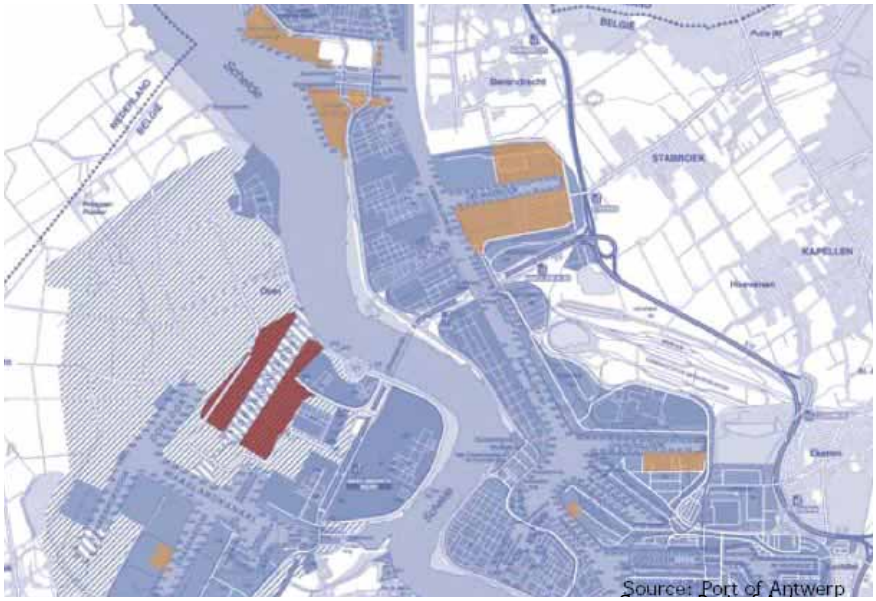
8.10 **North Sea Continent (Germany, Belgium and the Netherlands)**

The ports of Antwerp, Rotterdam, Hamburg and Bremerhaven are the main container transhipment ports for the Baltic Sea Region. With minor exceptions, the large transhipment hubs have in common that roro vessels are not allowed access to the container berths. The dedicated container feeder vessels quite frequently have to call on several berths within each transhipment port. This is however not the case for those major deep sea operators that have their own feeder vessels.

8.10.1 **Antwerp, BE**

Port of Antwerp is situated along the Scheldt river, where there are several container terminals, some of which are located inside locks. There are extensive warehouse facilities located in the port, measuring 530 ha, which are among the largest in Europe.

Figure 62: *Port of Antwerp Container Terminals/Docks*



The Belgium-based subsidiary of PSA International; PSA HNN (Hesse-Noord Natie), operates two major terminals; the Nordzeeterminal and the Europaterminal. MSC is consolidating its business to the MSC Home Terminal and P&O Ports runs a terminal on the northern side. Further to these, there are two smaller terminals.

New capacity is provided in the Deurganck dock, adding about 2 km of quay length. PSA HNN and P&O Ports will operate the new terminals. Teu-capacity is reported to increase by some 1.5M TEU.

The port has about 2,800 calls per year giving a transport capacity of about 6.6M TEU. Like in other hub ports, large vessels (over 5,000 TEU) dominate. Their 560 calls 2006 represent 36% of the total carrying capacity. The largest number of calls was done by the smallest vessels, ie the feeders. They called about 1,400 times, but that add up to a mere 9% of the carrying capacity. The roro vessels represent a container capacity in TEU of about 1%.

The largest operator is MSC having about 2.5 times larger capacity per year than the second largest. The container capacity provided by MSC is about 25% of the capacity calling the port.

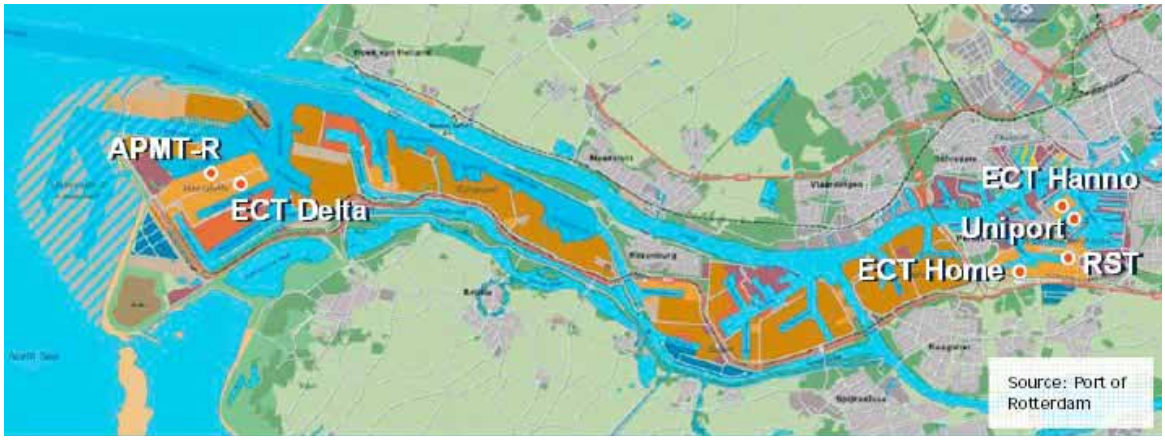
Over all, the major transoceanic container operators' deep sea and short sea calls represent 70% of the calling capacity.

Unifeeder is the largest feeder operator. The major feeder operators represent 7% of the port call capacity.

8.10.2 **Rotterdam, NL**

Port of Rotterdam is the largest port in Europe with an annual turnover amounting to 9.3M TEU. Measured in tons, containers is the second largest type of commodity handled following crude oil. Rotterdam is the first port of call for many of the container lines that call on Europe. 12.5% of all liners services have Rotterdam as the first port of call. As regards Far East services the figure is 27%.

Figure 63: *Container terminals in the Port of Rotterdam*



Spain used to be the major feeder destination from Rotterdam, but the increased volumes over Russia has made the Baltic the dominating market from year 2005.

Rotterdam prepares for future transport demands by extending the Maasvlakte area with new port capacity in a first step in the Euromax Container Terminal (ECT) aiming at a capacity of 3.2M TEU by 2008.

Further expansion is planned in four new terminals in the large port project Maasvlakte 2, which will raise the total container capacity up to 16M TEU by around 2012. Further down the line, 32M TEU are set as possible capacity, but then we are looking at the second half of the 2020s.

8.10.3 **Hamburg, DE**

Hamburg is the second largest container port in Northern Europe and the largest transhipment hub for the Baltic Sea Region. The TEU turnover nearly doubled between 2000 and 2005, from 4.2M TEU to 8.1M TEU.

Eurogate and HHLA (Hamburger Hafen und Logistik AG) are the two container terminal operators. Eurogate is running the Eurogate terminal and HHLA is running the terminals Burchardkai, Altenwerder and Tollerort.

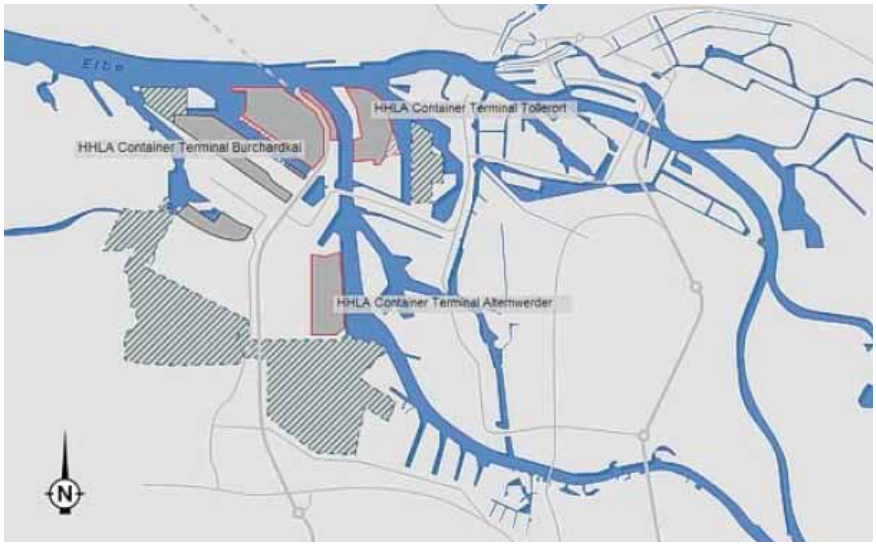
Table 47: *Hamburg container terminals*

Operators Full Container Terminals / Location	Quay Length	Terminal Area (Berths)	No Quayside Cranes	Depth Alonside	Total Cont. Capacity
Eurogate Container Terminal Hamburg CTH / Waltershofer Hafen, Predöhlkai	2,050 m	140 ha (7)	18 (15x post-Panmax)	16.7 m	2,600,000 TEU* *Planned capacitiy 4.5 m TEU (2010)
HHLA Container Terminal Burchardkai (CTB) / Buchardkai, Parkhafen, Althabaskakai	2,850 m	160 ha (10)	20 (13x post-Panamax)	16.5 m	2,800,000 TEU* *Planned capacity 5.2 m TEU
HHLA Container Terminal Altenwerder (CTA) / Altenwerder	1,400 m	80 ha (4)	15 (13x post-Panamax)	16.7 m	2,400,000 TEU* *Planned capacity 3.0 m TEU
HHLA Container Terminal Tollerort (CTT) / Tollerort	995 m	40 ha (4)	7x post-Panamax	15.2 m	950,000 TEU* *Planned capacity 2 m TEU

In 2004, a "Port Upgrade" programme was introduced. It comprises the construction of four large container vessel berths and one feeder berth, investments in waterways, road and rail links, plus freeing areas for logistics facilities.

Further to the above, deepening the river Elbe, restructuring the central free port zone and construction of the harbour link road are mentioned as crucial investments.

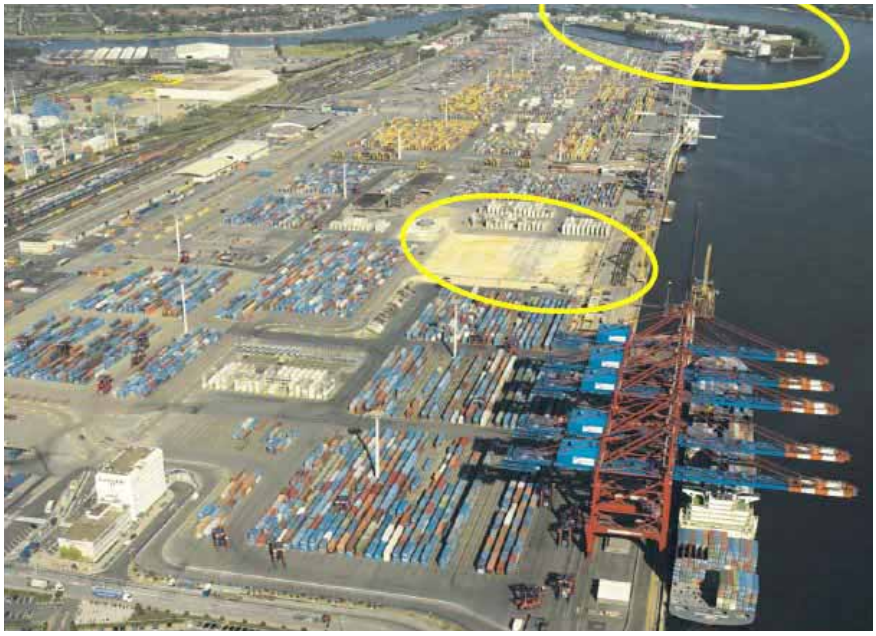
Figure 64: *HHLA expansion plans*



HHLA claims they will invest in excess of €1,000M over the years in its container handling capacity in the Hamburg terminals. The Burchardskai capacity will be close to doubled, Altenwerder increased by 25% and Tollerort more than doubled.

Furthermore, a new train station is constructed in Burchardskai and new storage blocks are laid out in Altenwerder.

Figure 65: *Eurogate Container Terminal Hamburg*



Eurogate is a major container terminals and logistics provider with operation all around Europe. Investments in Hamburg are reported to amount to €200M up to 2008, boosting capacity 73% up to 4.5M TEU.

Hamburg is now being marketed as a 15M TEU port, with plans to reach 18M TEU within a foreseeable, but not specified future.

The total carrying capacity of calling container vessels in Hamburg amount to about 13M TEU per annum. The major overseas container operators represent about 75% of this capacity. The major regional feeder operators represent 15% and all others about 10%.

Looking at the capacity in size of the vessels 50% of the capacity comes by vessels larger than 5,000 TEU and 22% by vessels below 1,000 TEU. The 3,000-4,999 TEU range represents 13%.

8.10.4 **Bremerhaven, DE**

Bremerhaven is the Eurogate's largest terminal, handling in excess of 3.7M TEU in 2005. One terminal is run in a joint venture with Maersk and another with MSC.

Figure 66: *Bremerhaven Container Terminal*

The container terminal is being expanded with the construction of four new container berths, extending the container quay length to 5 km. The expansion is scheduled to be finalised in 2008. The first berth was inaugurated in October 2006. The project budget amounts to €500M.

Table 48: *Bremerhaven Container Terminal*

Operators Full Container Terminals / Location	Quay Length	Terminal Area (Berths)	No Quayside Cranes	Depth Alonside	Total Cont. Capacity
Eurogate Container Terminal Bremerhaven	3,040 m* *5.000 m (2008)	200 ha (12) *290 ha (16)	27 (24 post-Panamax)	14.0 m	4,000,000 TEU* *Planned capacitiy 7.0 m TEU (2008)

The port of Bremerhaven has roughly between 450 and 500 calls per month and the figure is growing. The largest vessels are the ships size of more than 5,000 TEU carrying capacity. They represent more than 30% of all the carrying capacity. The size from 3,000 up to 5,000 is also at the 30% level. 24% of the vessels are of less than 1,000 TEU, where we find the majority of the feeder vessels. The roro ships in Bremerhaven are close to non-existent.

The largest operator is Maersk having a total capacity of about 300,000 TEU/month. Maersk represents about 42% of the container carrying capacity in the port. All major container operators represent a capacity of 73% while the major feeder operators represent 16%.

This is three times as much as the second largest operator MSC. Bremerhaven has about 3,400 calls per year representing a carrying capacity of 5.7M TEU.

8.10.5 **Jade Weser Port, Wilhemshaven, DE**

Among the most topical North European container port projects is the Jade Weser Port project. The port is located close by Wilhelmshaven in Germany. The project is one of the major projects for deep sea shipping presently running.

The 2.7M-TEU project received the go-ahead from the German waterways and shipping administration in March-07. Construction of the infrastructure of the new deep-water facility in Wilhelmshaven will cost about €650M and the yard, buildings and equipment a further €350M. The latter will be financed by Bremen-based terminal operator Eurogate and its 30% partner in the venture, APM/Maersk. National Container Company (NCC) from Russia has been granted a minority shareholding in Jade Weser Port in return for Eurogate's involvement in the Ust-Luga project in Russia. Reportedly both groups are likely to target further joint projects in the Black Sea region.

New legal hurdles arise though as more and more lawsuits are being filed by residents and citizens' action groups. The investors still hope to commission the terminal in 2010, although work was originally scheduled to begin this spring.

Figure 67: *Jade Weser Port a container port project*

The basis for the project is the demand for deeper ports induced by the new container vessels that operates on long distances. Presently the largest vessels have a draught of 16 m when fully loaded to the dwt. Few ports in Europe can accept this size of vessels.

The allowed draught at the container terminal in some of the major ports today are 9.45 m in Bremen, 13 m in Bremerhaven, 15.1 m in Hamburg and 13.5 m in Rotterdam.

The Jade Weser Port project was brought forward as a location because of the good fairway which is moderately used and the available land area that is suitable for a terminal. The fairway is presently used by larger tank tonnage supplying crude oil to the refineries in Wilhelmshaven.

There are both railroad and road connections in place. The main activity is expected to be transhipments, but the option of supplying the Ruhr area with containers by rail or inland waterways using the Ems canal system leading to the Mittelland canal in Germany seems as a great option for the future. The upgrading of the Mittelland canal is a prioritised infrastructure project in Germany.

In Figure 68 the grey area indicates the area reserved for the terminal in first and future development. In the first stage the following dimensions are planned to be:

- Terminal area 120 ha
- Logistics area 170 ha
- Additional industrial area 400 ha
- Length of quay 1,725 m
- Depth of terminal, Quay to gate 650 m
- Depth at quay 18 m
- Terminal handling capacity 2.7 millions TEU
- Total cost of project about € 900 millions

Figure 68: *Physical orientation of Jade Weser Port area*

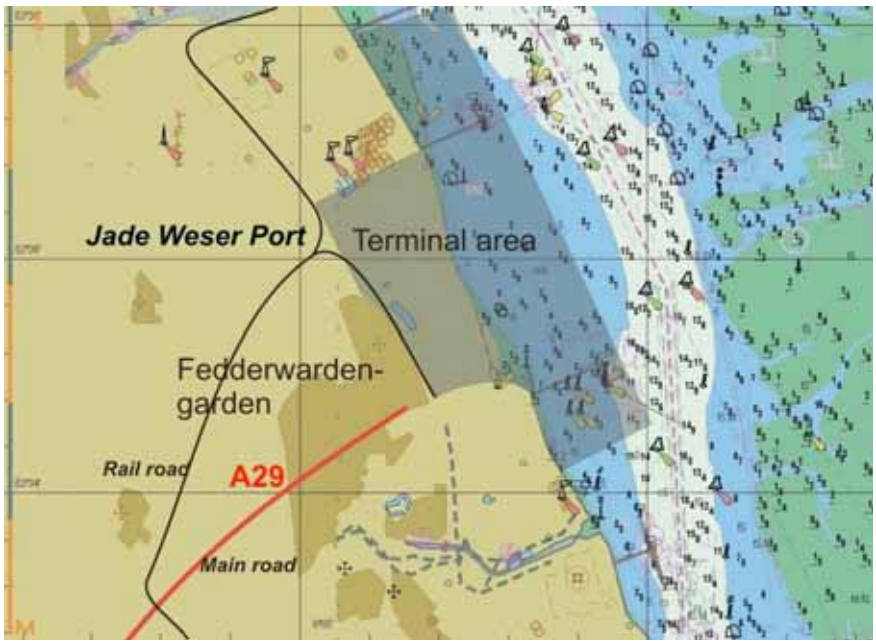
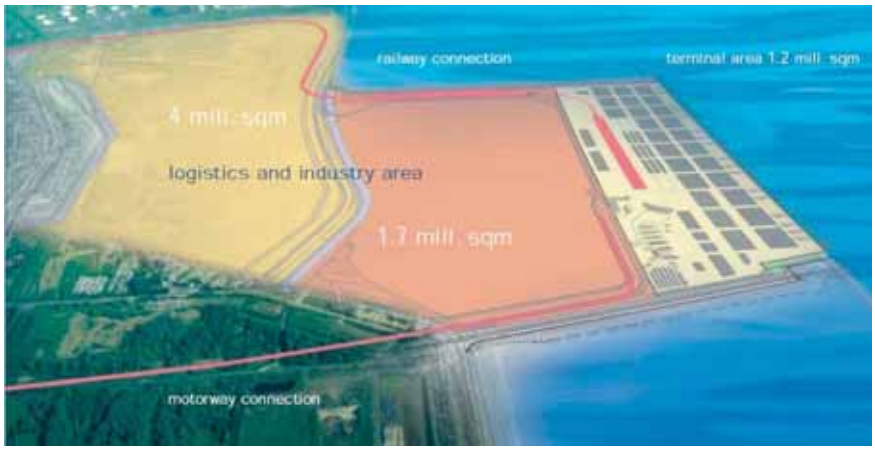


Figure 69: *Jade Weser Port terminal by 2010*

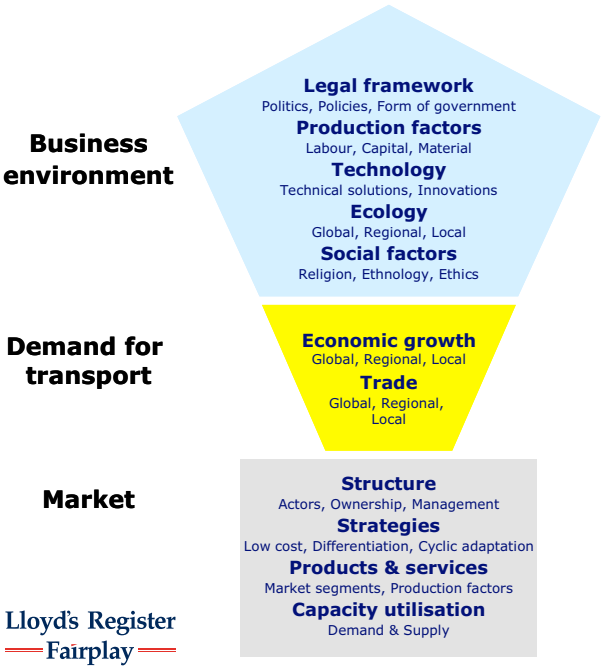


The shipping industry will probably welcome this new port as it increases the competition in several aspects. In the fierce competition between ports and between the deep sea shipping companies every opportunity to keep down the cost and benchmark the service in the region is welcomed by everyone but those affected by the pressure.

9 Approach

The figure below illustrates the analytical approach used in this publication. Changes in demand for seaborne transport capacity are a function of economic growth and international trade, which in turn result from changes in the business environment.

The effects of changing demand for seaborne transport capacity depend on how the markets are organised; the market structure (e.g. monopoly, oligopoly etc), strategies used to meet demand and products and services developed to meet demand, as well as the different components of utilisation.



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