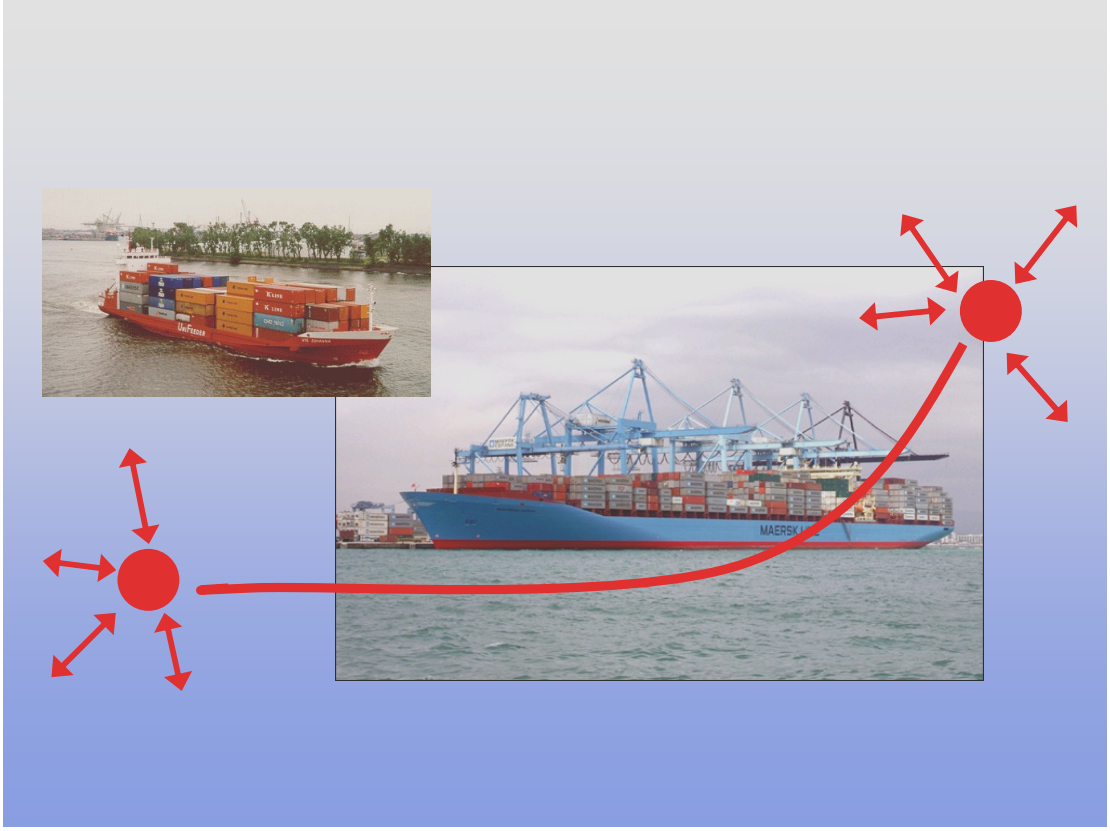
GENERAL BUSINESS ENVIRONMENT, ECONOMY, TRADE, TRANSPORTS



AND CONTAINER MARKET CHARACTERISTICS

GÖTEBORG 2002-10-16

Sjöfartens Analys Institut
The Institute of Shipping Analysis

GENERAL BUSINESS ENVIRONMENT, ECONOMY, TRADE, TRANSPORTS AND CONTAINER MARKET CHARACTERISTICS

THE PROJECT RESULT IS PRESENTED IN THE FOLLOWING REPORTS:

- *General Business Environment, Economy, Trade, Transports and Container Market Characteristics*
- *The North European Maritime Container Feeder Market*
- *Summary & Concluding Analysis*

Our reference: NEB Feeder Market - General
Kaj Rehnström

SJÖFARTENS ANALYS INSTITUT
Lilla Bommen 1, 411 04 GÖTEBORG
Tel: +46 31-771 25 50, Fax:+46 31-15 69 65, E-mail sai@sai.se

2002-10-24

Foreword

Previous research made by The Institute of Shipping Analysis (SAI) indicates a large potential for Short Sea Shipping container feeder systems in the future. That is why we have undertaken this research project - The North European Maritime Container Feeder Market". The objective is to define the driving forces behind the development of the Short Sea Shipping container market and transport networks, their strengths and hindrances.

The research was financed by the following organisations:

▪ Göteborgs Hamn	▪ Helsingborgs Hamn
▪ Copenhagen Malmö Port	▪ Smålandshamnar
▪ Gävle Hamn	▪ Vinnova
▪ SAI	▪ Swedish Maritime Administration

We are also convinced that everyone that reads this report will join us in warm thanks for their support, which has made it possible for us to conduct this research.

The result is presented in the following separate reports:

- *Summary & Concluding Analysis*
- *The North European Maritime Container Feeder Market*
- *General Business Environment, Economy, Trade, Transports and Container Market Characteristics*

Responsible for the project management have been Kaj Rehnström, Executive manager SAI, Jennie Thalenius, Manager Research SAI and Prof. Kenth Lumsden, Chalmers University of Technology, Department of Transportation and Logistics.

Jennie Thalenius has been responsible for the main report about the North European Container Feeder Market and the database development together with Per Olof Arnäs from Chalmers University of Technology, Department of Transportation and Logistics, who has worked with the database development. Kaj Rehnström has been responsible for the report on General Business Environment, Transports and Container Market Characteristics.

Finally, many thanks for your contributions - Barbro Wilén and Christopher Pålsson, SAI; Niklas Bengtsson, MariTerm and Erik Bastiansen, MSR Consultants.

We hope that this work will contribute to a better understanding of the economic welfare that Short Sea Shipping creates for all of us.
Göteborg, 2002-10-16

Kaj Rehnström

Table of contents

Figures

Tables

Summary and conclusions

The growth in seaborne trade of containerised cargo has outstripped the growth in world trade in general and world economic growth in particular since the introduction of the container during the 1950s on the West-East /East-West long haul trades. It reached an astonishing 73 million TEU in 2001.

Since 1990 a slightly larger growth in seaborne trade has been seen in the "North-South trades", as well as in the two "East-West trades" from Asia and to the USA and Europe respectively compared to the old traditionally West-East /East-West long haul trades

The transport links forming the transport chain from the first origin of cargo to the final destination have been more integrated and the transport of a manufacturer is increasingly outsourced to a specialist "Logistics Company".

The legal framework of container shipping has also changed radically as common freight rate fixing in liner conferences has been forbidden. Thus, political decisions, intermodality and logistic services have become increasingly important.

The containerisation of the container friendly goods[1] has reached a level where the process only gives a minor contribution to the over all growth in the container trade.

However the containerisation of the non container-friendly and often heavier cargoes has started to improve and the share of non container-friendly goods being transported in containers is increasing.

Behind these structural changes lie considerable:

- increases in volume for Latin America, the Mediterranean-Middle East, India and the rest of the Far East
- reduced container freight rates due to the use of larger vessels, increased co-operation, alliances etc as well as rationalisations in the other parts of the logistic chain. Above all, the cost for the sea leg in a door-to-door transport has decreased substantially.

There are still economies of scale to be exploited by using larger ships, but in our view the potential is not so large anymore. Technically there are no great challenges where ships are concerned.

The changes discussed above are reflected in all key figures such as ton/TEU, lifts/TEU and TEU/slot. Figures that will continue to change over time as the container is breaking into new markets in line with the following future driving forces:[2]

---

[1] Seaborne trade in container friendly commodities within **manufactures** is represented by the following commodity groups defined by the WTO: Office and telecom equipment,Textiles,Clothing,Other consumer goods

[2] Based on SNF, Fremtidig utvikling i skipsfarten og skipsfartens markeder" [Future development in shipping and shipping markets] Atle Minsaas, Peter C. Omtvedt, Sigbjörn Södal and Tor Wergeland and SAI's own research.

- Economic growth. Growing globalisation of economic activity and growing free trade.
- Increased political intervention. Conditions underlying political frameworks and environmental, safety and social considerations.
- The use of economies of scale in all parts of the logistic chain - technically as well as organisationally.
- Relatively higher growth of goods physically and economically suitable for container transport.
- Transport and logistic thinking.
- Developments in the Information and Communications Technology area (ICT).

Combined, these driving forces will have a major influence on how companies configure their logistics solutions, which in turn affect shipping in several respects.

The prerequisites for economic growth during the next 10 years are rather good with a generally favourable technology factor leading to improved productivity in the world economy and hope for no disruptions in the supply of production factors i.e. there should be no risk for inflation during the next 10 years. However, there are many uncertainties around the geopolitical situation that can negatively influence economic growth.

The following scenario is therefore based on rather cautious assumptions for the period 2001-2010, with:

- an average world GDP growth of 2% per year,
- an average of 7% per annum growth in container friendly goods, representing an average ratio between GDP growth and container friendly goods of 3.5 compared to a little over 4 during the 1990s,
- an increase in the non container friendly cargoes' share of all container shipments from 7 % to 10 %,

the shipment of containers will increase by approximately 7 % per year from 73 million in 2001 to 145 million in 2010 i.e. a reduced yearly growth rate with nearly 15 % compared to the 1990s, but still a doubling of the shipments in absolute volumes corresponding to 75 million TEU compared to the increase of 35 million during the 1990s.

If we add a business cycle perspective to the trend line above it is essential to bear in mind that the starting years 2001 and 2002 for the scenario period is an economic recession. Neither a recession nor a boom period is a good starting point to form the basis for more long-term projections.

The slowdown of economic growth in 2001 and 2002 and the corresponding reduction of the growth rate in seaborne container trade in combination with an upturn in the supply of slot capacity sent the container market into a recession. The German beneficial tax system once again stimulated the investors to order too many container ships in the short term.

It could take two years and an upturn in the economic growth for the market to recover. For those actors who foresaw the prevailing situation and acted accordingly the next two years is a good time for investment in container shipping. Scrapping will increase and ordering of new tonnage will drop during

2002-2003 and deliveries will be reduced 2004-2006, while demand can be expected to start to increase again during this period.

The turnaround of the market can be fast due to the relatively high growth rates in the demand for container shipment, which could be expected during an upturn in the economy and a similar slowdown in the growth of capacity. Thus a relatively strong recovery in freight rates and prices are expected during the period 2004-2006; how strong depends on the shape and the force in the business cycle upturn.

The large number of operators on the market and the reduced influence of price collaboration in conferences makes it unlikely that operators and charterers can match the changes in demand by a corresponding adjustment of capacity in the medium and short term.

This is clearly illustrated by the development during the last few years and we expect a majority of the operators/charterers to make the same mistakes again, despite the tax amendment in Germany.

The picture below summarises our view on price and charter developments.

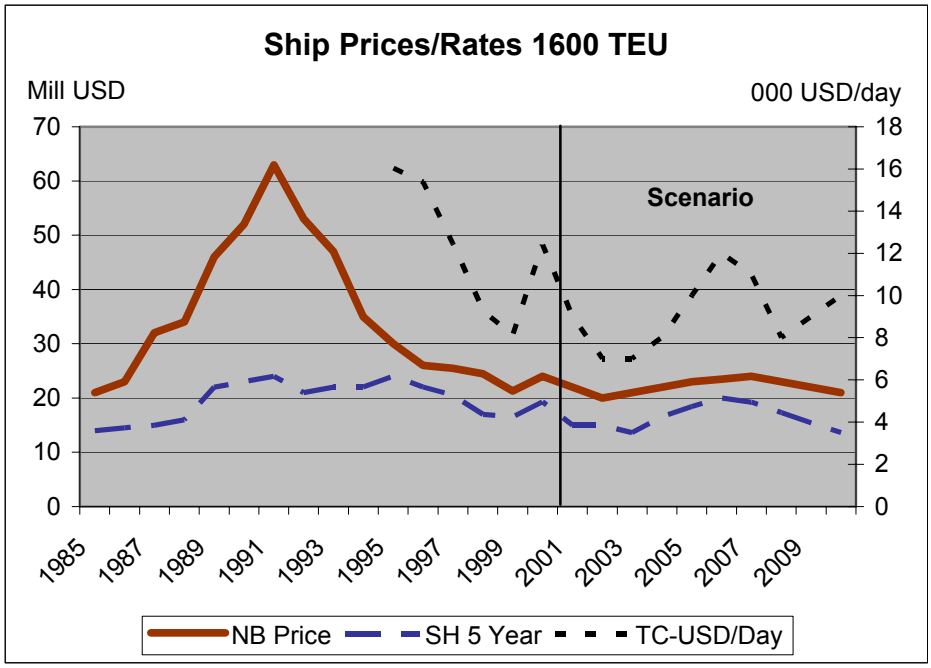


Figure 1: Ship prices and rates

Based on the discussion and the scenario above there are three striking observation to be made:

1. A doubling of seaborne trade 2001-2010 represents a global increase of approximately 75 million TEU.
2. An increase in volumes that represent no capacity problem for the sea part of the transport chain, but the rationalisation potential in the sea leg of a door-to-door transport is substantially lower than in the past. The problem or key question is to what extent the non sea part of the transport chain can cope with such an increase in volumes.
3. The concept of sustainable development has created "new" policy objectives. Since the market does not fully price "sustainability" transport pricing will be shaped through political processes. Transport calculations

will include "new" cost items that may not be offset through the use of economies of scale, ICT, deregulation and harmonisation.

This can lead to a scenario with rising unit costs in the next 10 years. In the case of peripheral countries, with considerable transport distances to major markets and a substantial dependence on trade, higher transport costs would, of course, have an adverse impact in a longer-term perspective on economic growth.

To avoid such a scenario becoming a reality we can conclude that the need for innovations in the future is in communications, marketing, general organisation and technology in terminal and land systems. Focus is more on the holistic commercial side together with terminals and transport efficiency from the terminal to the customer/producer.

As the volume of container shipments becomes larger and more diversified geographically and cargo wise there will be more opportunities for specialised niche operations as well as mega logistic operators.

The specialised niche and mega operators will find the conference way more or less closed after recent decisions in the EU and what is left are mergers and take-overs because it seems to be the only way of getting larger if anti-trust immunity becomes fully lifted. Conferences may be replaced by discussion agreements although at this stage the European Commission does not allow these. Other forms of co-operation and specialisation of services will, however emerge such as "E-Shipping"

The crucial resource for a full mega logistics provider is a regular and high quality access to shippers and to specialised transport services. Such an operator is managing a logistic net providing Logistic Chain Management. The operator does not necessarily have to own the hardware used in providing the services.

One particularly interesting segment of the shipping transport service market in the future is the " slot" market where transporters can offer TEU capacity as a complement to their main business.

This market is heavily dependent on the possibilities for those transporters to sell their TEU capacity on an easily accessible market for both combination capacity and complete ship charters. This market is of particular interest in the short-sea-shipping segment of container transportation.

The above trends will influence the system of shipping lines including the selection of hubs for transhipment of containers as well as more direct lines based on medium sized vessels for medium distance trade. Smaller container ports will also be engaged in short sea operations

Finally, it does not matter what growth scenario you believe in or if your business provides a worldwide logistic service, a specialised niche operation, geographically, functionally or cargo wise. Scale of operation and control of capacity supply is important for all parts of the liner business. It is therefore crucial to define your business segment correctly, because that determines how the scale of your operation is measured.

1 Introduction

1.1 Background

Previous research made by The Institute of Shipping Analysis (SAI) indicates a large potential for North European Short Sea Shipping container feeder systems in the future. That is why SAI together with Chalmers University of Technology, Department of Transportation and Logistics decided to undertake a deeper research, within the specified area.

1.2 Objective

The main objective is to enhance the knowledge about the structure, competitiveness and driving forces in the port and shipping market for containers within the Northern Europe and Baltic regions. At the same time, it was most urgent to develop more efficient and reliable methods to quantify market indicators in physical terms. Available statistics are fragmented, not compatible or lacking e.g. about the demand for transport capacity and its geographical distribution.

The project goals therefore also include to:

- Evaluate data acquisition methods and sources together with quality aspects regarding statistics.
- Build a network of contacts as a valuable source of more information and basis for further development.
- Develop a cargo database for the region on a port level.
- Develop a database structure integrating cargo, ship movements and fleet data to be able to follow the development of market structures and trends in a consistent way over time. Such a tool is necessary to be able to combine data from different sources with varying structures. At the same time it must offer flexibility. This holds a growing complexity due to the large and rapidly increasing amount of data when different databases are to be combined.
- Develop indicators for identifying structures.

1.3 Methodology

Through the years, SAI has developed a concept/model for the strategic business environment and market valid for any shipping market research field (Figure 2). The concept/model works as a general checklist for the research work.

The model includes several dimensions, which have to be considered before any further general or specific analysis can be made.

- *Research conditions*
  - Geography/Distance/Cargo type
  - Time perspective
  - Methodology and data collection

The transport system delimitations and parts with influence areas, all determinants of the development of the general or any specific transport market.

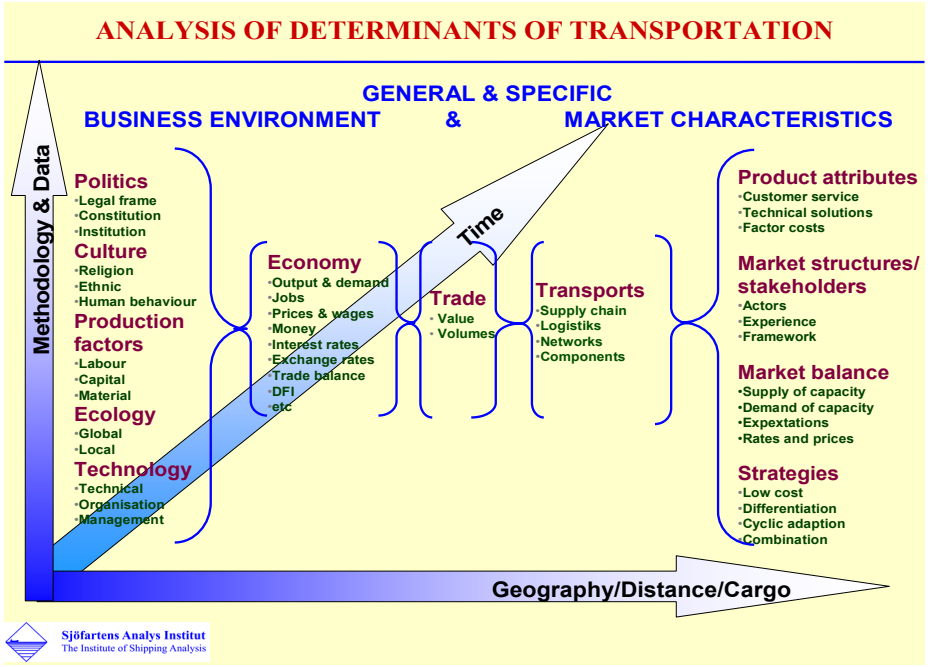


Figure 2: SAI Research Model: Determinants of Transportation

The concept takes into consideration the dynamics and dependency relations within this research field, which means that changes in any part of the system also affects other parts.

The reseach conditions for this report are the global market, a time period up to 2010 and a methodology, which strictly follows the concept descibed above. Data and information come from well known sources.

2 Business Environment

2.1 Political influence

A growing world population, globalisation, terrorism, environmental problems and special conditions in developing countries have gradually attracted greater political attention.

2.1.1 Sustainability

The concept of sustainability gained a political breakthrough in conjunction with the Brundtland Commission's report "Our Common Future" (1987), which spoke of achieving what it referred to as sustainable development.

Following this breakthrough, new policy initiatives emerged in a number of areas, including the transport sector. The concept and vision underlying sustainability has influenced the formulation of current transport and industrial policy objectives in several countries, including the EU.

Current international economic and shipping policy is governed by the following motives:

- Sustainable economic growth.
- Competitive situation (fair competition).
- Environmental effects (sustainable environmentally friendly development).
- The importance and role of transport for longer-term sustainable economic development (sustainable transport and mobility).
- Safety issues (safe transport system).

The policy motives underlying the industry and transport policy emerging particularly in the EU and globally has turned from a purely protectionist direction towards long-term sustainability, which is encompassed by the concept of long-term sustainable economic development.

It is not yet feasible to use the optimisation models prescribed by macroeconomic and trade theory in an appraisal of the long-term efficiency resulting from transport and shipping policy. This requires the possibility to measure and quantify sustainability as well as causal relationships.

Before future research supplies us with new methods, sustainability will be evaluated through the policy process. This also implies that the influence of policy in the transport industry and on its competitive conditions will be even more significant in the future.

Transport policy decisions affect the transport market directly and indirectly when measures are not competitively neutral. Accordingly, an

extremely important factor is the approach used in transport policy and decisions at the national and EU levels. In this context, an important question for the future involves the principles governing infrastructure charges as noted in the White Paper (COM 1998:466).

The principle underlying responsibility for the cost of transport, namely, that the user pays may be regarded as correct but is also extremely difficult to implement in practice. This involves the application of the marginal cost principle but application requires competitive neutrality in respect of member countries and type of transport. One can hardly say that the marginal cost principle is in force today since there are numerous exemptions to it, with sharply varying methods and principles applied among member countries. Implementation entails that everyone is treated equally and that nobody is discriminated against.

A greater use of rail and maritime transport may be viewed as an urgent need but this should be achieved by stimulating the development of inter-modal transport solutions. A major step would be to really implement the deregulation of rail traffic. Railways cannot be sheltered from competition through higher charges and taxes on road transport.

Infrastructure has become a feature of regional policy in Europe. In turn, this has created problems of priorities when costly investments in, for example, road infrastructure in a certain region are weighed up against the needs of other regions.

At the same time, transport and infrastructure must be viewed in a broader international perspective, in which the development of just a few links is given major importance – TEN (Trans European Network) and the Nordic Triangle are examples of this. A good infrastructure is a precondition for the development of future transport systems and, ultimately, for the competitiveness of the export industry.

The general conclusion is that development is a slow process, in which individual countries more or less gradually “copy” each other’s system, as in the case of Norway emulating Holland. In the longer term, this will eliminate cost differentials among various EU flags.

The trend is evident when we look at changes in the German, Italian, Dutch, Irish and French regulations.

The maritime business cluster in the Netherlands has attracted considerable attention in recent years. There are many indications that several countries will focus on acting as hosts for similar clusters in the future, leading to stiffer tax competition and other effects. The trend towards the creation of the most favourable conditions for business clusters is set to continue. This time on a European level.

2.1.2 International Maritime Organisation

IMO, or its predecessor IMCO (International Maritime Consultative Organisation) was formally established in 1948. The first meeting was not held until 1959 when the convention on its establishment had been ratified by a sufficient number of countries to enter into force.

IMO´s work on marine environment and safety issues is important and has come more into focus during the past decade. The work is governed by the following conventions and protocols:

- The international Convention on Load Lines, 1966, as modified by the Protocol of 1988 relating thereto.
- The International Convention for the Safety of Life at Sea, 1974 as modified by the Protocol of 1988 relating thereto. (SOLAS)
- The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978.(STCW)
- The Convention on the International Regulations for Preventing Collisions at Sea,1972
- The International Convention for the Prevention of Pollution from ships 1973, as modified by the Protocol of 1978 relating thereto. (MARPOL). March 6, 1992 new amendments to MARPOL 73/78, 13F and 13G were adopted.

SOLAS and MARPOL have received most attention from the media while the labour law and social issues have not been in focus. It is, however, in those areas that the greatest changes are likely to take place with the establishment of a global employment market.

Therefore the STCW convention, which regulates the international requirements for seafarers' training and qualifications, is of special importance.

When the SOLAS Convention has been ratified and implemented i.e. incorporated into the individual country's legislation, it is up to the maritime administration of the flag state to ensure that all ships in its own fleet follow the SOLAS rules.

From a strictly legal point of view, there is no international law that governs the safety at sea work. Any country, which ratifies a convention, is supposed to incorporate it into its own legislation. Hereby ships are compelled to follow the convention. Otherwise, their owners are breaking national laws.

The IMO can also adopt a resolution. This works more like a recommendation and it is up to each country to decide if they want to incorporate it into their legislation or not. The ISM code was adopted as a recommendation after the Herald of Free Enterprise casualty but was later made into a convention after the fire on board the Scandinavian Star.

In addition to this, any member state can make its own national laws on safety at sea. These rules, however, can only apply to ships under its own flag. Adherence is controlled by its own maritime administration.

Most countries have chosen to, in part or entirely, assign this exercise of authority to the classification societies since they are considered more experienced and with greater competence in this area than an individual nation with a small merchant navy and a young shipping tradition.

The increasingly international character of shipping and above all shipowners will influence international trade organisations and political institutions ever more.

2.1.3 Port state control

Every flag state should guarantee that the certified vessel follows the international conventions. There are, however, countries, which issue certificates without taking very serious prior control measures.

Because of this port states have assumed the right to inspect the ships arriving at their ports. You are not allowed to do this in a discriminatory manner or make stricter demands than those that have been agreed in the IMO. If a country wants to make stricter demands it will have to be done by bilateral agreements with other flag states. The flag state then incorporates into its own legislation that operating in the specified waters requires the agreed conditions.

It was not until 1982 that 14 European countries were tired enough of too many flag states issuing certificates for non-seaworthy vessels that port state controls started in earnest. To put pressure on the delinquent countries and get rid of the most non-seaworthy ships from their own waters a co-ordination and systematisation of the port state control of the different countries was introduced.

The Paris Memorandum of Understanding (MoU) on Port State Control means that the port states party to the agreement undertake to inspect 25% of all foreign vessels in their ports. Today the Paris MoU consists of 19 participating maritime administrations and covers the waters of the European coastal states and the North Atlantic basin from North America to Europe. Over 18,000 inspections take place annually on board foreign ships in the Paris MoU ports.

The idea of systematic regional port state controls is spreading to several other parts of the world. In South America, 13 countries have joined the Viña del Mar Agreement, Latin American Region. In the Pacific 17 countries have signed the Tokyo MoU, Asia-Pacific Region, and 2 more will be joining.

In a port state control inspection the certificates and other documentation, which should be carried on board, are inspected. The following conventions are followed up:

- The international Convention on Load Lines, 1966, as modified by the Protocol of 1988 relating thereto.
- The International Convention for the Safety of Life at Sea, 1974 as modified by the Protocol of 1988 relating thereto.
- The International Convention for the Prevention of Pollution from ships 1973, as modified by the Protocol of 1978 relating thereto.
- The International Convention on Standards of Training, Certification and Watch keeping for Seafarers, 1978.
- The Convention on the International Regulations for Preventing Collisions at Sea, 1972
- The Merchant Shipping (Minimum Standards) Convention, 1976, (ILO Convention No 147).

If the necessary documents are all present and correct and nobody suspects the vessel to be non-seaworthy the inspection is over. Often some suspicions arise and a more thorough inspection of the ship can be made.

To put further pressure on the flag states that do not control their own vessels a list is compiled of the countries whose ships have had serious deficiencies above average during the last three years.

There is a clear dividing line within the EU between Greece and Portugal and the other EU countries in respect of both the approach to shipping and the frequency of deficiencies. This affects the political situation in the EU. It is not only a question of the approach to and standard of business activities, but also a question of attitude in principle where countries like Denmark and the UK and to a certain extent Germany and the Netherlands with a verifiable high standard in their shipping industry are opposed to increased supranational flag control within the framework of the EU.

The problems of the environment and safety will probably be difficult to solve only via the flag states. An appreciably tougher port state control is likely to be needed for the future. This way there is a more natural connection between those who pursue the port state control issues, safety and the environment, than in most flag states above all the large open registers.

Tougher port state controls, improved procedures, increased co-operation between the classification societies and with shippers lead to better information on ship standards, which flags are over-represented where deficiencies and detentions are concerned and which owners who operate sub-standard tonnage.

2.1.4 National regulation of ocean liner service

In 1998 the Congress of the United States enacted the Ocean Shipping Reform Act, which became effective May 1, 1999. This Act amended the 1984 Shipping Act of the United States, retaining certain provisions and amending others. It has been hailed by carriers and shippers, particularly those represented by the National Industrial Transportation League (NIT League) as legislation, which deregulates the shipping industry and places greater reliance on the marketplace to determine ocean liner transportation

In the EU there are two principal regulations, which permit ocean common carriers to enter agreements with anti-trust immunity. The first is EC Reg 4056/86, regulating conferences, and the second is the Consortia Regulation, EU 870/95, issued in April 1995.

The past decade has seen continued litigation between the officials of DG Transports & Energy, the Commission and conferences particularly Trans Atlantic Agreement (TAA), and TACA over the meaning of EC Reg, 4056/86 and the scope of Articles 85 and 86 of the Treaty of Rome which govern antitrust law.

The Commission has ruled against inland price fixing by conferences, capacity limitation provisions and restrictions on service contracts. It has lifted TACA's immunity, charged TACA with abuse of power under Article 86 of the Treaty of Rome and continued violation of inland pricing prohibitions and violations with respect to fixing freight forwarder commissions and assessed substantial penalties. All these various decisions have been appealed to the Court of First Instance of the European Union.

Even before the introduction of the 1998 US Ocean Shipping Reform Act quite a number of US conferences were dissolved and replaced by Discussion Agreements. The US Federal Maritime Commission (FMC) has no objections against such bodies but they are not allowed to dictate rates. The European Commission forbids discussion agreements as well as joint capping of space by conferences, other than to counter short-time drops in demand.

At the end of 2001 the OECD published a report on the conference system strongly advocating the lifting of anti-trust immunity for conference lines. The OECD is not a regulatory body and it is up to the members to react. It all hinges on the fact whether groups such as the shippers' councils, who strongly condemn conferences in their present form, will be successful in pushing their case with the FMC, the European Commission and other regulatory bodies. So far the FMC have agreed in principle to maintain the anti-trust immunity of the carriers in their recent report on OSRA.

Various regulations published in China have also been the subject of dispute between the United States and western countries and carriers. First, Shanghai Shipping Exchange imposed regulations with a filing requirement for tariffs and gave the agency administrating the regulatory

scheme the right to intervene in certain cases where the rates were deemed too high or too low.

2.1.5 Safety and security

Deregulation of world shipping and the inferior standards that characterise the ship registers of many flag states, combined with a number of accidents in recent years, have led to a focus on safety issues. The reasons for this are the environmental and social consequences of accidents involving freight and passenger vessels. The tighter regulations being considered by the IMO will contribute to a significant reduction in the supply of transport capacity in a number of markets, which may contribute to higher freight prices over the next decade.

2.1.6 Trade

Trade policy affects transport through:

- regional policy agreements
- multilateral removal of trade barriers.

The creation of regional trade areas normally results in increased trade among countries in the particular region and a certain decline in trade with the rest of the world. However, the trade-generating effects exceed the distortional effects, leading to an overall growth in trade flows. Future developments will not be dramatically different from those of the past 10 - 20 years.

Trade policy questions are of key significance for international transport and the continuing liberalisation of world trade. A breakthrough by WTO (World Trade Organisation) in respect of the liberalisation of the agricultural sector will have a very positive overall effect on the dry bulk sector, mainly because of long haul imports to the industrialised countries from third world exporters.

2.2 Technology influence

2.2.1 Information and Communication

Development in the Information and Communication Technology (ICT) area will change internal work processes in companies, as well as communication among companies. Consequently, ICT also creates the conditions for strategic changes.

Globalisation of operations will continue in line with improvements in communications, which means that major players will become larger and will impose new requirements on their distribution systems.

ICT will play a steadily greater role in economic development worldwide. It will have profound effects in various ways:

- As technology platforms for information and communication.
- As "catalysts" in enhancing the efficiency in work processes and business communications.
- As an industry.

The first two points will have a direct impact on shipping. The development of ICT impacts on commercial transactions between producers and consumers, as well as on co-operation among companies through the full or partial integration of internal information.

It is easy to imagine a scenario in which information on goods and transport is available without delay for the players involved, which in turn will affect their working methods in relation to other parts of the transport chain. Opportunities also emerge for new players, such as network operators, who understand the technical potential of ICT, although they do not necessarily know much about maritime transport.

It is not easy to gain an overview of Internet trading, but the success of this requires the development of highly effective distribution systems and other innovations. Intermediaries who can offer improved service through a combination of groupage cargo and flexibility will be winners.

Internet trading will simultaneously contribute to fragmenting international trade flows. In the area of international transport, this entails a paradigm shift, with the emergence of totally new market opportunities. Meanwhile, a new type of expertise will be required.

ICT will undoubtedly lead to new ways of thinking and thus also to new working methods. New skills and strategies to facilitate adaptation to the market will therefore be a key challenge for shipping. In purely technical terms, ICT represents major potential for communication between vessels and onshore organisations. This permits progress towards the generation and processing of more information at a highly centralised level, at the same time as other central functions can be carried out by remote control from land.

2.2.2 Unitisation and Specialisation

During the 1950-1960s the traditional system of ”break bulk” liner shipping became increasingly unable to cope with the escalating volume of world trade, and industry observers could see that the old methods had reached “the end of the line”.

To overcome these problems, palletisation and containerisation were introduced to speed up the flow of cargo. Putting general cargo into standard units created a technological push for new types of vessels – the fully cellular container vessel as well as new types of combination vessels.

In the early 1960s, goods shipped from Europe to the United States could take months to arrive, but thirty years later, just a few days after leaving the factory in Europe, a container wagon could be arriving at its destination in East Coast USA with its valuable cargo safe from damage or pilferage and readily transferable to rail or barge with the minimum of delay or manual effort.

2.2.3 Economies of scale

By exploiting economies of scale and developing integrated transport systems, shipping has reduced transport costs to such an extent that it is often cheaper for industries to import materials by sea from suppliers several thousand miles away than by land from suppliers only a few hundred miles away.

The upward trend in ship sizes was most apparent in the oil industry. At the end of the Second World War in 1945 the largest tanker was the Nash Bulk of 23,814 dwt. In 1970 it was the Universe Iran of 326,933 dwt. This upward trend reached its peak in 1976 when the Jahre Viking 564,650 dwt was delivered.

In dry bulk shipping, the move into large bulk vessels was equally pronounced. Iron ore bulk transport started in the 1920s with the use of 24,000 dwt ore carriers. By the 1970s vessels of 200,000 dwt were widely in use on the volume routes, while the first generation of 300,000 dwt vessels started to come into service in the mid-1980s. There was also a steady upward movement in the size of ships used for the transport of commodities such as grain, sugar, non-ferrous metal ores and forest products.

The development of container vessels has also been towards larger ships. From 1,500 TEU the ships have evolved through 3,000 to 7,000 TEU. The largest on order today are six 10,150 TEU contracted by AP Möller. Vessels of 16,000 EU now seem feasible. (Malacca-max)

2.3 Ecological influence

2.3.1 Environment

Growing concern about the global environment will entail considerable uncertainty in assessments of the long-term trend for shipping.

The key driving force will be changes in attitude among shipping customers, who are giving greater priority to environmentally compatible and safe transport. These changes in attitude represent considerable challenges as well as major opportunities for shipping.

Environmental regulations may entail a substantial burden for the transport market – but they also present opportunities, and notably so if the industry

improves the conditions for inter-modal transport systems with a more distinct environmental profile. In the long run the greenhouse effect may be scientifically and politically accepted as a global problem and in that case the world will be forced to tax all use of fossil fuels.

This may have several consequences:

- First and foremost, there is a wish for a transition from coal to gas and other energy forms. There is currently a keen interest in hydrogen-based fuel cells, which may eventually lead to a reduction in the use of coal and oil.
- Energy taxes will hit the steel industry, which will increasingly shift production from ore to scrap-based production, and lead to a significant reduction in demand for coal and iron ore.
- Energy taxes will also lead to a technical development towards a more energy-efficient society. This will have a positive impact on world output and trade but will, of course, continually reduce the need for oil and coal.

Longer term, a combination of these effects may reduce the need for coal and oil by 20-30%. This will have considerably adverse effects on transport cost in general and the need for tanker and dry cargo tonnage.

2.4 Influence from production factors

2.4.1 Labour, material and capital

The high economic growth during the 1950s and 1960s created a substantial demand for all inputs, which at first could be met by a considerable rationalisation above all through the use of large-scale technology and great movements of labour. In the early 1970s productivity could not keep up with the pace of development at the same time as growth culminated in all industrial countries in 1973. The result was dramatic increases in the price of inputs. These increases were strengthened by the geopolitical situation affecting the crude oil market. The world entered a period of inflation, which lasted until the mid-1980s. Since then, inflation could be held in check during the following 10 years thanks to greatly increased productivity, reduced input of raw materials, the creation of free capital markets and changed monetary policies.

2.4.2 Flags of Convenience – Labour cost

In everyday conversation words like national registers, parallel registers, flags of convenience, second registers and open registers are used. The concepts are not homogenous but an attempt at defining them is made below.

- A national register is a register under which the owner is also required to maintain accounting records in the flag state. There must be a genuine link between the flag and ownership. Normally it is a condition of national register to use crew of that nationality.
- By open registers we understand that it is possible and relatively easy for a shipowner to register his ship irrespective of his country of domicile. An increasing number of national registers have opened the possibility for owners of other nationalities to register their vessels. It has also become more common that national registers allow a varying degree of foreign crews on local conditions.
- Second registers are national registers, which complement the traditional registers and allow the employment of foreign nationals on local conditions and are open for registration to foreign owners.
- A parallel register is in reality a way to avoid the label second register like NIS (Norway) and DIS (Denmark). Finland has adopted this solution.
- Flags of convenience (FOC) are registers, which provide low taxes and tax conditions of employment and operation. FOC - is a classification made by the ITF. It is the ITF Fair Practice Committee, which decides, which registers should be considered FOC registers. The criteria for being considered a FOC are called the "Rochdale criteria" and were formulated by a British commission in 1970. Ships registered in the FOC registers where the owner can show that there is a genuine link between ownership and flag are not considered flag of convenience flagged vessels. The principle that all ITF agreements should be based on the domicile of the ship's owner rather than the nationality of the crew was established at a FPC meeting in London in 1959. In 1971 guidelines for ITF collective agreements were drawn up. Today one quarter of all FOC vessels are operated under ITF collective agreements covering some 80,000 seafarers

The first important flag of convenience was the Panamanian, which was initially used as a flag of convenience in 1922 to carry alcoholic beverages during the American prohibition. During the Second World War, the Panamanian flag proved of great use. By switching tonnage to the Panamanian flag, American ships maintained their neutrality after the US entered the war. In 1948 US oil interests assisted in establishing another flag of convenience in Liberia.

The high labour costs at home, which kept US ships from being competitive, and the need to retain control over a large part of the world's merchant fleet for strategic and political reasons, led US maritime policymakers to support the flags of convenience.

The adoption of such flags by US-controlled oil companies and independent owners meant that powerful lobbies were established to ensure their continued existence. There has been an ever-increasing

number of countries that have 'opened' their registries. In addition to Panama, Liberia and Honduras (the infamous 'PanHoLib' flags), Costa Rica, Bermuda, the Isle of Man, Cyprus, Vanuatu, Lebanon, Malta, Bangladesh, the Marshal Islands, Saint Vincent, the Cayman Islands, the Bahamas and Hong Kong, among others, have established such registries.

The adoption of flags of convenience was not without hurdles. The first problems, which arose with the first post-war depression in the freight market from 1948 to 1950, stimulated organised opposition to flags of convenience, especially Panama. Many old and sub-standard ships had been registered under the Panamanian flag after the war, which led to low safety standards and poor working conditions on these vessels. Thus, when competition became more intense during the freight depression, some shipowners and seamen's unions attempted to put an end to flags of convenience.

The 1958 boycott by the ITF against flags of convenience took place mainly in the ports of the USA, the UK and northern Europe. The campaign against flags of convenience was encouraged by the British, Norwegians, Dutch and others, in order to diminish competition from the Greeks[3], who controlled more than half the flag-of-convenience fleet at the time.

The fact that Greece was the only traditional maritime European nation to take such extensive advantage of flags of convenience during the post-war period may be attributed not only to the choices made by US policymakers but also to the internal structures of the country.

Great Britain and Norway did not rely to a similar extent on flags of convenience. The reasons may lie first with the powerful labour unions in these countries that prohibited the use of such flags and second with financial incentives by their governments.

The large growth of the open registers has brought about a very wide quality variation of tonnage operating under these registers, because many flag states have a limited ability to follow-up and ensure a homogenous quality within the register.

Individual nations have their own preferences where the utilisation of open registers is concerned. Most of these preferences have historical explanations. Even countries which are low cost countries under their own flag, e.g. Russia, which takes 9th place in the world controlled tonnage league, has flagged out almost 30% of its fleet.

Apart from Japan there is a pattern, which shows that the countries that have flagged out the largest proportion of ships have a tendency to have a

[3] A History of Greek-Owned Shipping, Gelina Harlaftis

high average age of their national flag fleet. The reason is probably that these ships trade on very specialised and protected markets.

The major portion of newbuildings is registered under open registers today and it is especially noticeable how new large container tonnage is registered in open registers, ever more specialised tonnage and passenger ships are registered in the open and FOC registers.

However, the creation of second national registers such as NIS and DIS in combination with the fact that certain national registers like the Dutch one allow mixed crews has had a reducing effect on flagging-out of ships from the national registers.

In the longer run, working times and wage costs for the more qualified employees on board tend to become more uniform. This will be more important on small and medium size ships as new technology is put into operation. Reduction in manning levels continues but it is a slow process, which is mainly influenced by the speed at which old ships are replaced.

Finally we can establish that adjustment to the EU state aid guidelines has taken place in a number of different steps, which has created continuous disturbances and dislocations of the competitiveness of short sea shipping.

In the end the result will be adjustment to the guidelines and an equalisation of the differences that occur in wage levels for comparable positions between countries. The adjustment of manning costs between the North European registers has led to a large reduction in the number of people employed on board from the countries concerned. The reduction has meant loss of a strategic competence in the maritime sector of great importance to the EU.

The internationalisation of the employment market for seafarers will make demand for personnel and their level of competency the driving force of manning costs. It means that questions of competency to a higher extent than at present must be solved within the framework of a broader international set of rules and increased co-operation on research and education among the shipping nations.

2.5 Development of the world economy

Maritime transport is undoubtedly one of the world's most international industries, and in studying the maritime industry we are drawn into a discussion of the world economy as a whole.

The idea of shipping as an important catalyst of economic development is not new. Adam Smith, often regarded as the father of modern economics, saw shipping as one of the principal stepping-stones to economic development. Today, we know that he was right and economic development has generally gone hand in hand with sea trade for sound economic reasons.

Since 1950 onwards one can distinguish two major different phases of economic development:

- 1950 -1973: was by far the best phase ever in terms of growth performance.
- 1973 - Today: from 1973 onwards and the second best phase ever in terms of global economic growth performance

Interrelations between the different parts of the world economy have greatly intensified during both periods and the volume of commodity trade rose faster than GDP. The ratio of exports to world GDP rose from 5.5 per cent in 1950 to 17.2 in 1998. There was a huge increase in international travel, transports, communications and other service transactions. These improved the international division of labour, facilitated the diffusion of ideas and technology, and transmitted high levels of demand from the advanced capitalist group to other areas of the world.

The flow of foreign investment to poorer parts of the world (Africa, Asia excluding Japan, and Latin America) rose at an impressive pace in the past half century. As a result, the stock of foreign capital rose from 4 to 22 per cent of their GDP. However, the present ratio is only two thirds of its 1914 level. Most of the huge expansion in international investment in the past half century took place within the advanced country group.

There were several reasons for unusually favourable performance in the first phase:

- In the first place, the advanced countries created a new kind of liberal international order with explicit and rational codes of behaviour, and institutions for co-operation (OEEC, OECD, IMF, World Bank and the GATT) which had not existed before.
- There was a very serious East-West split from 1948 onwards, but the split reinforced harmony of interest between Western economies so the beggar your neighbour behaviour of pre-war years did not recur.
- USA played a diffusionist role in the golden age in sharp contrast to its role in the inter-war years and provided a substantial flow of aid for Europe when it was most needed, fostering procedures for articulate co-operation and liberal trading policies. Until the 1970s the USA also provided the world with a strong anchor for international monetary stability.
- A new element of strength was the character of domestic policy, which was self-consciously devoted to promotion of high levels of demand and employment in the advanced countries.
- North-South relations were transformed from the colonial tutelage of pre-war years to a situation where more emphasis was placed on action to stimulate development.
- The huge expansion of trade in the advanced capitalist economies transmitted a dynamic influence throughout the world economy.

- Investment rose to unprecedented levels and expectations became euphoric.
- Throughout Europe and Asia there was still substantial scope for "normal elements" of recovery from the years of depression and war.
- There was the potential for growth on the supply side.
- Continued acceleration of technical progress in the lead countries.
- Until the 1970s, there was also much milder inflationary pressure than could have been expected in conditions of secular boom.

Since 1973, the world picture has changed a great deal. Per capita growth has been less than half as fast. There has been much greater divergence in the performance of different regions. In Western Europe and Japan, per capita growth fell well below that in the golden age.

Although our age is second best, and international economic relationships have been intensified through continuing liberalisation, the overall momentum of growth has decelerated abruptly, and the divergence in performance in different parts of the world has been sharply dissimulating. In the first phase the gap in income per capita between the poorest and richest regions fell from 15 to 13:1, since then it has increased to 19:1

As far as goods transport is concerned, growth is due to a large extent to changes in the world economy and its system of production. In the last twenty years, we have moved from a "stock" economy to a "flow" economy. This phenomenon has been emphasised by the relocation of some industries - particularly for goods with a high labour input - which are trying to reduce production costs, even though the production site is hundreds or even thousands of kilometres away from the final assembly plant or away from users. The abolition of frontiers has resulted in the establishment of a "just-in-time" or "revolving stock" production system

Direct foreign investment is growing two to three times faster than international trade, which in turn is expanding 1.5 - 2 times faster than global GDP. Moreover, a substantial and increasing share of global exports and imports consists of internal shipments within multinational companies.

There is a definite tendency towards consolidation in a number of markets through take-overs and alliances between companies. In shipping, this means that shipping companies are seeking a scale of operation that permits them to be cost effective and market leaders in a global market. Recent years have witnessed a greater degree of consolidation in international container traffic, for example, as well as in chemical and gas transport operations.

Higher quality requirements and product development opportunities mean that foreign direct investments tend to move towards areas with already appropriate industrial environments. Silicon Valley exemplifies this type of self-reinforcing business clusters.

It seems evident that Asia will continue to attract a large share of international investment capital, quite simply because Asia is the foremost growth area worldwide and has a surplus of low-cost labour. India and China are expected to attract a considerable portion of international capital over the next 20 years.

2.6 Development of world trade

The world trade excluding commercial services is by definition the sum of the international exchange of all types of commodities between one country and all other countries in the world, measured, e.g. on the export side.

Due to the wide variation of commodities from, e.g. diamonds to iron ore, a common measure of the physical quantities traded, e.g. weight, volume, number of units, is impractical. The world trade is therefore measured by the value in US Dollars ("USD").

The statistics published by WTO are used in this section. These statistics are based on data from EUROSTAT, FAO, IMF, OECD, UN, and the World Bank, which in turn are based on national statistics. These statistics in local currency are converted to US Dollars, and thus changes in exchange rates influence the outcome of the calculation of world trade.

Furthermore, trade figures are reported in current prices that are subject to price changes as well as changes in the composition of trade with regard to commodities. These factors may result in changes in trade from one year to the other even though the actual physical quantities may be unchanged.

In order to depict changes in the quantities or "volume" of trade unit value indices are estimated on a regional basis to convert the value index of trade to a volume index, i.e. an index designed to neutralise the effects of the above-mentioned influences from currency changes, price changes and commodity type composition.

The WTO publishes comprehensive trade statistics by geographical region, country, and by commodity group which are used here to establish origin/destination matrices ("O/D-matrices") of world trade by type of commodity.

The principle of converting the value of trade into a measure of the volume has been applied to each trade defined in the O/D-matrices by using the unit value index of world trade estimated by the WTO[4].

During the 20th century the world has gone from a colonial trade to a market oriented trade as shown below

[4] The overall unit value index probably differs according to the trade and commodity, but that detailed data are not available.

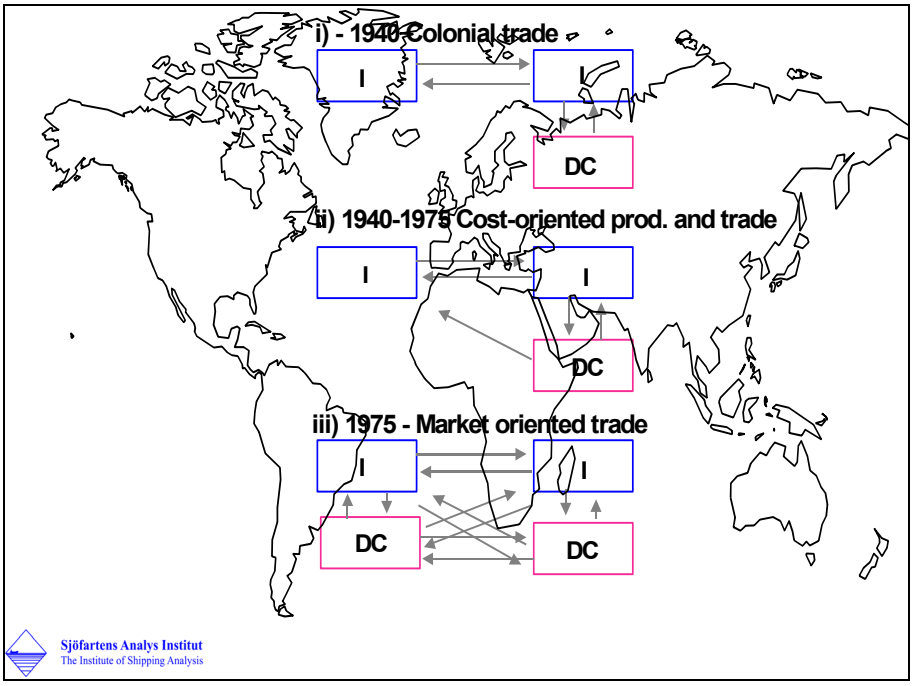


Figure 3: World trade driving forces- I=Industrialised countries-DC= Developing

International trade was given additional growth potential with the proliferation of multi national corporations, which are using the principle of comparative advantages. This development together with the continuous liberalisation of world trade have led to the present move towards "globalisation" of industries, i.e. a locally based enterprise is able to market and sell its products world-wide and purchase source materials and sub-supplies world-wide. The Internet and E-commerce are important factors in this development.

Another important factor in trade and especially in the globalisation of trade is transportation, i.e. the availability of a cheap, reliable, and fast transport network across the world. Especially the development in inter-continental trade in manufactures has been the driving force in the development of the seaborne container trades, e.g. the continuous decline in transport costs, faster transit times, more frequent sailings, as well as the increase in the quality of transport.

2.6.1 Economic growth vs trade

In 2000 total world exports made up USD 6,186 billion. Since 1990 world trade on a volume basis in USD has increased by 95% corresponding to an average rate of growth of 6.9% per year. Over three quarters of world trade comprises manufactures, which have seen an even stronger growth since 1990 of 7.7% per year. See table and figure below.

Table 1: World Economic Growth and World Trade

World Economic Growth and World Trade Gross Domestic Product and Volume Index of World Merchandise Exports Sources: World Trade Organisation and SAI			
Year	World GDP	World Exports, Volume Index	
		Total	Manufactures
Index, 1990=100			
1990	100.0	100.0	100.0
1995	107.5	135.7	137.2
2000	124.9	195.8	210.1
Annual Rates of Growth In Percent			
1990 to 2000	2.2	6.9	7.7
1990 to 1995	1.5	6.3	6.5
1995 to 2000	3.0	7.6	8.9

From the table above it is further seen that growth rates in trade were slightly higher during the second part of the decade, which should be seen against the background of a doubling of global economic growth from 1.5% to 3.0%. In 2000, the growth of the world economy reached 4.0%, total world trade almost 12% and world trade in manufactures over 14%.

The figure below shows the annual rates of growth from 1990 to 2000. The low growth rates seen in the period 1990-93 are the result of economic downturns in the major economies, e.g. the USA, Europe and Japan. From 1994 to 1997 generally strong growth was seen, whereas the reduced rates in 1998 and partly in 1999 show the effect of the Asian Crisis.

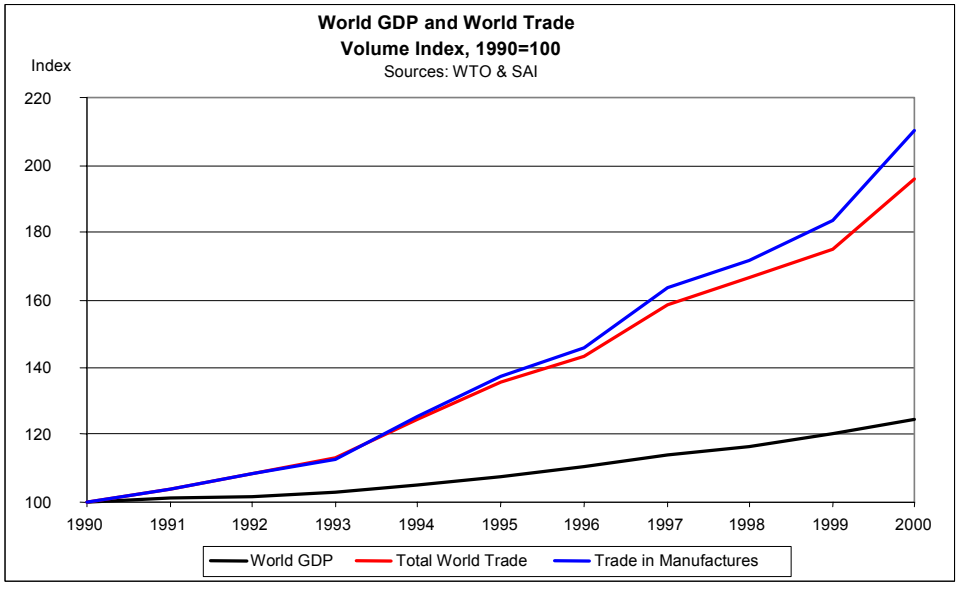


Figure 4: World GDP and World Trade

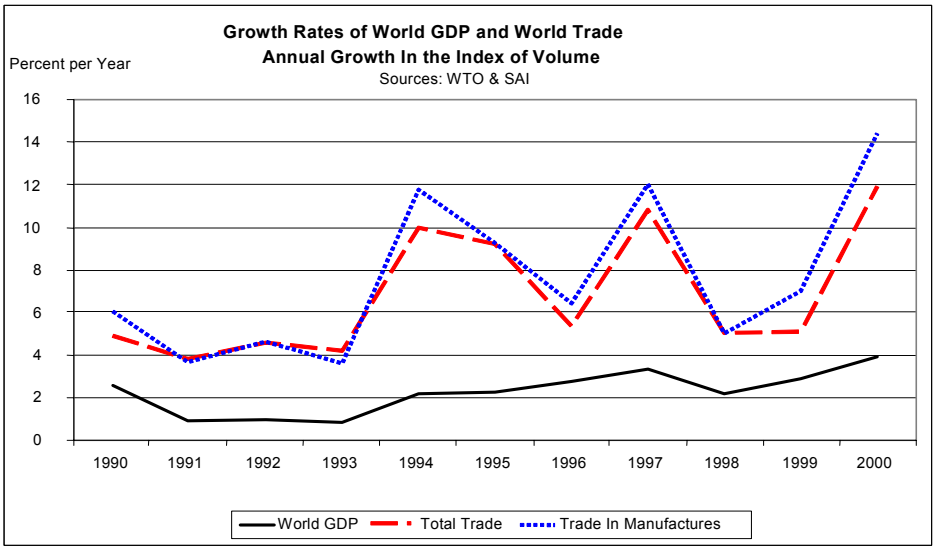


Figure 5: Growth Rates of World GDP

From the figure above it is seen that world trade has increased much faster than economic growth, thus indicating the effects of, e.g. liberalisation of international trade and of globalisation.

The ratio between the growth rate in world trade and the rate of economic growth is defined as the elasticity of world trade versus economic growth. Average values of the elasticity over a period of years are shown in the table below. It is seen that in the period 1990-2000 world trade increased around 3 times as fast as global economic growth. During the first half of the decade the elasticity was 4.3 due to strong trade growth and low economic growth, whereas the ratio declined to 2.5 in the second half of the decade as the rate of economic growth doubled, whereas trade growth only picked up marginally.

Table 2: Elasticity of World Trade

Elasticity of World Trade

The Ratio Between Growth in World Trade and Economic Growth

Sources: World Trade Organisation and SAI

Period of Years	World Exports, Volume Index	
	Total	Manufactures
1990 to 2000	3.1	3.4
1990 to 1995	4.3	4.5
1995 to 2000	2.5	2.9

It is also seen that the elasticity with regard to world trade in manufactures is higher than that of total trade, especially with regard to the second half of the decade as the increases in growth rates of trade in manufactures were much higher than for total trade. This indicates the importance of the globalisation process in world trade in general and of manufactures in particular.

The figure below shows the elasticity of trade in manufactures on an annual basis as well as the average values for the time periods 1990-1995 and 1995-2000.

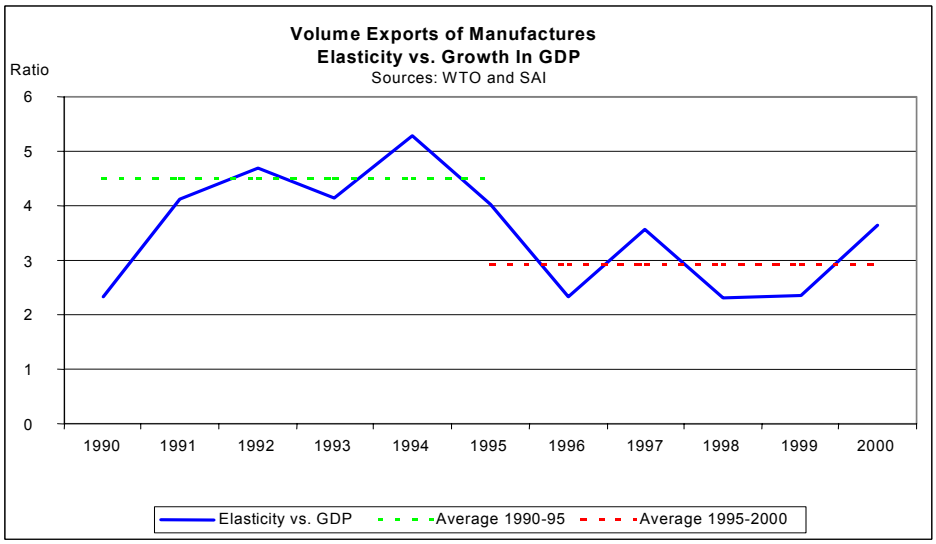


Figure 6: Volume Exports of Manufactures – Elasticity vs. Growth in GDP

2.6.2 World Trade By Types of Commodities

The table below shows a breakdown of world trade in current value by main types of commodities. All international trade is included, irrespective of the transport distance or the means of transportation.

Table 3: World Trade

World Trade
Total merchandise exports. Current Value in Billion US Dollars
Source: World Trade Organisation and SAI

Products	Billion US Dollars			Share In % of Total		
	1990	1995	2000	1990	1995	2000
1. Agricultural products	**414,2**	**576,7**	**558,3**	**12,6**	**12,2**	**9,3**
1.1 Food	315,1	443,1	442,3	9,6	9,3	7,4
1.2 Raw materials	99,1	133,6	116,0	3,0	2,8	1,9
2. Mining products	**482,9**	**521,3**	**813,2**	**14,7**	**11,0**	**13,6**
2.1 Ores and other minerals	52,7	59,9	62,1	1,6	1,3	1,0
2.2 Fuels	357,4	355,6	630,9	10,9	7,5	10,5
2.3 Non-ferrous metals	72,8	105,8	120,2	2,2	2,2	2,0
3. Manufactures	**2390,0**	**3641,8**	**4630,0**	**72,7**	**76,8**	**77,1**
3.1 Iron and steel	105,8	150,4	143,5	3,2	3,2	2,4
3.2 Chemicals	295,9	465,6	573,8	9,0	9,8	9,6
3.3 Other semi-manufactures	263,7	388,8	449,1	8,0	8,2	7,5
3.4 Machinery and transport equipment	1212,9	1903,8	2565,9	36,9	40,2	42,8
3.4.1 Automotive products	318,9	452,2	571,3	9,7	9,5	9,5
3.4.2 Office and telecom equipment	298,5	600,7	939,9	9,1	12,7	15,7
3.4.3 Other machinery and transport equipment	595,5	851,0	1054,7	18,1	18,0	17,6
3.5 Textiles	104,3	149,7	157,5	3,2	3,2	2,6
3.6 Clothing	108,0	157,4	198,9	3,3	3,3	3,3
3.7 Other consumer goods	299,4	426,1	541,4	9,1	9,0	9,0
Sum	**3287,1**	**4739,9**	**6001,4**	**100,0**	**100,0**	**100,0**
Total including unspecified products	**3388,0**	**4934,0**	**6186,0**	-	-	-

2.6.3 Trade in Container Friendly Commodities

The following discussion addresses the attractiveness of transporting the commodity-groups shown in the table above in containers.

In principle, all types of commodities that may be stowed in a container should be regarded as a potential market of the container shipping industry. However, certain types of commodities are in most cases transported in specialised vessels due to, e.g. the large quantities to be transported.

This is especially the case with regard to "2. Mining products" in the table, i.e. dry and liquid bulk commodities, e.g. crude oil, oil products, iron ore, coal, other ferrous and non-ferrous ores, crude minerals, crude fertilisers, non-ferrous metals, and metal scrap.

Within "1. Agricultural products" The share of containerised transports is substantial within certain types of commodities included in "1.1 Food", e.g. food, beverages, tobacco, and fruit, whereas the share is low with regard to other types of commodities, e.g. live animals, oils, fats, and oilseeds. The part of commodities that needs to be transported in a controlled ambience, e.g. frozen or cooled, is referred to as "refrigerated commodities".

In the case of "1.2 Raw materials" the share of containerised trade is less substantial than in the before mentioned sub-group of commodities. However, certain bulk commodities e.g. waste paper and hay, that are not traditionally traded internationally, may take advantage of very low ocean shipping rates. These types of commodities are, however, regarded to be of secondary importance to the container shipping industry.

In the case of "3. Manufactures" the two first subgroups comprising "3.1 Iron and steel" and "3.2 Chemicals" are seeing a low share of containerised transport, although the concept of tank containers is increasing especially in transports over short distances, and in the case of speciality chemicals. The sub-group "3.3 Other semi-manufactures" including rubber, cork, and wood manufactures, paper, paperboard as well as metal and non-metallic mineral manufactures probably have a high share of containerised trade.

On the other hand, the major part of "3.4 Machinery and transport equipment" is normally not containerised, e.g. power generating machinery, other non-electrical machinery, cars, other motor vehicles, railway vehicles, and aircraft, whereas other types of commodities, e.g. electrical machinery and apparatus, office machinery, and telecommunication equipment are normally transported in containers. It is likely that an increasing share of seaborne car trades will be containerised in the future. In the case of the three remaining groups of manufactures comprising "3.5 Textiles", "3.6 clothing", and "3.7 "Other consumer goods" the share of containerised trade is high.

Seaborne trade in container friendly commodities within **manufactures** is, as mentioned above, in this context represented by the following commodity groups defined by the WTO:

- Office and telecom equipment
- Textiles
- Clothing
- Other consumer goods

The share of container friendly commodities that is transported in containers has increased sharply since the introduction of the container, but with a gradually slowing rate of growth. The average share of seaborne trade of container friendly commodities that are actually transported in containers is estimated to have increased from around 77 % in 1990 to just over 80% in 2000.

Other types of commodities, e.g. waste paper, hay are regarded as common commodities to container shipping. The development in trade in these selected groups of commodities is thus regarded as a very good approximation to the development in the potential for the overall global container shipping industry. The development in trade in these commodities will be the topic of section 4.3 Market Balance.

Since 1990 strong growth of around 8.7% per year has been registered in the ***world import*** of container friendly commodities as defined above on a value basis.

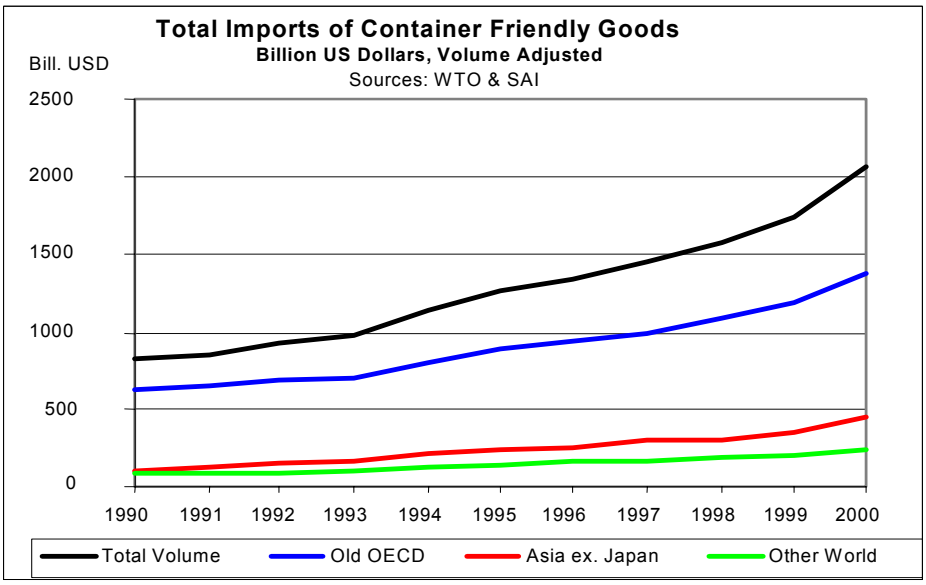


Figure 7: Total Imports of Container Friendly Goods

The most important ***import areas*** are Western Europe, North America and Japan[5] of which Japan has seen the strongest growth of 11.6% per year since 1990, followed by North America (10.8%) and Western Europe (6.2%). In 2000 these three areas accounted for around 66 % of world imports of container friendly commodities compared to 76 % in 1990. See figure below.

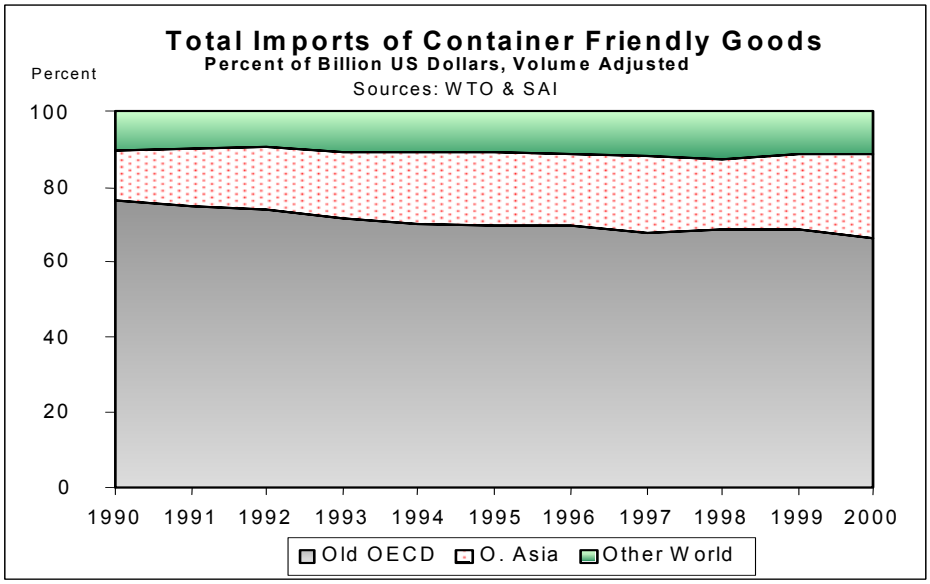


Figure 8: Share of total Imports of Container Friendly Goods

This decline in shares is mainly due to the relatively low growth in imports to Western Europe. In absolute terms Western Europe has the largest foreign trade due to its huge intra-regional trade making up almost 60% of total imports of that area. Japan's share of world imports in container friendly goods is small, around 6.5%, compared to the two other areas. The strongest growth rates in imports of container friendly commodities have, however, been registered in other than the above-mentioned geographical areas, i.e. in Latin America (15.5%) and in "Other Asia"[6] (13.3%).

In 2000 Latin America accounted for less than 5% of world imports, whereas Other Asia's share was 22%. The other areas of the world, i.e. Eastern Europe, Africa, and the Middle East together accounted for around 6.5% of world imports in 2000.

[5] These three countries/areas are denoted: "Old OECD"

[6] Total Asia exclusive of Japan.

When trade is seen from ***an export point*** of view the old OECD has a much-reduced weight, especially if intra-area trade is excluded: Their share of inter-continental exports declined to just below 50% in 2000 compared to 57% of inter-continental imports in 1990. On the other hand, inter-continental exports of "Other Asia" increased to almost 37% from 17% of inter-continental exports. See figure below.

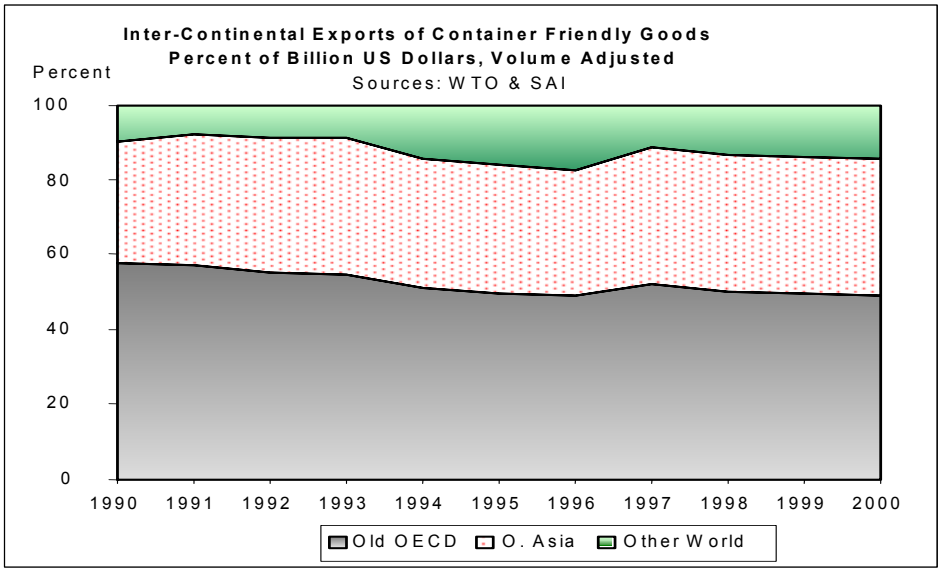


Figure 9: Inter-Continental Exports of Container Friendly Goods

The table below shows the origin/destination table for world trade in USD in 2000 of container friendly manufactures.

Table 4: Trade in Container Friendly Manufactures in 2000

Trade in Container Friendly Manufactures in 2000 in Current US Dollars
Sources: WTO and SAI

	Destination								
Origin	North America	Latin America	Western Europe	Eastern Europe	Africa	Middle East	Japan	Other Asia	Total
N. America	80,2	57,4	61,8	1,6	1,5	4,0	25,6	63,9	295,9
L. America	74,1	6,9	3,3	0,2	0,0	0,1	1,0	1,3	87,0
W. Europe	61,3	10,0	408,6	36,2	14,1	13,5	15,7	44,7	604,0
E. Europe	2,9	1,0	39,5	15,4	0,8	1,2	0,4	4,8	66,0
Africa	1,9	0,2	10,3	0,0	2,2	0,3	0,1	1,8	17,0
M. East	6,5	0,4	6,9	0,4	0,8	2,9	0,3	3,4	21,4
Japan	48,1	2,8	31,7	0,6	0,4	1,3	0,0	73,3	158,2
O. Asia	187,4	14,7	119,5	7,4	6,3	12,7	79,5	227,2	654,8
Total	462,4	93,4	681,6	61,7	26,2	36,0	122,4	420,4	1904,2

2.7 Conclusions

Previously discussed driving forces that have affected the container market will continue to do so. The following forces will play a larger role for container shipping in the future.[7]

- Developments in the Information and Communications Technology area (ICT).
- Globalisation of economic activity and greater free trade.
- Conditions underlying political frameworks and environmental and social considerations.

These driving forces will lead to considerable changes, which the industry must be prepared to meet. A primary conclusion is that, irrespective of the driving forces to which one attaches the greatest weight, the relevant skills and know-how will increasingly become the key competition parameters of the future. Combined, these factors will have a major influence on how companies configure their logistics solutions, which in turn affects shipping in several respects.

The international economy is undergoing increasing economic and political integration, leading to growing global trade. Shipping is ahead of other industries in this process of change and the emergence of an internationally mobile labour market for seafarers has resulted in changes in competitive terms for players in the shipping industry. At the international level, environmental policies, as well as financial, security and trade policies have major potential implications.

With a favourable productivity development during the next 10 years and a good supply of production factors there should be no risk of inflation. It no geopolitical disruptions occur during the next 10 years the basis for relatively good economic growth is there.

If we assume about 2% growth of GDP per annum and an average growth of trade in container friendly goods during the period 2000-2010 of 7% per annum, trade will grow from 1 904 billion USD to 3 700 billion USD.

A relation between GDP growth and container friendly goods of 3.5 compared to a little over 4 during the 1990s means an increase of 94%. If we assume that the value per unit remains unchanged the physical cargo of container friendly goods will also increase by 94% during the next 10-year period.

[7] SNF, Fremtidig utvikling i skipsfarten og skipsfartens markeder" [Future development in shipping and shipping markets] Atle Minsaas, Peter C. Omtvedt, Sigbjörn Södal and Tor Wergeland

This is not a prognosis, only an arithmetical example. What is important is that we can see no reason today why trade in container friendly goods should not grow considerably during the coming years.

In addition to this there is growth and increasing market shares for transporting “non container friendly goods” in containers. Today’s situation is too much influenced by the economic recession to form the basis for more long-term projections.

With the same trend as during the 1990s the share of container friendly goods imported/exported by the old-OECD countries will continue to fall.

Behind this structural change lies considerable increases in volume for Latin America, the Mediterranean-Middle East, India and the rest of the Far East. The transport pattern for container friendly goods will thus be more complicated and frequent. Growth will continue on the long haul trans-oceanic lines but intermediate and short sea shipping will be more in focus in the future.

3 Transport

With regard to the **inter-continental trade** sea borne transport of container friendly commodities has a very high share, and is in most cases only competing with air transport. The latter transport mode has a high share with regard to high value and/or time-sensitive commodities. However, the share of airborne trade in container friendly commodities is fairly low in terms of volume. It is thus assumed that seaborne transportation in most inter-continental trades has a share of the trade close to 100%.

Table 5: Factors influencing the modal split

Available modes
Transport distance
Volume in a period of time and parcel size
Transport costs
Transport time
Frequency in the transport system
Value of commodity
Land-based infrastructure and inter-modal considerations
Source: SAI

However, in the case where over-land connections and/or short sea connections involving roro-cargo vessels or ferries exist, the share of

containerised commodities is estimated to drop to as low as 15%, e.g. in the case of the trade between Western and Eastern Europe.

In the **intra-regional trade** the over-land and short sea roro-cargo/ferry transport modes have a naturally strong position, which, of course, depends on the geographical conditions, the state of the infrastructure as well as of the efficiency of the inter-modal nodes. Transport costs, transport time, and transport quality are probably among the most important factors in the competition between different transport modes in the intra-area trade. It is thus estimated that transport by sea of container friendly commodities in Western Europe has a fairly low share of around 30%[8] compared to a high share of around 90% in Asia excluding Japan.

The modal split is kept constant during the period 1990-2000. However, in spite of this the average share on a world wide basis has increased from just over 62% in 1990 to around 69.5 % in 2000 as the trade growth has been higher in trades with a high share of seaborne trade than in trades with a low share, especially intra-European trade

Over the long term, the transport sector, including maritime transport, has been able to meet growing transport requirements by exploiting economies of scale. This has also contributed to the transport industry being more or less continually subjected to supply pressure, resulting periodically in low profitability.

As a result of efficiency gains in transport networks, transport costs have declined in real terms over the longer term, notwithstanding the achievement of better services and customer value.

However, undertakings by transport purchasers have not been more extensive or long-term. Instead goods owners have greater flexibility and more options within open transport networks. Thus, the development is characterised by the growing structural complexity of the transport network and there are numerous reasons for this.

[8] The value is probably too high, but reflects the number of intra European movements of containers estimated by Drewry

4 Container Market characteristics

4.1 Product attributes

4.1.1 The container service

The container principle[9] was developed in the 1950s and early 1960s in the USA and in the Atlantic trade. The background was that the previous "cargo liner" ship type was becoming technologically obsolete as the volume of trade increased strongly, and the transport system was unable to offer lower unit costs or markedly faster transit times. The main reason for this was that the expensive "tailor made" cargo liners spent up to 50% of their time in port, which tied up capital, and limited the scope for economies of scale.

The solution was to unitise general cargo, which led to the development of standard containers, cellular container ships, container terminals equipped with specialised gantry cranes, container storage areas, and container handling equipment.

As the container concept was developed in the USA the first container designs focused on the local standards and requirements. However, later the International Standards Organisation developed a design based on the dimensions 8ft. high, 8ft. wide and 10, 20, 30, 40 ft. lengths. Today the 20ft. and 40ft. container are the "workhorses" of the business. Later on other types of container designs were introduced, e.g. high cubic containers, reefer containers, open top containers, open side containers.

Furthermore, containerisation of general cargo required the development of an inland transport system of trucks and rail cars as well as inland distribution centres and "stuffing" facilities.

The transport of one container from its first origin to its final destination will normally involve the following activities: Collecting of the cargo and stuffing the container, transportation from the first origin to the "nearest" port of loading, seaborne transport to the "nearest" destination port, and transport from this port to the final destination, emptying the container and distribution of the cargo, i.e. *the transport chain*.

The sea leg of the total transport chain may be divided into two or more parts.

In inter-continental transports two transhipments, one in each continent, are often seen. The first part of the sea link is normally referred to as the

[9] Based on Stopford

feeder or short sea link, the inter-continental link as the *main haul line or deep sea link*, and the last part of the journey the *distribution link*. The line operator is engaged in the main haul link, but is very often not engaged in the feeder and distribution links, which are managed by *feeder operators*. In the case of the feeder operator no distinction is made between incoming (feeder) containers and outgoing (distribution) containers.

As one line operator only has one or a few main haul lines linking one continent with another he is interested in calling ports with the largest potential for containers to be transported in order to maximise his capacity utilisation. Furthermore, the line operator is inclined to limit the number of port calls to be made in each region in order to increase the productivity of the ships. However, too few port calls may limit his market potential.

A feeder operator makes the same considerations. Therefore, the inter-continental lines are concentrated around a limited number of large ports where there is a large concentration of demand for transport services from the hinterland.

Part of these ports, or *hubs*, also offer a large number of feeder lines, or *spokes*, that spread out to mainly smaller ports located in the same geographical area.

In recent years hubs have been established far from demand concentrations where main lines intersect, e.g. Algeciras near Gibraltar where the East-West routes between Asia, Europe, and North America, as well as the North-South route between Europe and Africa intersect.

It is thus likely that this type of hub mainly sees the transfer of containers from one liner ship to another, rather than from a liner ship to a feeder ship or vice versa.

The hub and spoke system is designed especially for the inter-continental trades but also influences the structure of the intra-regional trades by offering an extensive transport network and (presumably) low costs.

The land-based links to/from the ports may involve truck or rail transport as well as short sea ferry transport. The “nearest” port may not be that with the shortest transport distance, but will normally be chosen to give the lowest total transport costs including time dependent costs.

Besides being able to offer lower unit transport costs and markedly faster transit times the container shipping industry also led to further development of the previous general cargo shipping business, e.g. liner companies became providers of “through transport” services and of “door-to-door” services, and the business consolidated into fewer companies.

Furthermore, the containerisation of general cargo had a strong impact on port development, as well as on the shipping of small parcels of wet and

dry bulk cargoes and "neo-bulk"[10] cargoes, which generally led to the development of specialised types of ships.

Finally, as the previous strong link between liner- and tramp shipping was effectively broken the container shipping market had to cater for its own requirement for marginal capacity, which led to the development of the container ship charter market.

4.1.2 Economics and cost components

Calculations for 4000 miles transatlantic, 8000 miles Trans-Pacific and 11500 miles Europe-Far East routes show that the diseconomies of ship size in port are outweighed by economies of size at sea.

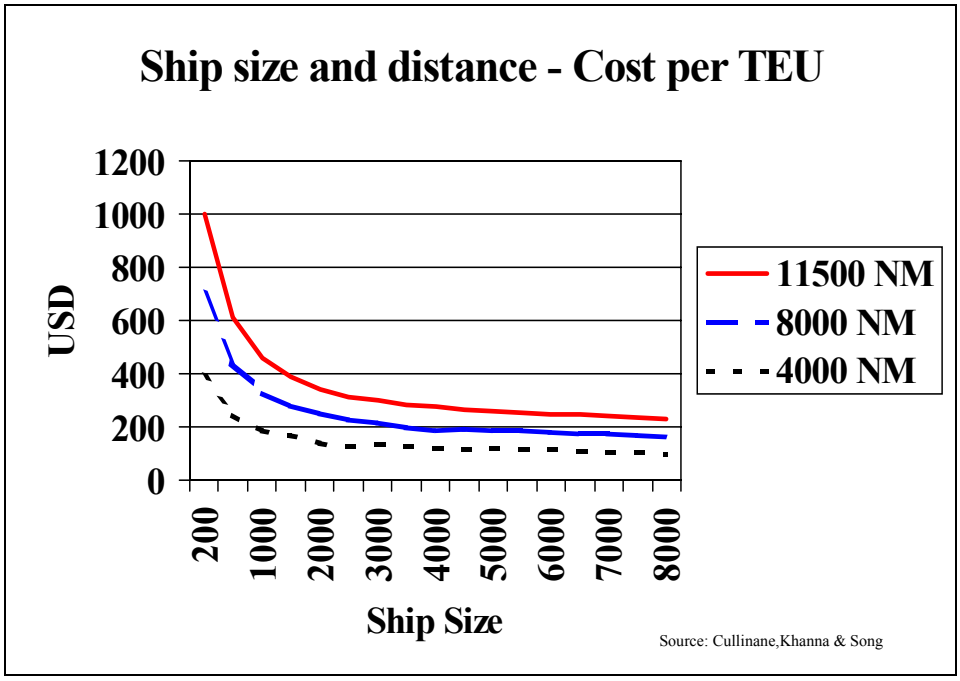


Figure 10: Distance comparison USD/TEU

More specifically: Under all input port productivity scenarios, the results of the sensitivity analysis show that for the Europe-Far East and Trans-Pacific liner routes, economies of scale are enjoyed at ship sizes beyond 8000 TEU.

In contrast, for the shorter trans-Atlantic route, when port times are 100% more than initially modelled or if ships are serviced by a maximum of only three cranes, then the optimal size for a containership is only somewhere between 5000 and 6000 TEU (taking into consideration only the total shipping cost associated with the voyage).

[10] e.g. cars, forest products

Clearly on routes where expected time in port is greater than the best estimate inputs applied in this study (which are based on the average productivity of a set of large, mainline ports), diseconomies of scale in port will have a relatively greater significance, thus reducing the optimum ship size for the route.

Equally, continued general world-wide improvements in port productivity will so fundamentally alter the container shipping cost environment that in the absence of any technological constraint, ship size optima for all routes will continue to increase as they have done in the past.

To illustrate the advantages of economies of scale and the importance of ship size and speed, the following illustration has been taken from a report, which has been made by the Marine Faculty of the University of Delft, Holland.[11]

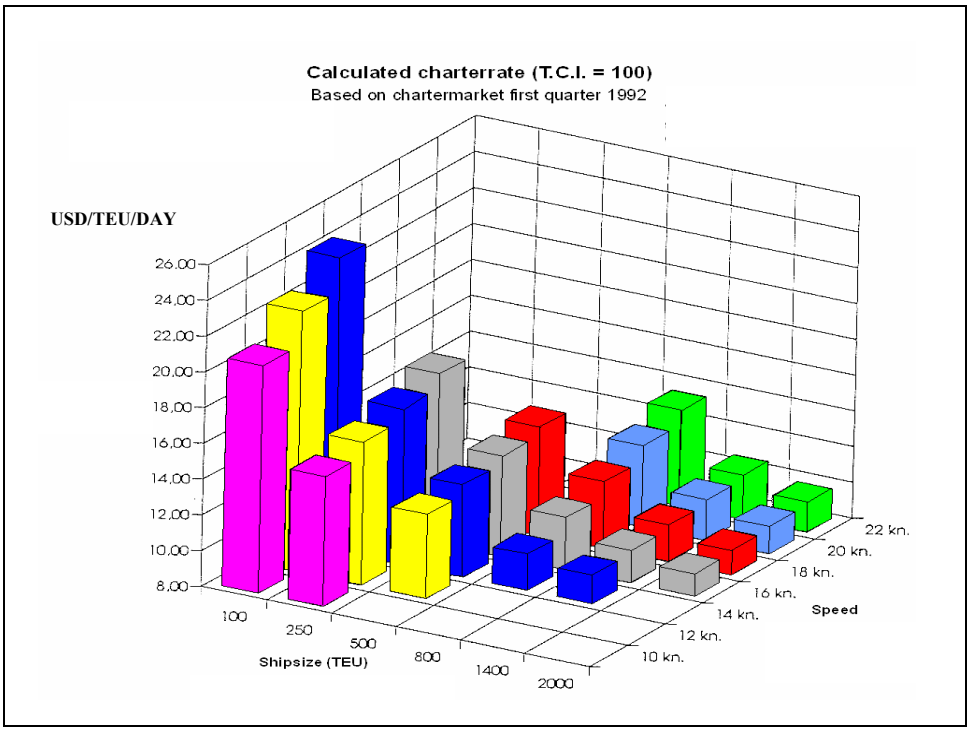
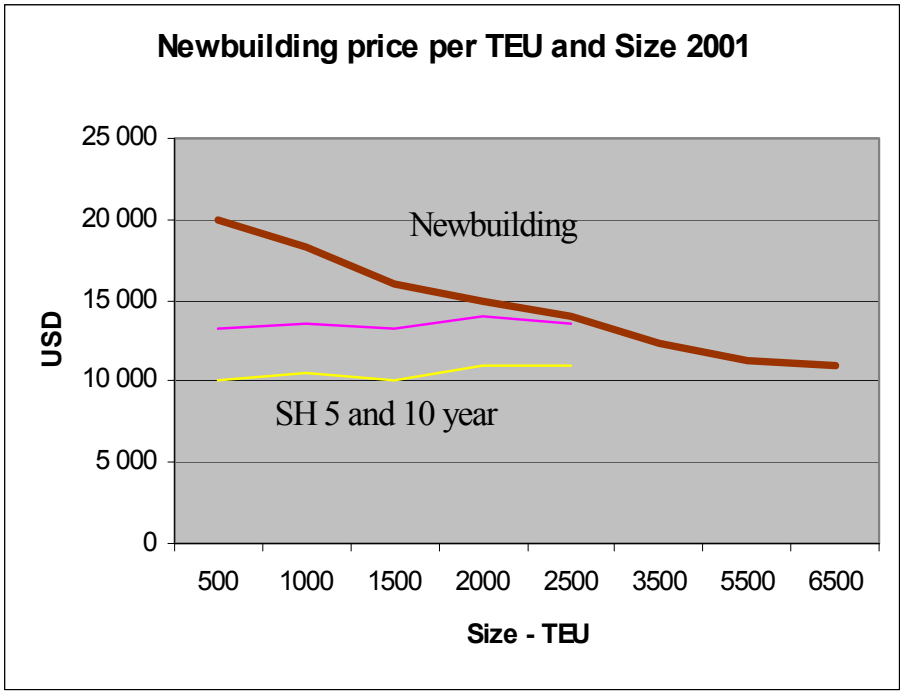


Figure 11 Rate/container and day as a function of shipsize and speed

As can be seen from the figure, the ship's container capacity is more important for determining freight cost than speed. On the other hand, the importance of speed decreases with the size of the ships. If the speed of a small ship increases it means a relatively larger increase in cost than if a corresponding increase of speed is made for a larger ship.

[11] "Analysis of the containership charter market 1983-1992". N. Wijnolst, M. Hoek, Delft University Press 1993.

Ships designed for liner traffic are often given a size, which allows for handling more goods than normally booked at all times. This in lieu of giving priority to always having a fully loaded ship. (Cf. Industrial shipping where the ship is usually fully loaded.) The reason being that it is vital for the operator always to be able to offer customers transport capacity to prevent them from finding other routes for their goods because the ship/line has a temporary lack of capacity.



Source: Drewry, FearnResearch, Clarkson, calculation by SAI

Figure 12: Newbuilding price per TEU and size 2001

According to the diagram above, the cost is cut in half from about 20,000 USD per slot from ships of around 500 TEU to 10,000 USD for ships of 6,500 TEU. From the shape of the curve it emerges that economies of scale continue beyond 6,500 TEU but with a considerable decline in marginal cost per slot.

While purchasing a newbuilding there is a gain from economies of scale, which does not seem to remain when the ship has been on the market for a few years. For second hand ships the price per slot seems to be unchanged irrespective of the size of the ship. This means that the second hand market does not put a premium on economies of scale but capital cost per slot is the same irrespective of the size of the ship.

This means that the ability to compete is the same for the smaller second hand ships as for the larger ones. With growing volumes on medium and short hauls and increased supply of relatively cheap smaller tonnage in

medium sizes the container will become an increasingly competitive alternative in these trades.

Table 6 Estimated share of total operating cost

	Share %	Accumulated
Vessel Capital	11	11
Vessel Operation	5	16
Bunkers	3	19
Port & Canals	6	25
Transport/Feeding	24	49
Administration	10	59
Terminals	17	76
Depots/Refrigeration	1	77
Container imbalance	6	83
Equipment provision	15	98
Cargo insurance	2	100
Total	100	
Source: Rounded from Drewry – based on estimates for three main east-west trades		

There are varying figures on the sea transport's share of the total cost of a door-to-door transport. According to the table above the sea transport is about 25%. According to Dyna Liners Trade Review 2001, ocean transport (port-port) amounts to 20% of a full house-house movement.

The next table shows the port cost for feeder vessels based on calculations on three small vessels in Northern Europe

Table 7: N. European port cost/TEU for feeder tonnage

	USD/TEU	
Antwerp	37	100
Rotterdam	39	105
Felixstow	52	141
Hamburg	59	159
Bremen	79	214
Source: Confidential Average feeder port cost per TEU. Based on three different sizes of ships and 150, 250 respectively 375 loaded/unloaded TEU. (Harbour and quay dues, port towage, pilot, mooring/unmooring, reporting vessel and VTS)		

What is not evident from the table above is that port costs per TEU for the various sizes are largely the same. Viz. that port call costs per TEU do not diminish with larger ships. On the other hand there are considerable cost differentials between various ports. These differentials are hardly decisive

for the operators' choice of port since they form such a small portion of total transport cost.

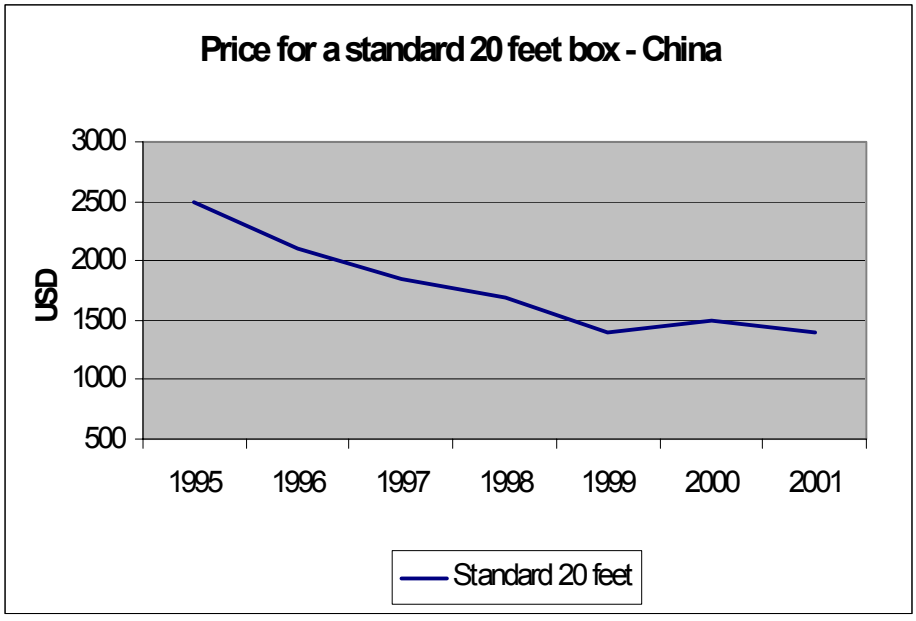
For the transport insurance for the goods to be valid and for the shipping company to assume responsibility for the transport, the container has to satisfy a certain standard CSC a class, as far as strength and weatherproofness are concerned.

The container is often leased. Usually a daily hire over a certain period and the terminals for withdrawal and return of the unit are specified. If the transport takes longer than contracted an additional fee can be debited for the extra time.

Nearly 90 % of all containers are produced in China. The world production during the last few years was:

- 2001 - 1,000 million
- 2000 - 1,740 million
- 1999 - 1,340 million

The price for a 20 foot standard container has dropped from 2,400 USD 1995 to 1,400 USD 2001. This corresponds to a decrease by over 8% per annum.



Source: Dynamar

Figure 13: Price for a standard 20 foot box

4.2 Market stakeholders

4.2.1 Owners and Operators

The seaborne container transport system is established around shipping lines that offer a certain capacity at regular intervals engaging a certain number of *liner ships*. Companies normally referred to as *line or liner operators/company* or *carriers* operate these shipping lines. The liner operator may also be a shipowner and thus an *owner/operator* that owns all or part of the fleet engaged in the liner operation. In many cases liner operators charter ships from shipowners, named *charter owners, tramp owners* or just *owners,* that are not themselves engaged as liner operators. Finally, the liner company may also be engaged in the land-based transportation offering, e.g. door-to-door transport services.

Since its start the container shipping industry has consolidated, and continues to do so. According to Containerisation International the top 20 liner companies in 2000 control around 70% of the capacity of the container fleet measured in TEU, compared with around 50% in 1995.

Liner conferences and alliances in global container shipping have been declared extinct a number of times through the years. The phenomenon has survived but the number of container shipping alliances diminishes. At the beginning of 2002 there were three main groupings. The alliances and their members are as follows:

- Grand Alliance: Hapag-Lloyd, NYK, OOCL, P&O Nedlloyd, MISC.
- New World Alliance: APL, Hyundai, and MOL.
- "CHKY": Temporary name of the alliance in the making between Coscon, Hanjin/Senator Lines, K Line, Yang Ming.

The table below shows a list from Dynamar of the 30 largest container operators in the world as at February 2002. Thereafter there are lists of the operators in Northern Europe.

Table 8: Largest container operators, Feb 2002

No.	(Parent) company	Existing fleet		Order book	
		KTEU	Ships	KTEU	Ships
1	Maersk Sealand	730	302	134	30
2	P&O Nedlloyd	368	145	25	6
3	Evergreen	354	135	33	9
4	MSC	329	161	66	10
5	Hanjn	290	86	61	12
6	APL	236	79	36	8
7	Coscon	232	118	17	4
8	CMA CGM	196	97	38	12
9	NYK	166	81	77	14
10	K Line	162	60	28	5
11	CP Ships	155	77	63	17
12	China Shipping	145	82	97	21
13	MOL	143	61	68	13
14	HMM	142	38	14	4
15	OOCL	137	46	65	12
16	Zim	132	68	29	6
17	Yang Ming	126	43	5	4
18	Hapag-Lloyd	119	34	59	7
19	CSAV	94	45	22	7
20	PIL	89	86	14	8
21	Hamburg Sud	86	46	11	3
22	Wan Hai	71	59	14	6
23	UASC	70	35	-	-
24	Delmas	60	54	16	8
25	MISC	50	32	-	-
26	Grimaldi	48	42	4	5
27	Kien Hung	41	27	7	4
28	IRISL	38	46	15	6
29	RCL	31	32	1	1
30	Sinotrans	28	31	-	-
Total top 30		4,868	2,248	1,019	242
World cap./fleet		7,287	7,167	1,429	465
Share top 30		67%	31%	71%	52%
Total 30 Sept.'01		4,767	2,251	1,114	268

Source: Dynamar.

At the same time as the number of operators of full service seems to decrease and get larger and larger the number of tramp shippers i.e. shipping companies providing transport capacity from ship time charter agreements to slot space agreements is growing

Tramp owners supply nearly 45 % of the ship capacity. Tramp owners have also done most of the newbuilding contracting during the last few years.

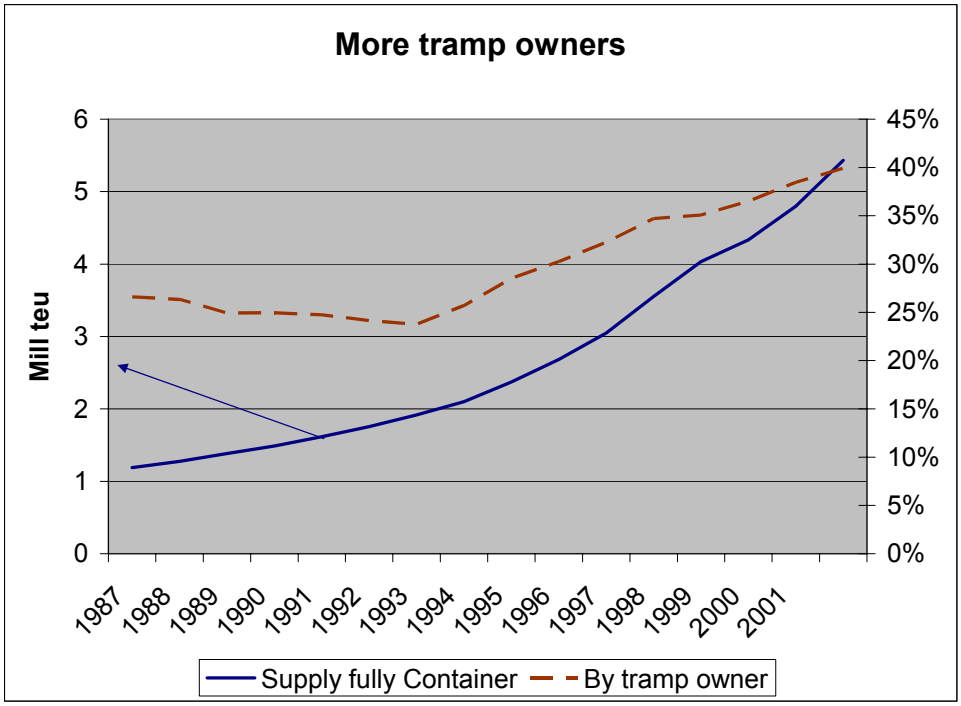
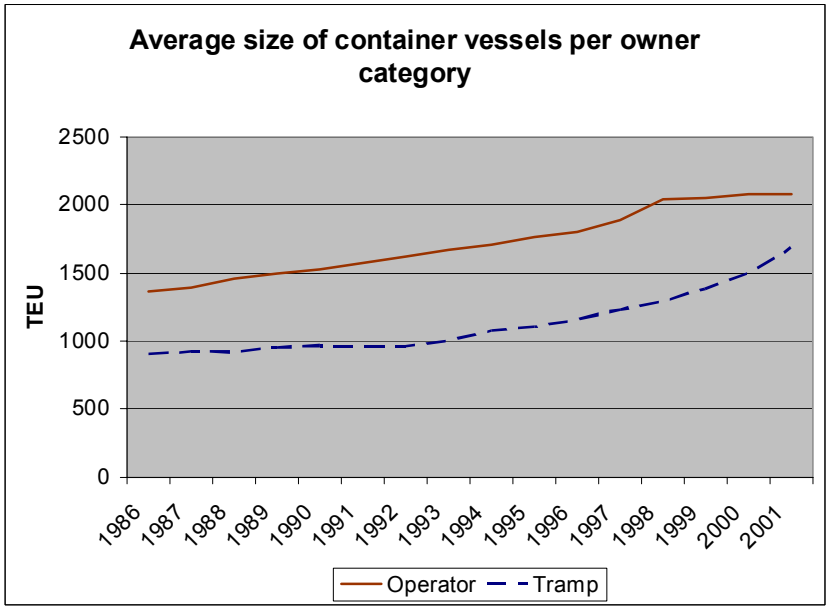


Figure 14: More tramp owners

The tramp owners are focusing on smaller and medium sized tonnage as shown by the graph below.



Source:SAI/Drewry

Figure 15: Average size per vessel owner

Germany controls no less than 20 % of the total fleet of container vessels and 35 % of the orderbook. There are two major reasons for this:

1. The huge and growing local and East European demand for transport of manufactured goods. Germany is the major exporting nation in the world.
2. Tax incentives.

These incentives have fuelled the ordering of modern tonnage and given the German operators and other sectors of the industry large advantages.

Many German containerships are owned by the "KG" system "a limited partnership" with private investors (Kommanditgesellschaft)

Since the tax law amendments of 2001, this form of raising capital has been reduced significantly. However, the introduction of a tonnage tax system has ensured that ship investments remain attractive. The beneficial tax system will give the German container shipping industry an advantage that will last for many years.

4.2.2 Ports and Terminals

A port basically serves its hinterland, which is defined by the geographical circumstances as well as the competition with nearby ports.

The competitiveness of a port depends on its accessibility from the landside, e.g. road- and rail connections, as well as the price-structure of services, e.g. port charges, and terminal handling charges (THCs).

Besides servicing the hinterland the container terminal may serve as a transhipment point. Also in this case the price to be paid may determine which port a liner operator prefers as his hub.

Other aspects, besides the commercial aspects mentioned previously, may also play a role, e.g. accessibility from the seaside, draught restrictions, capacity and efficiency of the container terminal.

Liner operators have seen the THCs increase in relative importance. This as well as the fact that the efficiency of the total transport chain also depends on the efficiency of the port has led major liner operators to become port operators, i.e. to gain operational control over the port operations.

Table 9: 30 largest ports

30 largest container ports 2000 - mill TEU liftings/throughput					
Port	Country	2000	Share %	1999	Change
1 Hong Kong	China	17,800	9%	16,200	9.9%
2 Singapore *	Singapore	17,040	8%	15,945	6.9%
3 Busan *	South Korea	7,540	4%	6,440	17.1%
4 Kaohsiung	Taiwan	7,426	4%	6,985	6.3%
5 Rotterdam	The Netherlands	6,300	3%	6,343	-0.7%
6 Shanghai	China	5,613	3%	4,210	33.3%
7 Los Angeles	USA	4,879	2%	3,829	27.4%
8 Long Beach	USA	4,601	2%	4,408	4.4%
9 Hamburg	Germany	4,250	2%	3,738	13.7%
10 Antwerp	Belgium	4,100	2%	3,614	13.4%
11 Shenzhen Ports	China	3,393	2%	2,984	13.7%
12 Tanjung Priok	Indonesia	3,369	2%	2,119	59.0%
13 Port Klang	Malaysia	3,206	2%	2,550	25.7%
14 New York/New Jersey	USA	3,178	2%	2,863	11.0%
15 Dubai	UAE	3,059	1%	2,840	7.7%
16 Tokyo	Japan	2,960	1%	2,696	9.8%
17 Felixstowe	UK	2,800	1%	2,776	0.9%
18 Bremen/B'haven	Germany	2,712	1%	2,181	24.3%
19 Gioia Tauro *	Italy	2,653	1%	2,253	17.8%
20 Yokohama	Japan	2,400	1%	2,173	10.4%
21 San Juan	Puerto Rico	2,393	1%	2,080	15.0%
22 Manila	Philippines	2,289	1%	2,147	6.6%
23 Laem Chabang	Thailand	2,195	1%	1,828	20.1%
24 Qingdao	China	2,100	1%	1,540	36.4%
25 Kobe	Japan	2,031	1%	2,176	-6.7%
26 Algeciras *	Spain	2,009	1%	1,833	9.6%
27 Keelung	Taiwan	1,955	1%	1,666	17.3%
28 Nagoya	Japan	1,890	1%	1,567	20.6%
29 Oakland	USA	1,777	1%	1,664	6.8%
30 Colombo *	Sri Lanka	1,733	1%	1,704	1.7%
Total above		129,651	62%	115,352	12.4%
Rest of world		78,349	38%		87.6 %
Total world		208,000	100%		

* ports whose throughput consists of over 50% of transhipment
Although not belonging to the above league of 30 top performers in container handling, the year 2000 throughput of the following ports consists of over 50% of transhipment volumes as well: **Americas**: Balboa, Cartagena, Freeport (Bah.), Kingston, Manzanillo (Pan.), Port of Spain **Asia**: Port Tanjung Pelepas **Middle East:** Aden, Fujairah, Khor Fakkan, Salalah **Mediterranean**: Domietta, Malta, Toronto **N. Europe:** Nil -
Source: Dynamar

As mentioned above, the technical specifications with regard to water depths, crane capacity, and general capacity are determining the maximum size of ship and capacity of ships that may call the port. Therefore, the key ports, specifically the hubs, have to be "extended" if, or rather when markedly larger ships are being introduced.

The number of lifts in the container terminal was according to Drewry and Clarkson in the size range of 210 million during 2000, an increase of 10

percent per year compared to the increase in seaborne container transports by 9 %.

The number of lifts per container was 2.9 in 1980, 3.0 in 1990 and 3.3 in 2000.

The increase in the number of lifts of loaded and empty containers can be explained by the development of the Hub and Spoke System and increased transhipment, which has increased from 11 % of the total lifting 1980 to more than 20 % 2000. We expect a better-balanced market in the future as the old regions' share of total trade decreases and intra regional trade increases.

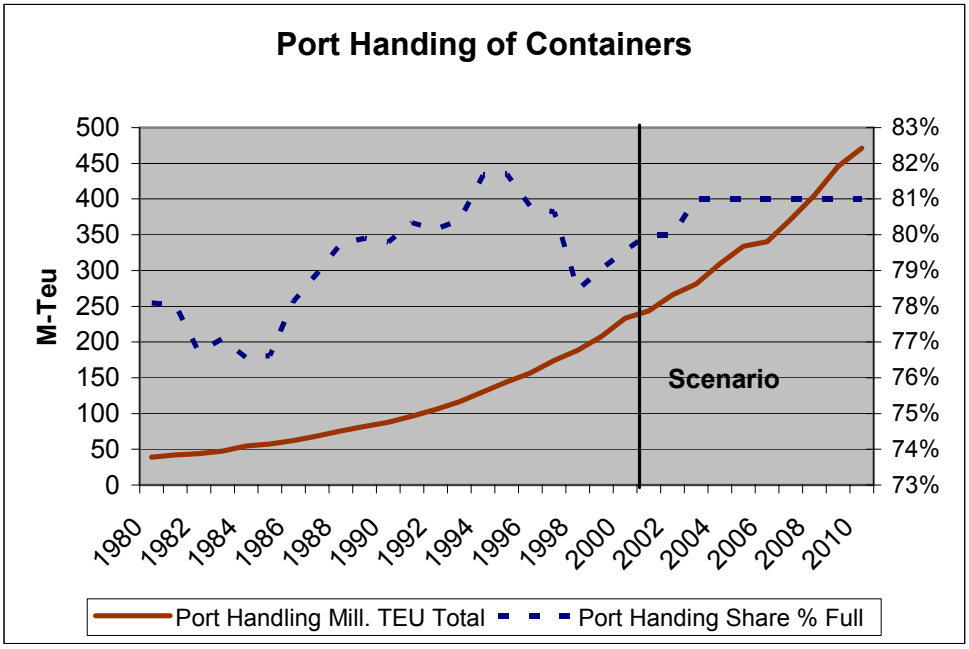


Figure 16: Port handling of containers

A doubling of the turnaround in the terminals in number of container lifts is expected for the period 2001-2010; from 233 in 2001 to 470 million lifts in 2010.

On the basis of presently available and agreed plans, total capacity corresponding to shipments of 15 million TEU will be added to the existing facilities in the five years to come. Despite the enormous growth in port lifts in the past, the terminal sector has been able to expand the capacity in a satisfactory way. Congestion has been a problem in some less developed areas of the world, but not in the Far East and among the OECD countries.

A doubling of the port turnaround during the 1990s meant an increase of roughly 100 million lifts. A doubling again during 2001-2010 means an

increase of more than 200 million lifts. It is obvious that new investment is needed as well as an improvement in productivity.

4.2.3 The Shippers' Points of View

In the shipping press shippers generally get only restricted coverage. However, their cargoes represent their lifeblood, and that of a carrier. Shippers' Councils and individual large shippers have been quite successful in breaking the often high-handed attitude of conference lines against their clientele. To further strengthen their position the European Shippers' Council, the USA-based National International Transportation League (NITL) and the Japanese Shippers' Council are now often taking joint action. They have invited shippers' groupings in other countries to join them.

From the point of view of the buyer of transport services the following objectives are associated with the transportation of incoming supplies and outgoing products – besides a range of more technical issues:

- Low overall transport costs
- Short transport time
- High frequency
- High regularity/low risk of delays
- Continuous access to status information

The fulfilment of these objectives, as well as the success criteria, have developed over time, and have led to shifts from one "school" of thinking to another.

Today the following concepts and factors are seen as important:

- The total "transport chain" from the first origin to the final destination should be regarded as a whole in order to be able to compare alternatives realistically.
- The individual links in this chain should be integrated to the highest degree possible in order to secure a smooth transition from one mode to the next.
- A high degree of electronic interchange of information should be available.

In many cases a manufacturer, a wholesaler, or a retailer leaves the responsibility of his external transport requirements to an external company. This has led to the formation of companies specialising in logistics, which have the total responsibility of the transport towards the cargo owner and binds all the actors engaged in the transport chain together.

4.3 Market balance

In section 2.6.3 the development in world trade in container friendly manufactures was discussed, and trade figures for the period 1990-2000 were derived from WTO statistics. The basis of the following calculations is the USD-value of trade by trade route converted to USD-volume by the overall unit value index. These figures are referred to as "trade volume units". The next step is to transform this information into seaborne transports of (loaded) containers measured in TEU, which requires estimation of the following key parameters:

- The share of trade that is seaborne, i.e. the "modal split" measured in trade volume units.
- The share of seaborne trade that is containerised measured in trade volume units.
- The relation between trade volume units and number of containers in TEUs.

None of these key parameters are available from a statistical database and they are also difficult to estimate. However, in order to be able to make projections it is regarded as valuable to be able to modify the individual key parameters. The estimates have been derived from several sources of unpublished and published industry research, and the final result with regard to the main trades has been adjusted according to data published by Drewry and Clarkson.

4.3.1 Seaborne Container Trade

Seaborne trade in containerised container friendly commodities increased by around 8.7 per year during 1990-2000 corresponding to an increase in seaborne TEU trade with 9.2 % as the market share for containers went up from 77 % to 80 %.

Table 10: Seaborne container transports with container friendly goods

Year	Million	%
1990	25.6	
1991	24.7	8.5
1992	29.4	6.0
1993	32.7	11.1
1994	37.9	16.1
1995	40.2	6.2
1996	43.7	8.5
1997	48.7	11.5
1998	51.5	5.9
1999	54.9	6.4
2000	61.4	11.9
1990-1995 1996-2000 1991-2000	9.5%/year 8.8%/year 9.2 %/year	

Major variations are seen from one year to the next according the changes in the business cycles of the world's economies. The development in growth rates during 1991-1995 follows the recovery of the world economy after the downturn in 1991-92, whereas the low rate of growth in 1996 stems from the downturn in economic growth in western Europe as well as a slow-down in growth in the USA during 1995-96.

The effects of the "Asian crisis" on world trade are seen in the low growth rate in 1998, which is followed by strong growth rates along with the economic upturn in the world economy during 1999 and 2000.

During the first half of the period the growth is estimated at 9.5% p.a., and thus slightly higher than the average of the total period, whereas a rate of 8.8% has been estimated for the second half of the period.

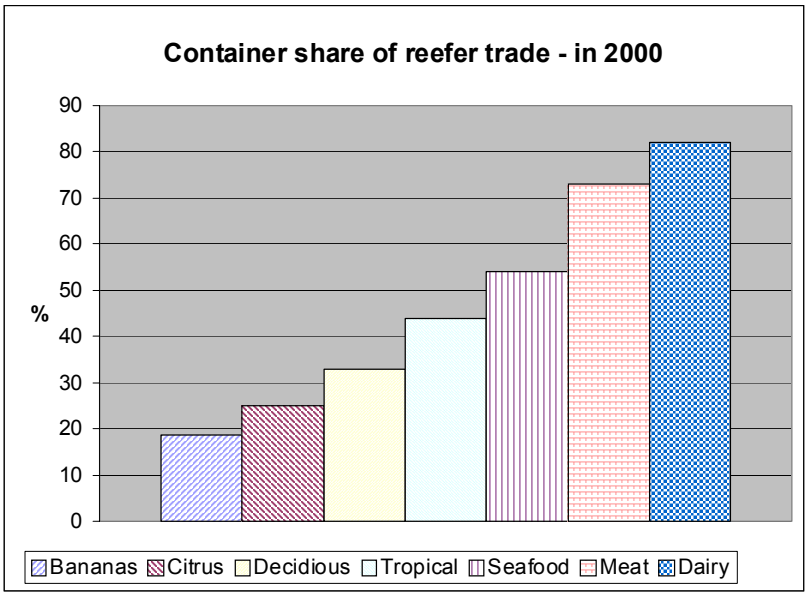
The starting point of the estimate of total seaborne TEU trade made by Drewry is total port handlings, which includes full as well as empty containers and transshipment of containers from one line to another. The port handling figures are adjusted for handling of empty and transshipment containers. Thereafter the world container trade is found as half the value of "port to port" handlings of full containers. According to these estimates the container traffic has increased from 28.5 mTEU to 70.1 mTEU during 1990 to 2000 corresponding to an average rate of growth of 9.4%.

The estimates made in this study based on container friendly goods only are somewhat lower, increasing from 25.6 mTEU in 1990 to 61.4 mTEU in 2000, corresponding to 9.2 % per year

The main differences stem from miscellaneous North-South trades and intra regional trades that were not included in the base of data for 1994 trade flows. By the year 2000 these trades amount to 5 mTEU which reduces the original difference in 2000 from 9 mTEU to 4 mTEU. The rest is explained by increased containerisation of "non container friendly commodities" including container reefer trade.

With regard to agricultural products shipped in containers by container ships an estimate has been made from various industry statistics and research reports that cover seaborne transport of bananas, citrus, deciduous fruit, exotic fruit, meat, dairy products, fish and miscellaneous products, referred to as trade in refrigerated cargo.

The figure below shows an increase in containers shipped by container ships during 1990-2000 from a total of around 0.5 mill. TEU at the beginning of the period to just over 2.0 mill. TEU in 2000, corresponding to an average rate of growth of over 13% per year.



Source: SAI/ Ocean Shipping Consultancy

Figure 17: Container share of reefer trade – in 2000

This growth rate is much higher than the rate of growth of around 5-5.5% per year seen for the total seaborne trade in refrigerated cargo, as container ships have taken an increasing share of the total market.

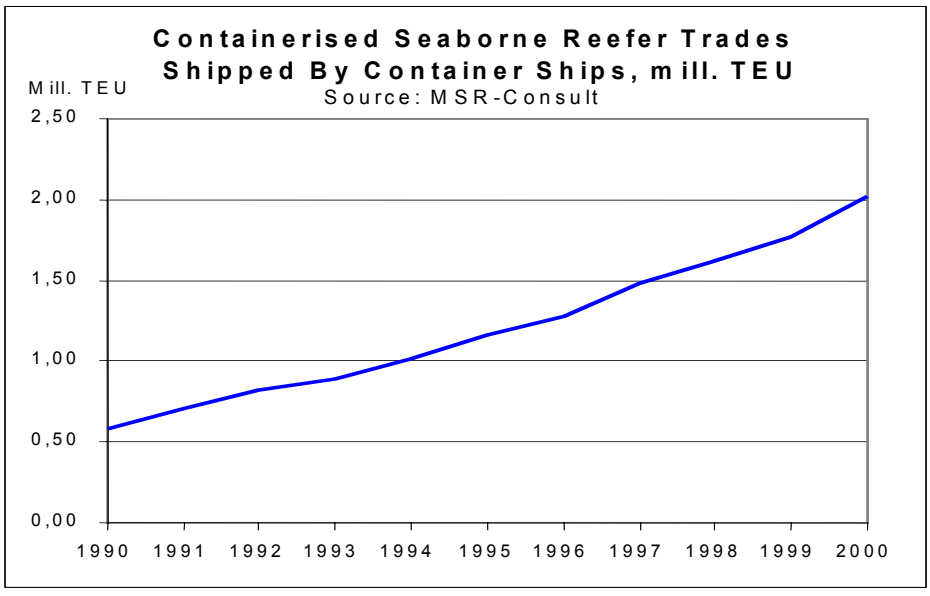


Figure 18: Containerised Seaborne Reefer Trades

According to Clarkson the total trade 2000 in TEU was 68 million and according to Drewry 70 million. For our further calculations we will use 70 million TEU in 2000 as the total TEU seaborne trade. A growth of 9 % per year for the period 1991-2000 corresponding to approximately 4 million TEU/year. The market share of "non container friendly commodities" 2000 is estimated to 7 % i.e. 5 million TEU.

44 % total share of reefer trade in 2000 could increase to 49 % 2010 i.e. 14 million tonnes according to Ocean Shipping Consultancy.

4.3.1.1 Trade by important trade routes

The table below shows the total container trade by major trade route. Data regarding the period 1990-1994 have not been shown as the estimates are regarded to be too uncertain.

Seaborne Container Trades, Mill. TEU
Source:MSR

Year	Main E-W Trades	Intra Asia	Intra Europe	All Others	Total
1990	-	-	-	-	25,6
1991	-	-	-	-	27,7
1992	-	-	-	-	29,4
1993	-	-	-	-	32,7
1994	-	-	-	-	37,9
1995	16,6	10,0	4,3	9,5	40,2
1996	17,1	11,9	4,4	10,3	43,7
1997	18,3	13,8	4,7	11,8	48,7
1998	19,8	12,9	5,5	13,3	51,5
1999	21,1	13,5	5,7	14,6	54,9
2000	23,4	14,1	5,8	18,2	61,4
Growth Rates, % p.a.					
1990-2000	-	-	-	-	9,2
1990-95	-	-	-	-	9,5
1995-2000	7,1	7,2	6,2	13,9	8,8

Table 11: Seaborne Container Trades, Mill. TEU

The three main East-West trades linking Europe, North America, and Asia have seen a growth of just over 7% p.a. for the period 1995-2000. This is the combined result of high growth rates of around 12% in the trades out of Asia and the westbound Atlantic trade, and of lower growth in the opposite directions.

The intra Asian trades have seen a somewhat lower growth of around 7.2% p.a. during the five-year period partly due to the decline in trade that was seen from 1997 to 98 due to the "Asian Crisis" as well as to the depressed Japanese economy during the period.

The growth in the inernal West European trade is fairly modest at around 6% p.a., which is estimated on the basis of a modest growth in trade and seaborne trade in container friendly commodities of around 7.5 %.

The rate of growth of other trades, i.e. mainly North-South trades as well as intra-regional trades other than in Asia and Western Europe is estimated at a high rate of almost 14% per year during 1995-2000.

4.3.1.2 Seaborne transports 2001-2010

After the Asian crisis, a strong demand for IT and other electronic equipment generated a boom in the exports from Asia to Europe and the US in 1999 and 2000 and the seaborne container trade rose by approximately 8 million TEU. This boom meant that liner shipping had a generally good year in 2000. Stronger cargo volumes and firmer freight rates in many trades, together with an upbeat charter market resulted in several liner operators/owners posting their best financial performances for years.

While the exports from Asia grew, the imports remained low, which eroded the previously well-balanced trade between Asia and the US and between Asia and Western Europe. The number of empty containers shipped by sea increased dramatically.

Last year eastbound transpacific trade (Asia/North America) has been particularly affected by the slowdown of the US economy. The top six North American West Coast ports have reported only a 2 percent increase in unloaded imports for the period, and a 1 percent decrease in loaded exports. Transatlantic westbound container volumes increased at the start of 2001, but due to the softness in the North American economy, these increases have melted away.

The main continental container ports in northern Europe have reported a year-on-year increase of 3.4 percent during the first six months of 2001, compared to just over 9 percent for the whole of 2000.

Even though ocean carriers have cause for concern in the dominant east-west trades, cargo flow projections are nevertheless encouraging. The main trades Asia/Europe, Asia/North America and North America/Europe are forecast to increase by an average of 7 percent per year in the next 3 years.

The growth in seaborne container transports during 2001 is estimated to 3 % and we expect the growth in 2002 to be 5 % corresponding to 4 million TEU.

If we assume as a trend for the period 2001-2010:

- An average world GDP growth of 2.0 %, down from 2.2 during the 1990s. A rather pessimistic assumption.
- A ratio of 3.5 to the growth in the trade in container friendly goods, down from 4.0 during the 1990s. This assumption reflects the low growth estimate.
- Increased market share for " non container friendly goods" to 10 %. The potential only in agriculture represents 30-40 % of the increase in

market share of non container friendly goods. This assumption could also be seen as a rather cautious one.

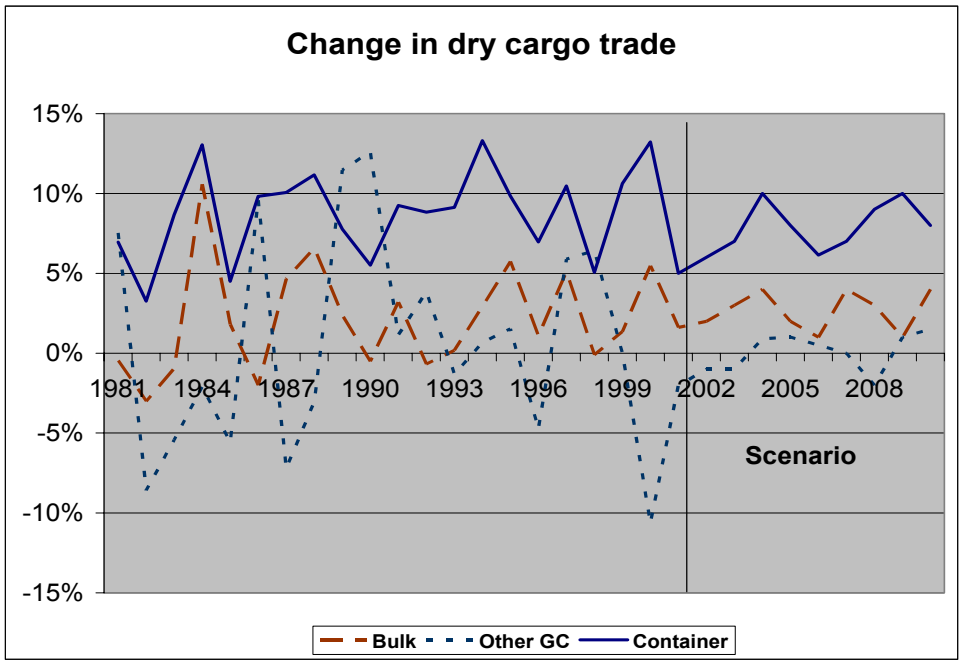
It would imply

- a growth in seaborne container shipment for container friendly goods with 7 % per year from 70 million TEU 2000 to 135 million 2010
- a growth in "non container friendly goods" from 5 million to 15 million TEU 2010, corresponding to 12 % per year. Containerisation continues to snipe at handy cargoes. In 2000 approximately 770 million tonnes of minor bulk cargoes were transported in bulk carriers. Although most of this is not likely to be containerised, analysis of the various commodities suggests there is scope for about 10 percent to move into containers. This will not happen immediately. However, even on this basis, worldwide container movements could increase by an extra 1-1.5 million TEU per year by taking over more medium valued goods.
- A total growth in seaborne trade with 7.5 million TEU nearly a doubling compared to the 1990s, corresponding to a growth of 7.58 %/ year down from 9.2 % during the 1990s, i.e. a reduction in growth path per year with 20 %

The following scenario illustrates a development based on an upturn in the economic growth during 2003-2006 followed by a slow down and an upturn again at the end of the period. To predict the exact pattern of the economic growth is impossible and there are a numerous conceivable political disruptions that could alter the amplitudes in the growth.

Just to remind the reader that this is not a forecast, it is a possible scenario based on the historic development that we have seen and the prospects for economic growth and trade that we expect for the next 10 years.

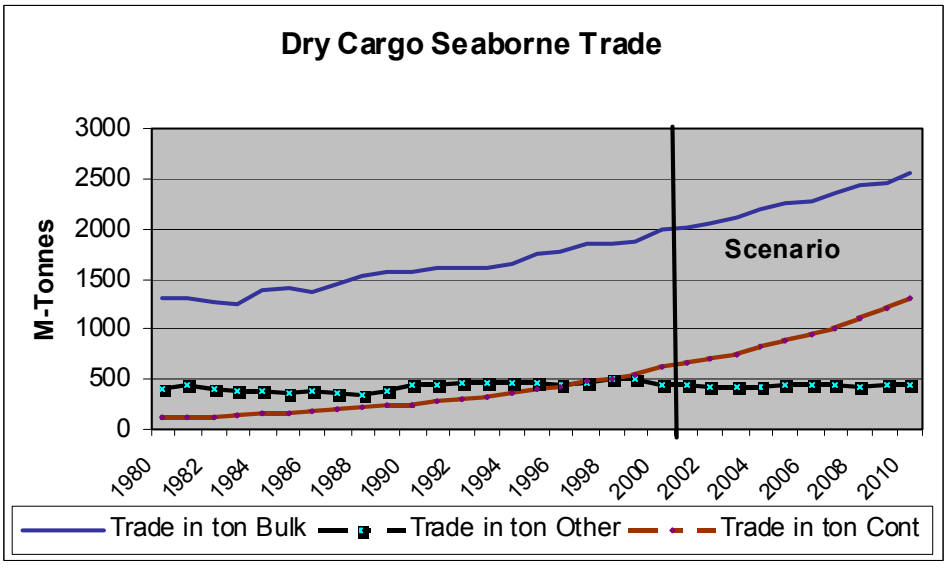
The picture below describes the historic growth in dry cargo trades since 1980 and the scenario for 2001-2010, the actual volumes and the share for bulk, general cargo and container goods.



Source: Drewry, FearnResearch, Clarkson,scenario by SAI

Figure 19: Change in dry cargo trade

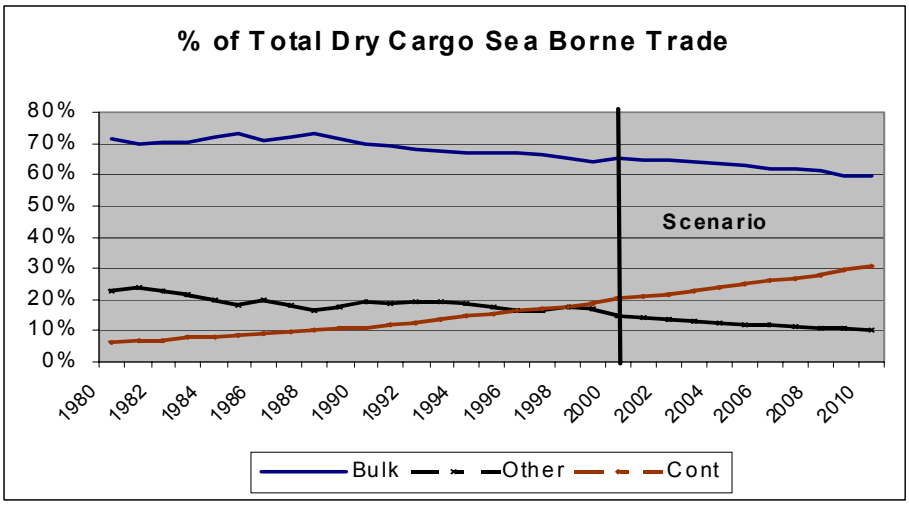
The dramatic fluctuations in the picture above turn out to a rather stable and robust growth when the development is described in total figures as in the picture below.



Source: Drewry, FearnResearch, Clarkson,scenario by SAI

Figure 20: Dry cargo seaborne trade

The share of goods shipped in containers is estimated to increase from app. 5 % 1980 (100 million tonnes) to 30% 2010 (1300 million tonnes) - Trends take time.

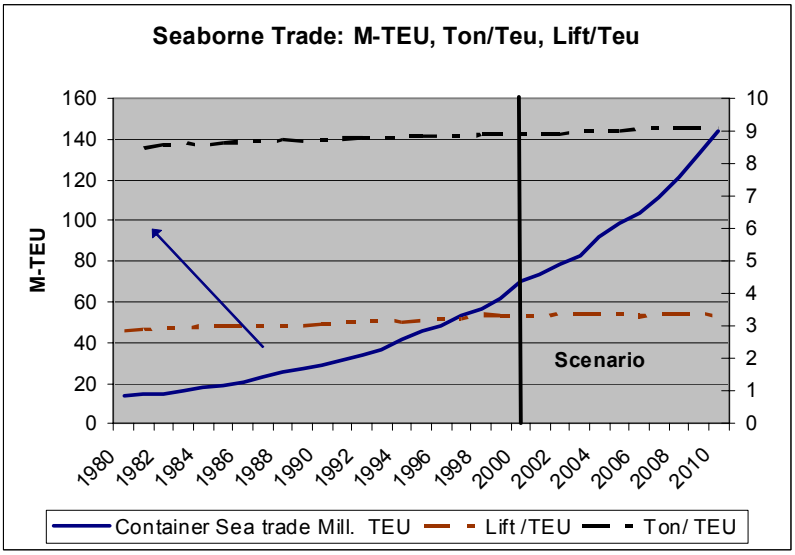


Source: Drewry, FearnResearch, Clarkson,scenario by SAI

Figure 21: Market share for various dry cargo goods

The average weight of all seaborne containers including empty TEU (approximately 20 % of TEU handled in the ports) has increased rather moderately during the period from 8.5 tonnes 1980 to 9.1 tonnes 2010.

The number of times the container is handled in the port has also increased from 2.9 to 3.4, an increase with nearly 20 %. This increase represents no less than 70 million lifts corresponding to nearly 20 % of the total estimated number of lifts of 480 million in 2010.



Source: Drewry, FearnResearch, Clarkson,scenario by SAI

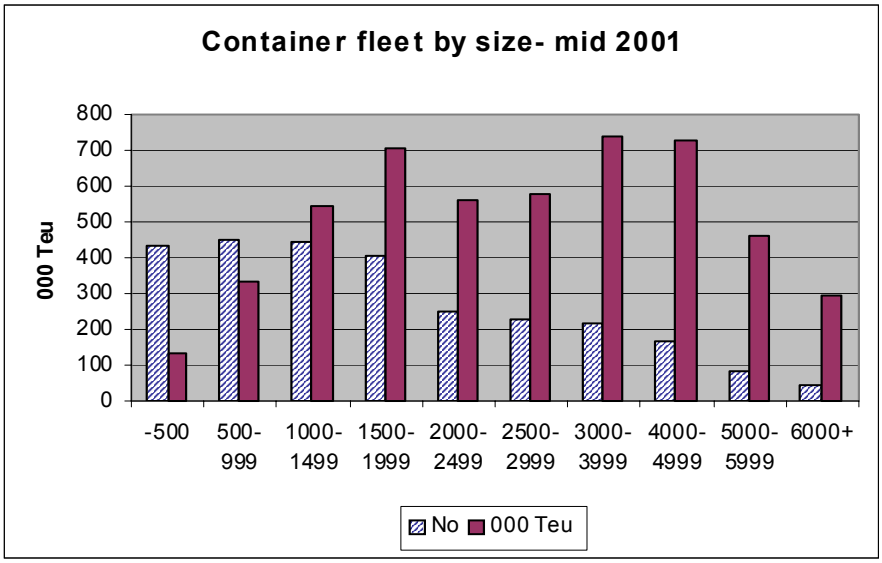
Figure 22: Container trade, Ton/TEU and Lift/TEU

The total seaborne transport of containers is estimated to increase by an average of 7 million TEU per year during the period 2001-2010 compared to 4 million during 1991-2000. A doubling of the container growth in numbers of TEU per year does not represent any capacity problem, neither for the operators nor the newbuilding yards.

4.3.2 Supply - Container slot capacity

In principle, almost any ship may transport containers, however, today only *cellular container ships,* i.e. ships tailor-made for transportation of containers, and *semi-container ships,* i.e. ships that may also transport non-containerised cargo, are included when estimating the supply of container carrying capacity. By the end of 2001 the capacity of the fleet in terms of nominal container slots amounted to around 7.3 m TEU of which 5.3 m TEU are included in the fleet of cellular containerships and some 2.0 m TEU stem from the fleet of semi-container ships.

The most striking development on the supply side has been the rapid increase in the capacity of the largest ship in the fleet, especially since the late 1980s where the breadth restriction of 100 feet, the maximum breadth to transit the Panama Canal, was abolished.



Source: SAI/Clarkson

Figure 23: Container fleet, no. and TEU by size.

The size of the largest ship has increased from just over 4 000 TEU during most of the 1980s up to around 7 300 TEU today. Based on information about ships on order a further increase to 7 700 TEU is foreseen in 2003. See figure below.

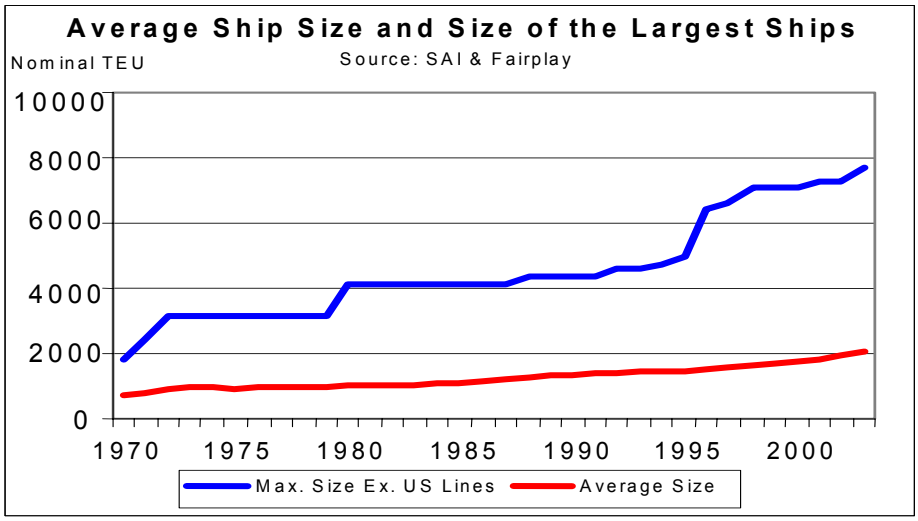


Figure 24: Average Ship Size and Size of the Largest Ship

It should, however, be mentioned that for competition reasons some liner companies do not publish the true capacity of their ships, and ships of 9 000 to 10 000 TEU have already been ordered by Maersk Sealand.

The average size of container ships develops, of course, more slowly than the size of the largest ship. During 1990-2000 the maximum size thus increased by 64%, whereas the average size increased by half the amount or by 32% [12].

The driving forces behind the increases in ship sizes have been the strong growth in container shipping as well as the incentive of liner companies to obtain lower unit costs in the highly competitive market.

It is regarded likely that the maximum and average ship size will continue to grow in the next several years to come up to so called “Malacca max” of around 16 000 TEU.

The technical considerations include the following:

- The required container terminal facilities e.g. water depth, cranes, and capacity in general.
- The draught of the mega container ships.
- Engines to propel the mega containerships.

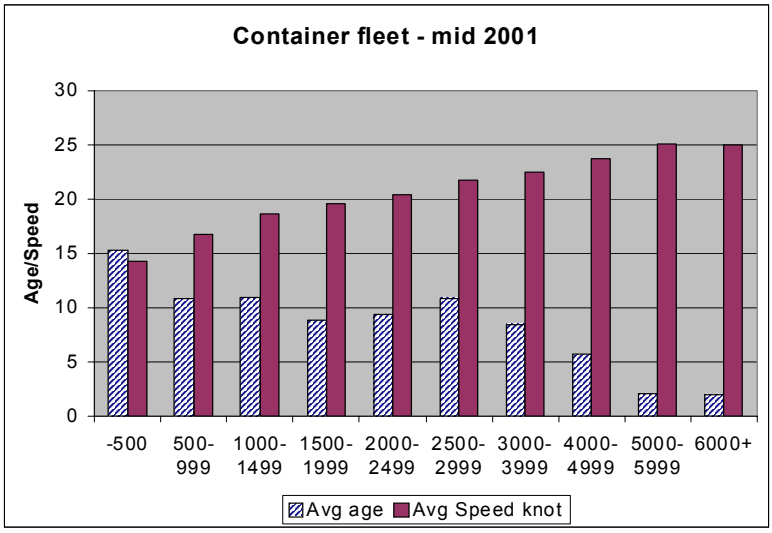
Today, the maximum draft of the largest container ships approach 14.5 meters, which is also the maximum draft available in almost all container ports.

A 10 000 TEU ship may still be operated within this limit, whereas the draught of a 12 000 TEU container ship will be around 17 meters, and that

[12] Own calculations based on data from Fairplay.

of a Malacca max at around 21 meters with a length of 400 meters and a beam of 60 meters.

The dramatic increase in size is reflected in the age profile of the fleet and the average nominal speed of the fleet. The larger the vessel is the higher is the nominal speed. The economics behind this phenomenon has been discussed earlier in the section on product characteristics above.



Source: SAI, Clarkson

Figure 25: Container fleet - Average age and speed

Today there is also a large number of different vessel types with container capacity. In 2001 those vessels represent approximately 25 % of the total existing TEU capacity of 7.3 million TEU.

4.3.2.1 Orderbook

The order book now comprises 519 ships totalling 1.6 million TEU. Measured in TEU capacity the present orderbook represents 30 percent of the total fleet.

The post-Panamaxes account for 50 percent of the container newbuilding orderbook measured in TEU and for 20 percent measured in number of vessels, with 112 vessels in the 4 700+ TEU category, scheduled for delivery between 2002 and 2004.

The Panamax (3-4 699 TEU) and Handy-/sub-panamax (1 000-2 999 TEU) represent 25 percent each of the orderbook measured in TEU. The Handy-/sub-Panamax has increased its share of the orderbook by 5 percentage-points in the last 12 months.

The orderbook for small feeder vessels (<1 000TEU) has recovered and is now on the same level as in 1998, or 80 units i.e. 36 units more than last year.

4.3.2.2 Demolitions

After 1998, when a record of 56 or 84 000 TEUs were sold to breakers' yards, demolition activity has slumped. In 2000, 15 vessels or 16 000 TEUs were removed from service in this way despite the Chinese re-entering the market with aggressive ship purchasing strategies and generally higher prices.

Last year, vessels of almost 40 000 TEU capacity were sold for demolition. This was lower than expected, but with freight rates declining we will probably see scrapping rates climb this year.

Scrapping should pick up particularly among handy-size and feeder-size container vessels, where there are 120 vessels, which are 25 years old or older, and 230 vessels, which are between 20 and 25 years old. That represents 5 and 8 percent of the existing fleet. Measured in TEU total demolition is expected to reach 96 000 TEU in 2002, when the fall in demand and rates will probably bottom out.

There is currently 10.5 million tonnes of tween-deck capacity over 25 years of age and this figure is set to swell dramatically over the next 5 years as a mass of late 1970s built tweens become over 25 years old.

Conservatively it can be assumed that 3 million dwt of tweens will be scrapped per annum. Based on 5 voyages a year this equates to around 15 million tonnes of cargo. If only 50 percent of this is containerised this will generate in the region of 750 000-1 000 000 additional box movements per annum.

Between 2004 and 2006 improved market conditions should again reduce the scrapping activities.

4.3.2.3 Future Supply

Total container fleet capacity will increase by 12 percent this year, 11 percent in 2003, and 7 percent in 2004.

Out of a total capacity growth of 2.3 million TEU in the period 2001-2006, 1 million TEU will be allocated to post-Panamax vessels, 0.6 million TEU to Panamax and 0.5 million TEU to sub-Panamax vessels. The final 0.1 million TEU growth will be allocated to feeder.

176 post-Panamax (>4 700 TEU) vessels now account for 1 million TEU or close to 20 percent of the world fleet. This proportion is expected to grow to 27 percent at the end of 2003, and to 28 percent at the end of 2006, the same proportion as for the Panamax (3 – 4 699 TEU) fleet.

In the next 3 years the scheduled deliveries of post-Panamaxes will increase the east/west trans-Pacific TEU capacity by an annual average of

10 percent, which is roughly 2-3 percent above the estimated annual demand growth on the dominating east/west legs. Some displacement of tonnage from these routes will therefore be necessary.

Table 12: Container fleet fully cellular 2000-2006

Post-panamax	4700+ teu	No.	136	184	238	289	316	331	341
Panamax/post-	3'-4699 teu	No.	356	372	421	471	510	525	540
Handy-/sub-panx	1' - 2.999 teu	No.	1 218	1 296	1 338	1 386	1 440	1 480	1 510
Feeder	100 - 999 teu	No.	951	967	998	1 025	1 058	1 086	1 112
	- 99 teu	No.	37	37	37	37	37	37	37
Total container fleet		**No.**	**2 698**	**2 856**	**3 032**	**3 208**	**3 361**	**3 459**	**3 540**
		M teu	**4,7**	**5,3**	**5,9**	**6,6**	**7,0**	**7,3**	**7,5**

Source: LR Fairplay

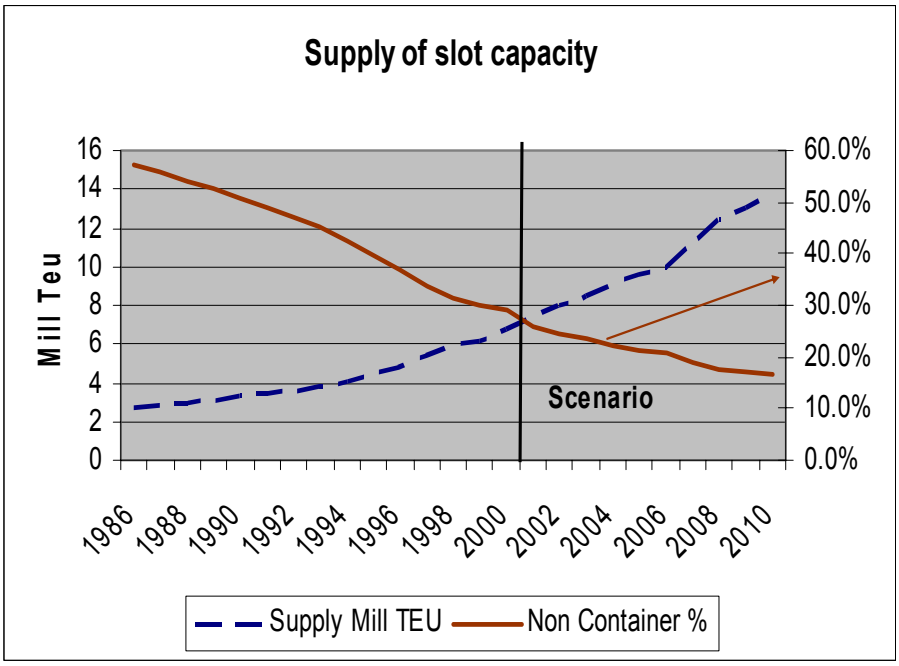
The sub-Panamax' share of the fleet will fall from 43 percent to 36 percent.

The larger tonnage (>3 500 TEU) might be deployed on Transatlantic, Far East to US East Coast, and Australian trades, while others will be forced to remain on other alternative Pacific routes.

Upsizing smaller trades and continued recovery in Asian and South American economies should stimulate demand for (2 500 – 3 500 TEU) vessels, but this demand could already this year be balanced by the deliveries of more than 40 vessels, built on speculation for the charter market.

Since the latest post-Panamax newbuildings have been chartered in under long-term contracts rather than being owned directly, the newbuilding spree will bring an increase in the charter market for boxships. Regarding the severe financial conditions surrounding liner companies, operators are likely to choose the long-term charter market more and more.

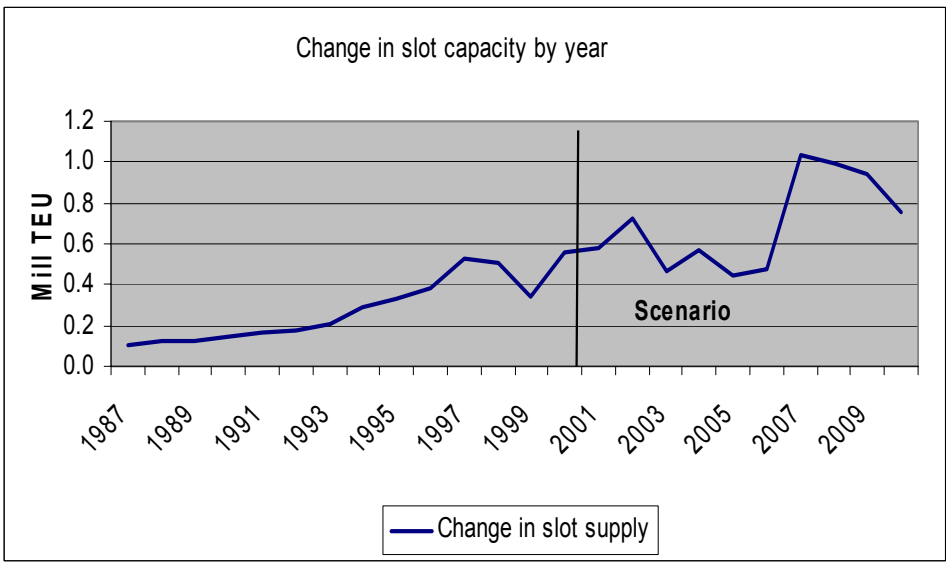
In this report all TEU capacity has been taken into account when the total supply of slot capacity has been estimated (illustrated by the picture below).



Source: Drewry, scenario by SAI

Figure 26: Supply of slot capacity

The average total slot capacity increase per year during the 1990s was 0.35 million. The needed estimated increase per year during the period 2001-2010 is 0.7 million TEU, implying that the newbuilding deliveries on average during the period, compared to 1991-2000, has to more than double taking into consideration scrapping during the same period (figure below).



Source: Drewry, FearnResearch, Clarkson,scenario by SAI

Figure 27: Change in slot capacity

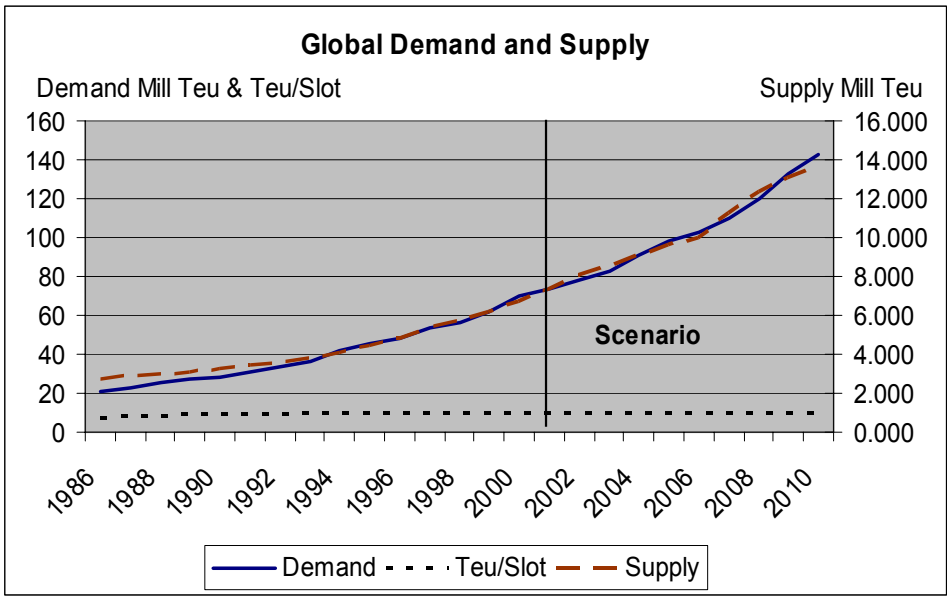
4.3.3 Freight and ship prices

The cargo owner, shipper, or agent is paying a certain price to get his container from the nearest port of origin to the nearest port of destination. This price is referred to as the *freight rate* or *box rate*; it includes the terminal handling charges ("THCs") and possible feeder operations, and is normally quoted in USD.

The main determinants of the freight rate are the trend for long-term transport costs and the capacity-utilisation on the market.

The costs of the line operator include production costs, administration costs, interests, and depreciation costs. The production costs is, of course, a function of the transport distance (bunker fuel costs etc.) and the ports to be visited (port dues) and possible canals to be passed (canal dues).

Even though the market situation should be regarded within the individual trades the overall market situation, i.e. the relation between the total available capacity and global demand has an influence. In the case of under-supply of capacity in one trade and available capacity in another trade, or from idle ships, capacity will be moved to the trade that lacks capacity.



Source: Drewry, FearnResearch, Clarkson,scenario by SAI

Figure 28: Global demand and supply

The market situation is directly a function of the relation between the competition between seaborne transportation and other modes of transportation, as well as the available capacity and demand within the seaborne trade in question. In most cases, however, and especially in inter-

continental trades the seaborne alternative is the only real possibility. In this case the transport cost and to some extent the transport time become very important driving forces in the formation of freight rates.

The charter market may be regarded as the reservoir of excess capacity, and charter rates as an indicator of the state of the overall market situation. See next section.

The pricing of a liner service is fairly complicated, compared to the pricing of seaborne transportation of wet and dry bulk commodities, and has changed radically since the introduction of container shipping and especially in the latest years due to legislation introduced in the USA and under way within the EU that has removed or strongly reduced the possibility of freight rate agreements among liner operators with the conferences.

Originally the container shipping industry adopted the principles formed in the days of the cargo liners, i.e. liner conferences where shippers (cargo owners) and liner operators negotiated rates and terms for all liner operators that were members of a particular conference.

One principle was that the freight rate depended on the type of commodity in question, i.e. a high value commodity would pay a higher unit freight rate than a low value commodity. Today this principle has disappeared (more or less) and has been replaced by a standard box rate.

On the legislative front the competition authorities in the USA and in the EU have worked for the abolishment of the pricing principles originally applied by the conferences.

These principles were forbidden by the USA for ships operating to and from that country in the Merchant Shipping Act, and the principle of confidential service contracts between single shippers and liner companies was introduced. In the EU similar regulation of liner shipping is underway. In spite of this development towards free and open competition the conferences still exist, but only as an advisory body.

Historical data regarding freight rates are not generally available partly due to the previous complicated structure of conference rates and today because of the confidentially of service agreements. The following discussion is based on data from various industry sources including Drewry and Containerisation International.

The following factors are the main determinants of freight rates on the main inter-continental routes:

- Long term operating cost
- The balance between demand and supply on the particular route and direction.

Due to several factors including the strong growth in container shipping, the increases in the size of ships, the ongoing consolidation of the

container shipping industry, increasing use of IT-systems, general rationalisations, lower prices for new ships, the transport cost in USD per TEU-mile has, no doubt, gone down.

Freight rates, on the other hand, have been strongly influenced by the market condition, i.e. in periods of a narrowing of the gap between supply and demand on a particular route rising freight rates have been registered and vice versa.

Based on yearly average freight rates for the Atlantic and Pacific trades an average decline of around 1.3% per year has been registered during 1978-84, see figure below, whereas quarterly average freight rates for the Atlantic, Pacific, and Europe-Asia trades have seen a decline per year of around 1.6% during 3rd quarter 1994 to 3rd quarter 2001 (see figure below[13]).

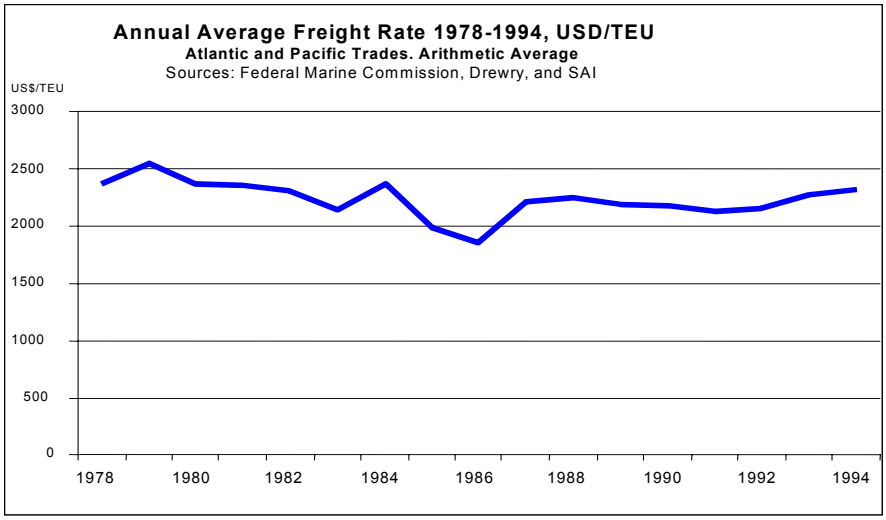


Figure 29: Annual Average Freight Rates 1978 - 1994

[13] For the period 1978-94 an arithmetic average is used, whereas for the period 3rd quarter 1994-3rd quarter 2001 a weighted average is used, weighted according to the volume of containers moved.

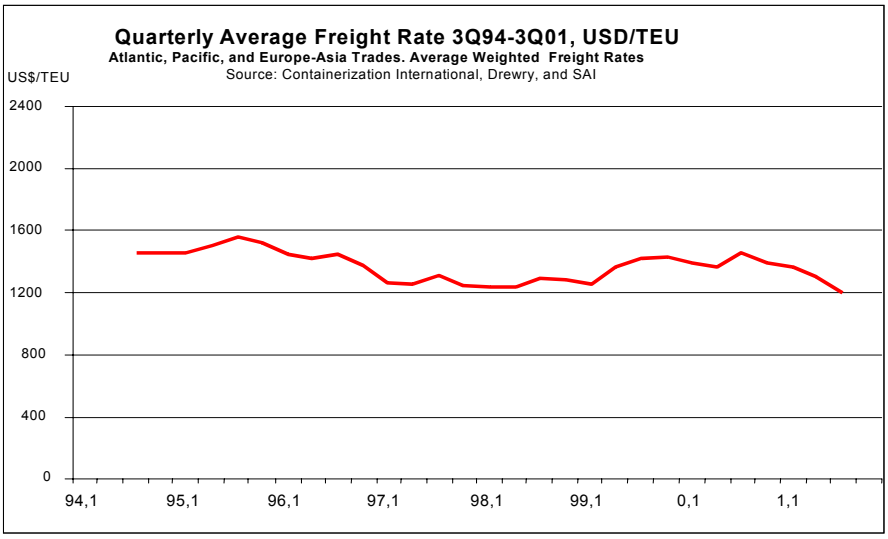


Figure 30: Quarterly Average Freight Rate 3Q94 – 3Q01(USD/TEU)

These average freight rates appear to be fairly stable, which, however, is the result of larger increases and decreases compensating each other, especially during the latest years where the "imbalances" in the flow of cargo between the two trade directions have increased.

In the short term - this year and next - the market will be hard hit by the fall in capacity utilisation.

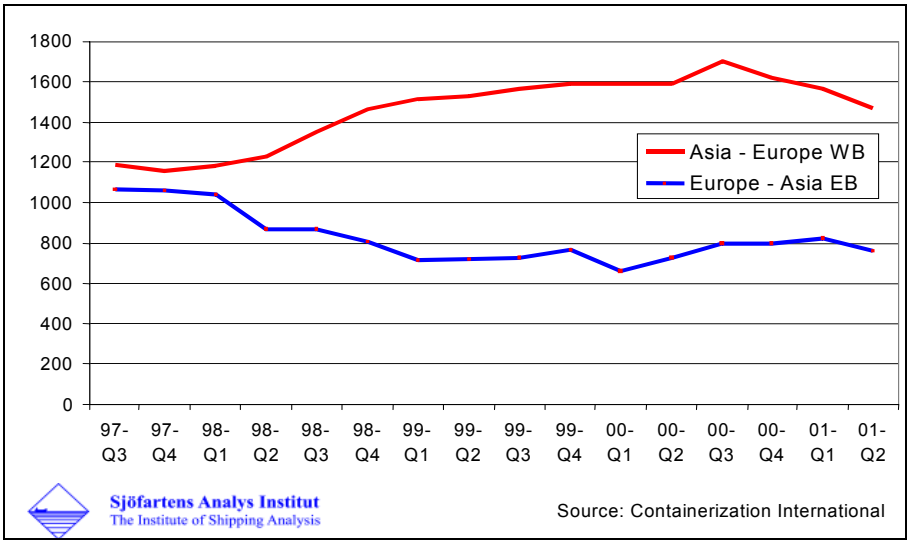


Figure 31: Asia - Europe rates (USD/TEU)

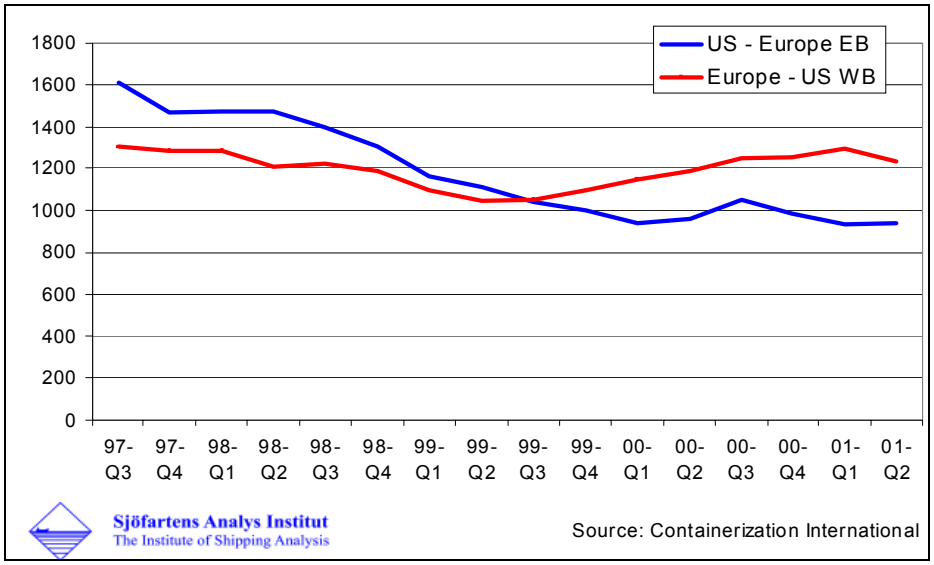


Figure 32: US - Europe rates (USD/TEU)

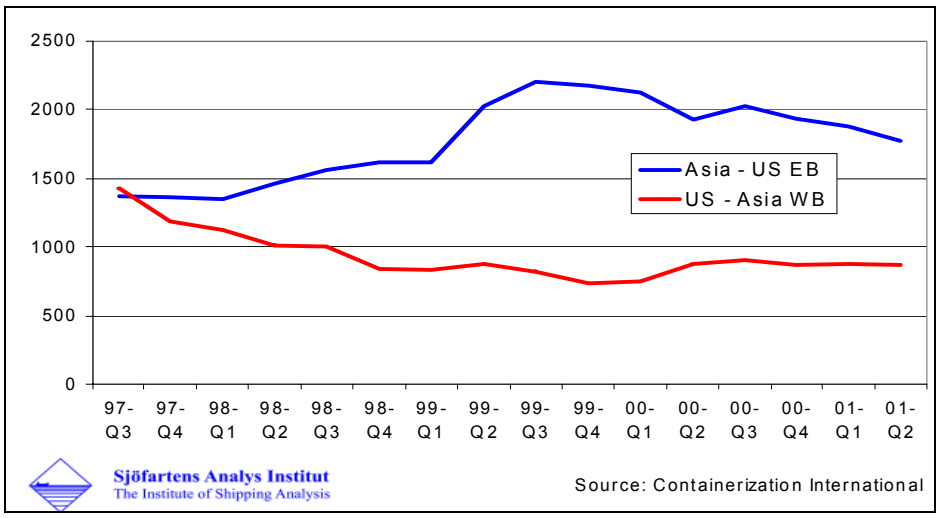


Figure 33: Asia -US rates (USD/TEU)

In 2002 and 2003 the fleet could expand by as much as 10-12 percent/ year and significant scrapping will be required in order to temper the massive orderbook. Whether or not the industry has over-ordered remains to be seen, but increases in demand will be needed to run at least at 9 percent in order to compensate for this delivery profile.

However, there are a number of other factors at play that should soften the blow in the short term. These include:

- China anticipates containerised throughput in its main ports increasing by 20% in 2001.
- Real demand for containership capacity actually relies on growth in demand on the dominant leg.

- Over half of the capacity entering service is for post-Panamax ships that will be deployed on the East/West trades.
- The period nature of the containership charter market protects it from short-term supply/demand imbalances.

The container ship charter market acts as a reservoir of excess capacity on the global container ship market, and charter rates indicate the overall demand for container ship capacity of liner operators.

This demand is primarily driven by the world trade in containerised commodities, but another strong driver is the demand from line operators to acquire more capacity in order to, e.g. establish new lines, increase the size of ships in an existing line, increase the frequency, and/or increase the number of ports called on each “roundtrip”.

These secondary factors reinforce the ups and downs created by the oscillations in trade, as line operators are eager to extend their services in a situation of strongly increasing demand and eager to “consolidate” their situation or cut back in a situation of declining or slowly growing demand.

It is thus not in contradiction to the development of declining freight rates and periods of likely heavy losses for liner companies that generally very strong charter rates have been seen from the mid 1980s and until late in the 1990s.

This period was characterised by strong competition and fight for market shares, where liner operators extended their network to become “global players” and to offer higher quality through higher frequency and shorter transit times.

Considering the large number of new post-Panamax vessels entering the market up to the end of next year, the charter market prospects do not appear encouraging. Some of the vessels replaced have already started to cascade down into other trades, thus inflicting a knock-on effect on smaller vessel sizes. The decline in charter rates is felt down to ships of 800 TEU. In the reefer market the increasing trend towards containerisation continues to depress the conventional reefer market, where there are very few signs of firming rates.

The development in the charter rate for up to 12 months charter of a 1,000 TEU container ship is seen in the figure below.

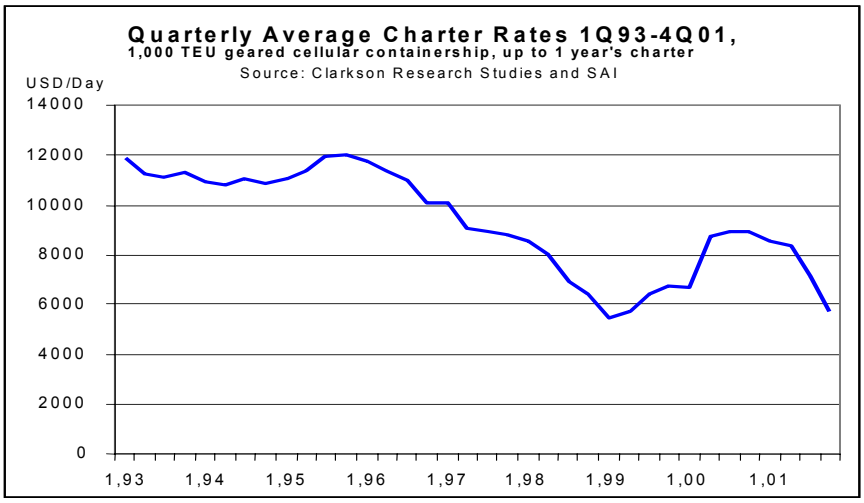


Figure 34: Quarterly Average Charter Rates 1Q93 – 4Q01

The time charter rate for the vessel has decreased more than the average freight rate for a TEU and rates will continue to be low with a few years exception in the middle of the period up to 2010.

The development of the time-charter rates for container vessels seen as a trend indicates together with the use of larger vessels that the sea leg in the transportation of containers has contributed to a substantial part of the overall reduction in freight rates during the 1990s.

In other words – the rationalisation and fierce competition on the sea leg might explain most of the rationalisation in the total container logistic chain.

Newbuilding prices for different types of ships are correlated and in the long run determined by the production cost in the major international shipbuilding countries.

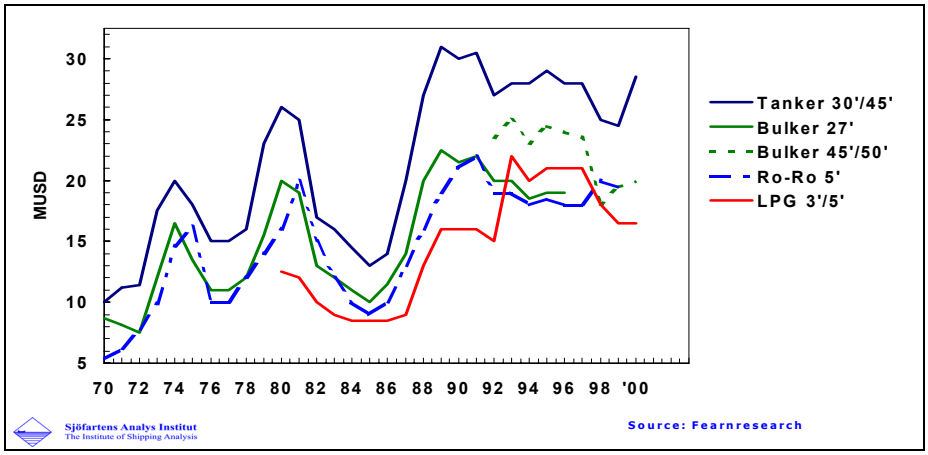


Figure 35: Newbuilding prices

The major difference compared to the period 1960-1990 is quite clear from the figure above. There is no inflation in the price development for new

ship capacity. We do not expect any inflation for at least the next 10 years, so prices will continue to fall marginally over the next 10-year period for identical ships. However, major fluctuation will occur due to the business cycle and bad timing in contracting as usual. The picture below summarises our view on price and charter development.

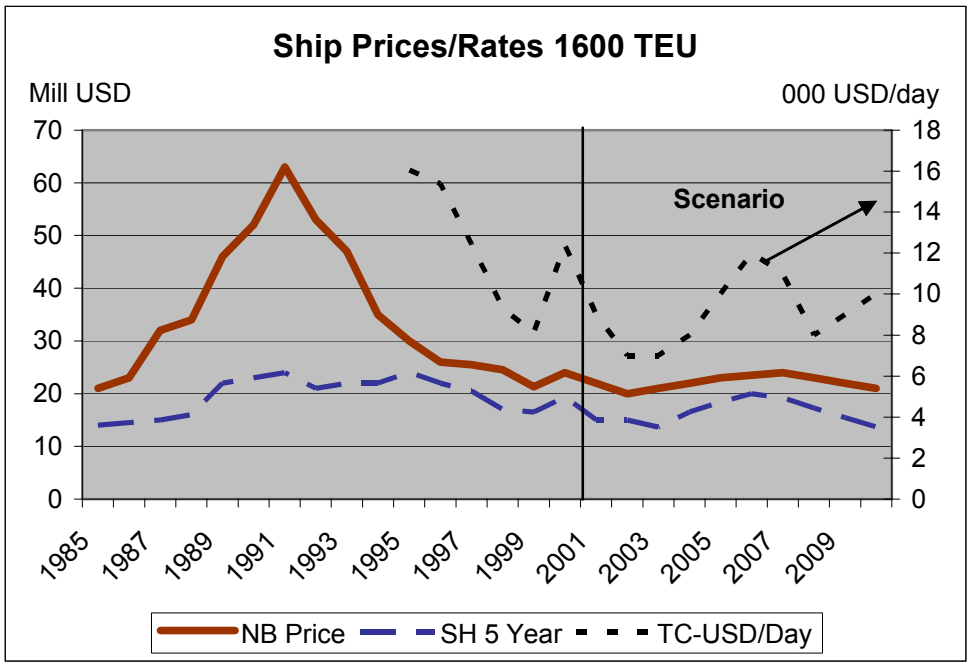


Figure 36: Ship price and charter rate development

4.4 Evaluation of the business strategies

The strategies below can be implemented in various ways on the container transport market and market segments:

- Low cost. By using economies of scale and other means to achieve the lowest cost per unit.
- Differentiation. Market or product. e.g. far reaching development according to customer needs. Also building barriers against outside competition by customer integration or alliances.
- Adaptation, timing. To sell, buy or make other efforts to follow market cycles and changes of trends in the markets.
- Combinations of the above strategies

Economies of scale in all parts of the chain and in all market segments i.e. low cost, high frequency, timing and easy access for the shipper to the services and information are the major criteria for future success i.e. a

general conclusion is that the capability to implement a combination of the above strategies will determine the individual actors' competitiveness.

The container transport market could be divided into the following major markets where the importance of the various business strategies differs.

- Logistic service including management that requires a considerable customer orientation and a highly differentiated service. Managing a network with a mix of own resources, hired capacities and pure network resources. The customer is the purchaser of a complete logistic service/transport.
- Shipping transport service, providing slot capacities and/or operation, which requires low cost, efficient operation and timing of investments. The customer could be the producer or the customer directly, but normally the logistic service provider constitutes the customer.
- Terminal service requires a customer orientation and a highly differentiated service but also providing terminal capacities at lowest cost including efficient operation.

4.5 Conclusions

The strong growth of the use of containers has made it possible to take increasing advantage of the system's economies of scale. Above all, the share of cost of the sea leg of the door-to-door transport has decreased substantially. There are still considerable economies of scale to be exploited by using larger ships, but in our view the potential has been halved. Technically there are no great challenges concerning the ships.

The demand for innovations is in communication, market, general organisation and technology in terminal and land systems.

Focus will therefore be on the terminal and transport from the terminal to the customer/producer.

It does not matter if your business provides a worldwide, specialised niche operation, geographically, functionally or cargo wise. Scale of operation and control of capacity supply is crucial for all parts of the liner business. It is crucial to define correctly what business you are part of, because that determines how to measure the scale of your operation.

As the volume of container shipments becomes larger and more diversified geographically and cargo wise there will be more opportunities for specialised niche operations.

But specialised niche and mega operators will find the conference way more or less closed and what is left are mergers and take-overs because it seems to be the only way of getting larger if anti-trust immunity becomes fully lifted.

Conferences may be replaced by discussion agreements although at this stage, as already mentioned the European Commission does not allow these.

Other forms of co-operation and specialisation of services will, however emerge such as “E-Shipping”

Container shipping lines and terminal operators have continued upgrading their web-sites and portals, regularly adding new products (from status information and tracking and trading to encrypted negotiable electronic Bills of Lading). Carrier groupings (this time not only the traditional alliances) are putting much emphasis on further developing their joint competing portals CargoSmart, GT Nexus and INTTRA through which shippers can communicate with the member lines and forwarders in one electronic common format.

The crucial resource for a full mega logistics provider servicing a huge amount of customers is a regular and high quality access to the shippers and to specialised transport services. Such an operator is managing a logistic net providing Logistic Chain Management. Most of the hardware, transport capacities (land-sea-air) and operations could be hired or taken in on time charter arrangements.

The market structure is thus becoming more complex than ever due to its characteristics as a net of services that could be combined to economies of scale in each individual order handled by the system.

The slowdown of the economic growth in 2001 and 2002 and the corresponding reduction of the growth rate in seaborne container trade in combination with an upturn in the supply of slot capacity sent the container market into a recession. It will take at least two years and an upturn in the economic growth for the market to recover. The German beneficial tax system has once again stimulated the investors to order too many container ships in the short term.

Scrapping will increase and ordering of new tonnage will drop during 2002 and 2003 and deliveries will be reduced 2004-2006, while demand can be expected to start to increase again during this period.

The turnaround of the market can be fast due to the relatively high growth rates in the demand for container shipment, which could be expected during an upturn in the economy and a similar slowdown in the growth of capacity.

If the prevailing situation was foreseen and acted up on accordingly the next two years is a good time for investment in container shipping

The large number of operators on the market and the reduced influence of price collaboration in conferences makes it unlikely that the operators and charterers on the market can match the changes in demand by a

corresponding adjustment of the capacity by adapting ordering of new capacity in time or by short-term reduction of existing capacity.

The average fall in the long term TEU-freight rate is due to the use of larger vessels, increased co-operation, alliances etc as well as rationalisation in the other parts of the logistic chain. We expect this rationalisation to continue in the future although at a somewhat slower pace.

The average time charter rate for 2000-2010 is expected to fall by 2 % per year. A total sea leg representing 20-25 % of the total cost for a door-to-door shipment of containers means a contribution of approximately of 0.5 % per year of rationalisation in the total logistic cost.

The main question is whether the actors in the terminal and land based part of the chain can achieve a productivity growth sufficient to improve the overall productivity and thereby contribute to a further drop in world logistics cost/unit.

References

Commission of the European Communities, 1992, *Green paper on the impact of transport on the environment. A Community strategy for "sustainable mobility"*

Commission of the European Communities, 1992, *Communication from the Commission concerning the future development of the common transport policy. A global approach to the construction of a Community framework for sustainable mobility*

Commission of the European Communities**,** 1994**,** *Trans-European Networks,* Office for Official Publications of the European Communities

Commission of the European Communities, 1993, *Transport in the 1990s,* Office for Official Publications of the European Communities

Commission of the European Communities, 1993, *The future development of the common transport policy. A global approach to the construction of a Community framework for sustainable mobility*, Bulletin Supplement 3/93

Commission of the European Communities, 1995, Communication from the Commission, *The development of short sea shipping in Europe: Prospects and challenges*

Commission of the European Communities, 1997, Communication from the Commission, guidelines for state aid

Commission of the European Communities , Council Directive 95/64/CE of 8 December 1995 on statistics relating to the carriage of goods and passengers by sea

Commission of the European Communities, White Paper "Fair Payment for Infrastructure Use: A phased approach to a common transport infrastructure charging framework in the European Union", COM (1998) 466 final

Clarkson Research Studies, *Container Intelligence Monthly, various issues*.

Clarkson Research Studies, *Shipping Review and Outlook, autumn 2001*

Containerisation International, *Containerisation Yearbook, various issues*

Drewry, *Container Market Outlook, October 1999*.

Drewry, *Global Container Markets, Prospects and Profitability in a High Growth Era, 1996*.

Drewry, *Annual Container Market Review and Forecast, September 2001*

Enright, M.J. (1998), *Regional clusters and firm strategy*, In: Chandler, A.D. - P. Hagström -Ö.Sölvell (eds), *The Dynamic Firm. The role of*

technology, strategy, organization and regions, Oxford: Oxford University Press.

European Community Shipowners' Associations, 1997*, State aid guidelines on maritime transport*

ESPO, European Sea Ports Organisation, 1994*, Miljöpolicy - med rekommendationer till miljöåtgärder*, (Brussels)

Federal Marine Commission, *The Ocean Shipping Reform Act,* June 2000

Harlaftis, G., *A History of Greek-Owned Shipping*

Swedish Ministry of Finance, Ds 1999:47, *Att reda sig själv – en ESO-rapport om rederier och subventioner, Lars Hultkrantz,* ESO (Group of experts for studies in public sector economics)

Jonsson, O. - A. Malmberg - L.O. Olander (1996), *Geografisk närhet och konkurrenskraft,* Stockholm: Ministry of Industry and Employment, report no. 2.

Krugman, P. (1994) *Development, Geography and Economic Theory,* Cambridge MA: MIT Press.

Lundquist, K-J (1996), *Företag, regioner och internationell konkurrens: Om regionala resursers betydelse,* Meddelande från Lunds Universitets Geografiska Institutioner, nr 129.Lund: Lund University Press.

Marshall, A. (1890), *Principles of Economics,* London: Macmillan.

Maskell, P. - H.Eskelinen - I. Hannibalsson - A. Malmberg - E. Vatne (1998), *Competitiveness, localised learning and regional development: Specialisation and prosperity in small open economies,* London: Routledge.

MDS Transmodal, *The European Container Freight Market; Containers By Sea, 1998*

Mitsui O.S.K. Lines, *Containerisation, Today and Tomorrow – for Sustaining Economic Growth, 2001*.

North, C.D., 1993, *Institutionerna, tillväxten och välståndet,* (Stockholm: SNS)

NTN (Nordiskt Transportpolitiskt Nätverk), Interreg IIC (www.ntn.dk): *Nordisk transport i framtiden. Krav till bærekraft og effektivitet*, (Delprojekt 5), Carsten Jahn Hansen, Karl G. Høyer, Emin Tengström *Flaskhalsar i ett transportsammanhang - och i ett Nordsjöperspektiv*, Delprojekt 6, Kenth Lumsden, Jennie Thalenius

Ocean Shipping Consultants, *Containerisation in North Europe to 2015,* July 2002

Porter E.M., *The Competitive Advantage of Nations,* 1998, London: The Macmillan Press

Saxenian, A. (1994), *Regional Advantage. Culture and competition in Silicon Valley and Route 128*, Cambridge MA: Harvard University Press.

Seaborne Commerce Asia, various issues.

The Institute of Shipping Analysis, (Göteborg)

Baltic Maritime Outlook 2000, December 1999
Containertransporterna och feedermarknaden, 1997
Den sjöfartstekniska utvecklingen inom RoRo-, Ropax-, färje- och containersjöfarten, 1996
Market reports, 1996-2002
North European shipping entrance fees and cost structure, 1996
Shipping a Theoretical Framework, 1997
Shipping Trade and Ports, 1996
The competitiveness of Swedish shipping companies, 1996, 1997
The European Ferry Markets, 1995
The Swedish Marine Industry, 1996

Swedish Maritime Administration, *Action programme for the Baltic Sea region*, 1999

SOU 1995:112, *Svensk sjöfart – Näring för framtiden*, Report of the Shipping Policy Committee

SOU 1997:171, *Den svenskflaggade handelsflottans konkurrenskraft,* Report no. 1 of the Committee on Shipping Structure and Capital Situation

SOU 1998:129, *Svensk sjöfartsnäring – hot och möjligheter*, Final report of the Committee on Shipping Structure and Capital Situation (SSK)

SOU 2000:8, Framtida godstransporter – transportköparnas krav på transportsystem, Report of the Goods Transport Delegation

Stopford M., 1993, *Maritime Economics*, (London: Routledge)

Thalenius J., 1990, *Cargo Carrier Flows and Utilisation*, Thesis for the degree of Licentiate of Philosophy, Chalmers University of Technology

Wergeland T. & Wijnolst N., 1996, S*hipping*

Wergeland T., Minsaas A., Omtvedt P.C., Sødal S., *Fremtidig utvikling i skipsfarten og skipsfartens markeder, SNF 24/00, Stiftelsen for samfunns- og næringslivsforskning,* 2000

Wijnolst N. et. al., *Malacca-Max Container Shipping Network Economy, Delft Marine Technology Series,* 2000

Wijnolst N. et. al., *Analysis of the containership charter market 1983-1992*, Delft University Press1993

World Commission on Environment and Development (WCED, *Our Common Future (Brundtland Report)*, 1987

Other sources:
Dynamar
Eurostat Statistics
FAO
FearnResearch
Federal Maritime Commission
Finnlines, home page
Hamburg Container Terminal Burchardkai, web
IMF
Lloyd´s Marine Intelligence Unit (LMIU)
Lloyd's Register - Fairplay Limited
OECD
Team Lines, home page
The Scandinavian Shipping Gazette
UN
Unifeeder Container Service, home page
WTO