



Prof. Dr. Berthold Volk

Standort/Place: Elsfleth

Fachbereich Seefahrt –
Department of Marine Studies

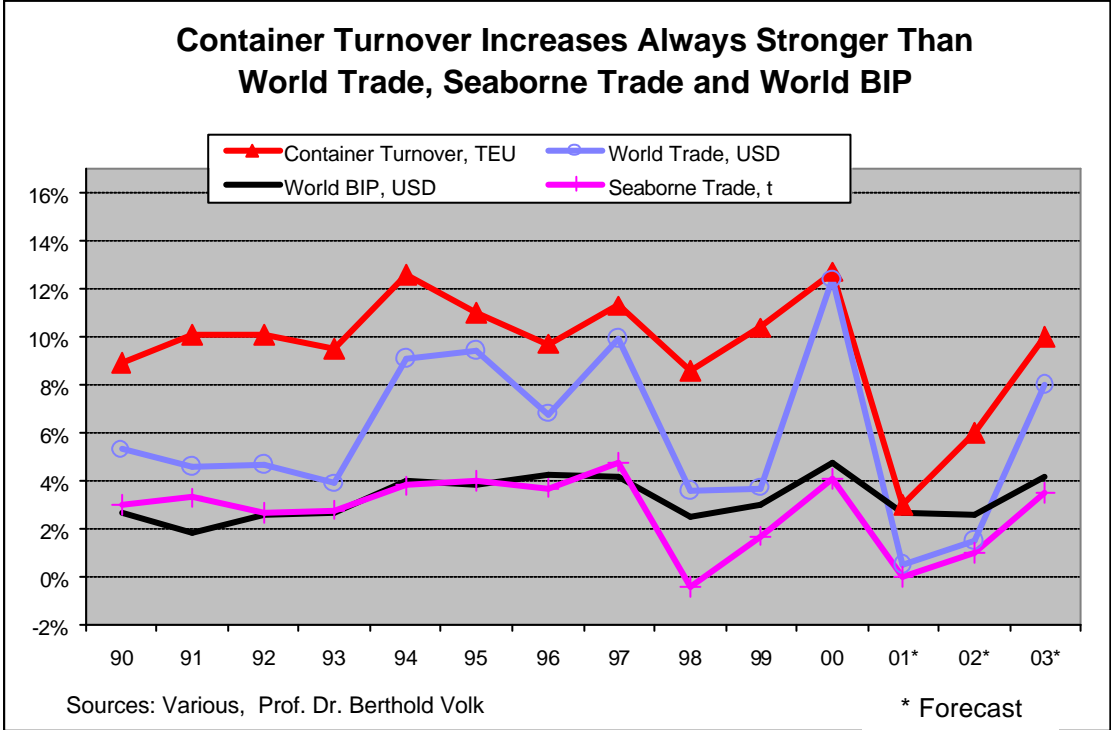
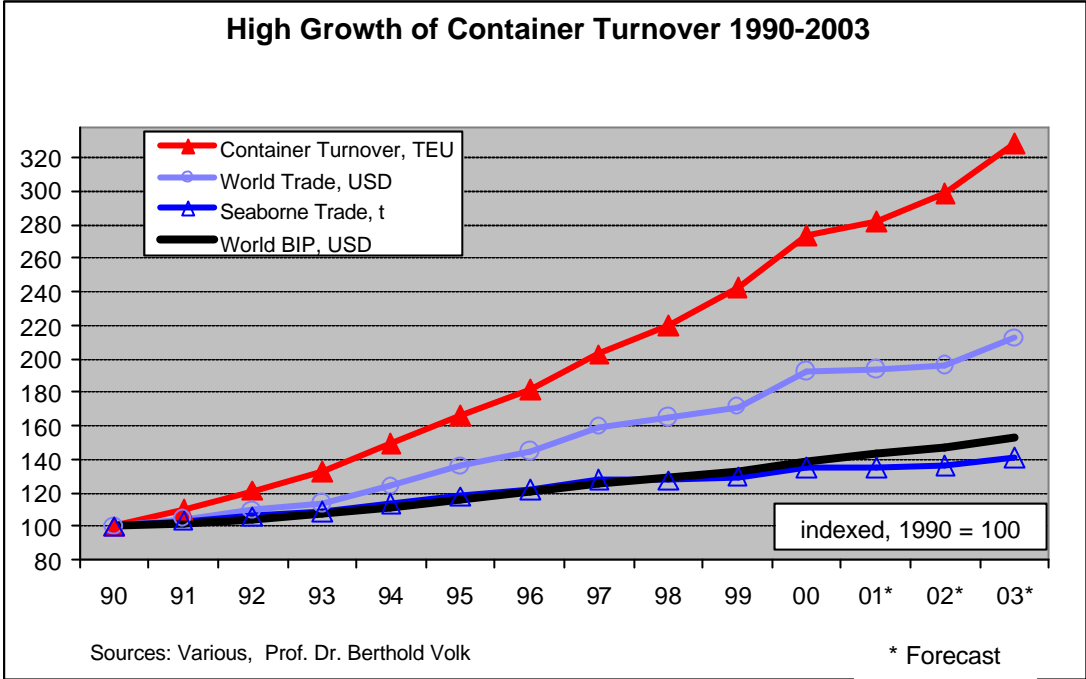
Growth Factors in Container Shipping

Introduction

The inauguration of the container some thirty five years ago brought about a significant structural change in international general cargo shipping which still is not completed. Container turnover figures of the ports of the world show exceptional high growth rates almost independent from the development of the world economy. During the seventies world container port turnover increased by an average of 22 % p.a., during the eighties by 9 % p.a. and during the nineties even again by 10.5 % p.a.

During the nineties market observers forecasted a slowing down of the growth rates due to the seemingly saturation of containerisation. However, yearly growth rates remained high and in some years even surpassed clearly the 10 % barrier. As is shown by the graphs below from 1995 the slowing down of growth rates finally seems to have started, however, the figure for 1998 must be seen in the context of the Asian crisis, a point to which a separate analysis will be made.

No other sector of shipping or of any land-based transportation sector has experienced such a phenomenal development. The reasons for the unparalleled success of the container trade are various and partly connected to each other.



Success Factor No. 1: Enormous Increase of Productivity

The starting point of containerisation has to be sought in the aftermath of the Suez crisis 1956. The closure of the Suez Canal brought about several shocks to shipping which can be sketched as follows (and which also serves as an example for the innovative power in a totally liberalised market as shipping always has been subject to):

- International shipping was forced to go substantially longer distances around the Cape of Good Hope. This had the effect of significantly increasing the transportation demand. The shipping markets experienced an explosion of freight rates.
- High income for shipping companies enabled them to invest. Lots of ships have been ordered.
- 1957 the Suez Canal was re-opened. The demand for ships fell back to pre-closure levels. However, the many ships ordered were delivered which caused an enormous oversupply.
- The final result of the Suez Canal closure was the most prolonged recession in shipping since World War II.

A freight rate level which over years does not cover the costs for ships forces the shipping companies to intensely look for potentials to reduce costs. The result in general cargo shipping was the introduction of several new ship types, among them the LASH carrier (Lighter aboard ship) and the containership in the sixties. For a number of years it was not clear which of both ship types would win the competition. Finally, the containership turned out to be successful. Today, the LASH carrier is a matter of history, irrespective of the fact that some of them still are trading. This is because the economical life of a ship may range up to thirty years, and LASH carriers built in the eighties are therefore still trading.

Using the container (the 20' or 40' box) implied the radical change from heterogeneous cargo to homogeneous cargo. Homogeneous cargo can be handled in the ports much easier. In the early days of containerisation it was calculated that the turnover cost in US ports per ton of cargo decreased from US\$ 5,85 to \$ 0,15. As to the total shipping leg of container transportation the productivity advantage is estimated to range between 4 and 8 times as against conventional general cargo shipping. With these productivity gains liner shipping companies who had invested into container ships were able to make profits even under the condition of depressed freight rates.

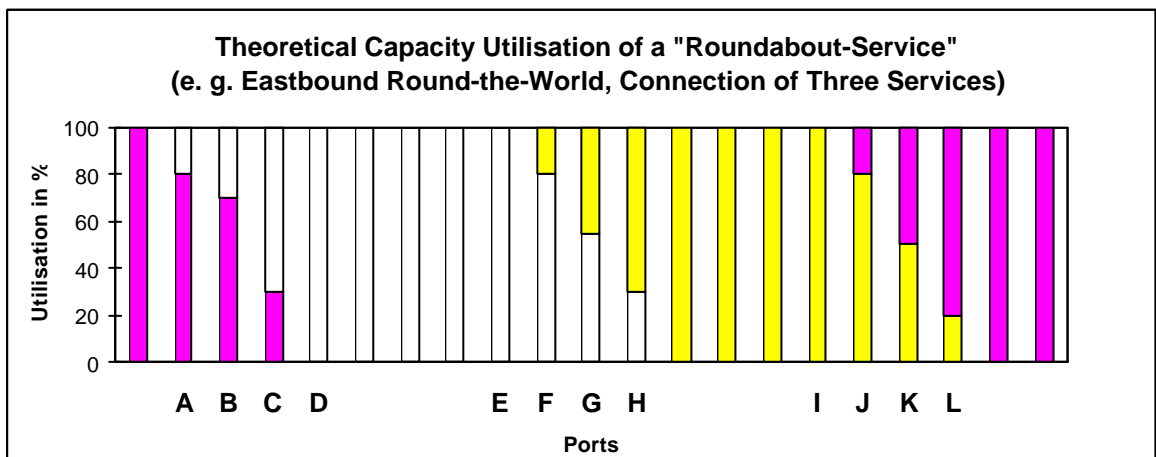
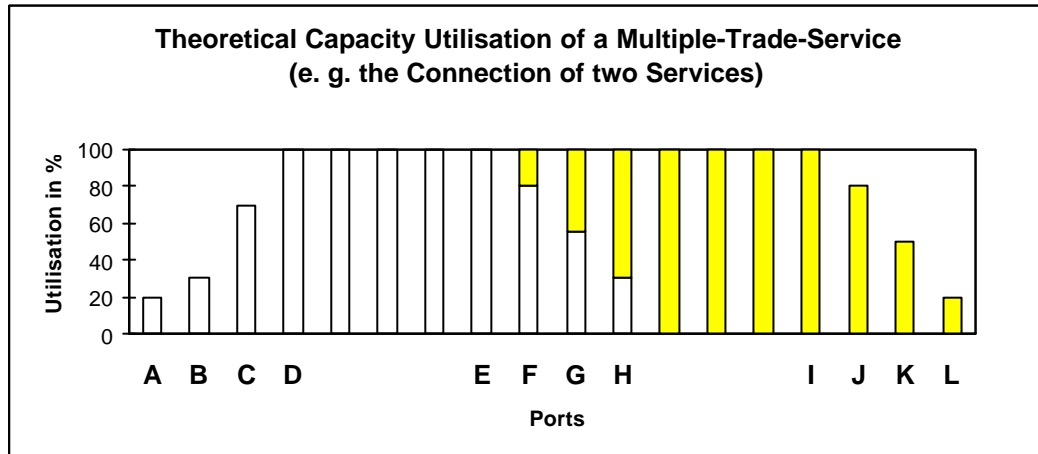
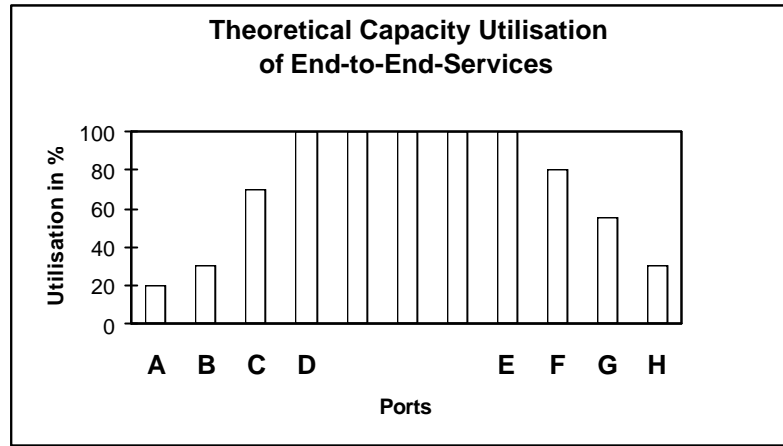
Gaining the benefits of containerisation, however, necessitates heavy investments in all parts of the transportation chain. These investments have taken place step by step and with different velocity in the various countries. The structural change in favour of the container still is under way in a number of countries such as in Latin America, Africa und Asia but also in higher developed areas such as in Baltic and Mediterranean countries. The container was and still is penetrating the general cargo market and for this reason growth rates have have

and still will continue to develop more than proportionate in comparison to the general cargo transportation market.

Success Factor No. 2: Structural Changes in Transportation

The high investments mentioned lead to a concentration within general cargo shipping in various aspects.

- **Ports.** Not every port was financially able to undertake the measures necessary for quays, cranes, van carriers and other equipment. A number of formerly important ports, such as San Francisco, Liverpool or Calcutta lost their significance.
 - **Hinterland connections.** The high volumes of cargo concentrated on fewer ports led to a concentration of traffic flows into the hinterland. E.g. the ports of Rotterdam and Antwerp could make use of the highly efficient inland ships on the river Rhine. Railways concentrated their investments onto few lines connecting main ports with the hinterland.
 - **Shipping Lines.** Also not every shipping line was able to invest into new and expensive ships and, in addition, into boxes. It is roughly calculated that for one US\$ investment into a ship another US\$ is needed for boxes.
 - **Port Calls.** In former days ships spent days and weeks in the many ports along a trade route. A round voyage between Northern Europe and the United States, for example, took 8 weeks. Today the round voyage is completed within four weeks only. The high capital involvement in ships and containers lead to an increase in ships' speed and in a reduction in the number of ports called. Ships earn money only when they move and not when they stay in a port. The new concept of offering several loops on given trade routes finally arrived.
 - **Ship Rotations and Feeder Shipping.** The reduction of port calls provoked the establishment of a new system to continuously serve all customers, also those formerly served directly via ports which have been deleted from the schedule. A world-wide system of new feeder connections emerged. The feeder ships operate intra-regionally and even inter-regionally substituting former direct deepsea connections.
 - **Combining deepsea trade routes.** Traditionally liner ships were employed between clearly defined areas of the world, e.g. from Northern Europe to the US East Coast or from East Asia to South Africa. In order to achieve a better utilisation of ships and/or to be able to employ bigger ships to reduce costs new transportation concepts came up. These are the pendulum concept and the round-the-world concept (multiple trade services, comp. the graphs below). Examples for pendulum trade routes are: NEur-USEC-USWC-FE or FE-S Afr-SAEC-SAWC. However, the round-the-world concept has proven some disadvantages, and it is not often used today.
-



Currently, no one of the main shipping lines in the Europe-Asia or Europe-America trades is calling at a port in the Baltic Sea. Cargo for Finland, Russia etc. is transhipped via Hamburg, Bremerhaven or Rotterdam, partly again via Gothenburg. Same is true for the the Irish Sea or the Bay of Bengal. One of the most important former trade routes, that was from Liverpool to Calcutta, is no longer directly served. Liverpool containers may be transhipped via Le Havre or Rotterdam, Calcutta containers via Colombo or Singapore.

Taking the example Liverpool-Calcutta via Rotterdam and Singapore. Instead of two box handlings in ports, one loading in Liverpool and one unloading in Calcutta, the boxes are handled sixfold: Loading in Liverpool, unloading and loading in Rotterdam, unloading and loading in Singapore and finally unloading in Calcutta. Introducing a feeder system meant a multiple turnover of containers which, by the way, was only acceptable to the shipping companies as to times and costs involved through the high productivity and comparably low costs of modern container ports.

The advantages of the feeder system were such that an estimated 20-25 % of all container handlings in the ports worldwide are feeder containers. It is estimated that the share of feeder containers of total containers handled in the port of Singapore, one of the world market leaders, amounts to some 80 %.

The feeder system served to push the port turnover figures in the past. Because some trade relations are still being newly containerised also in future the transshipment containers will lead to more than proportionate growth rates in container handling as against the general growth in transportation. However, the additional effects should not be estimated to be as large as in the past because there is an economical limit as to the share of feeder containers on given trade routes.

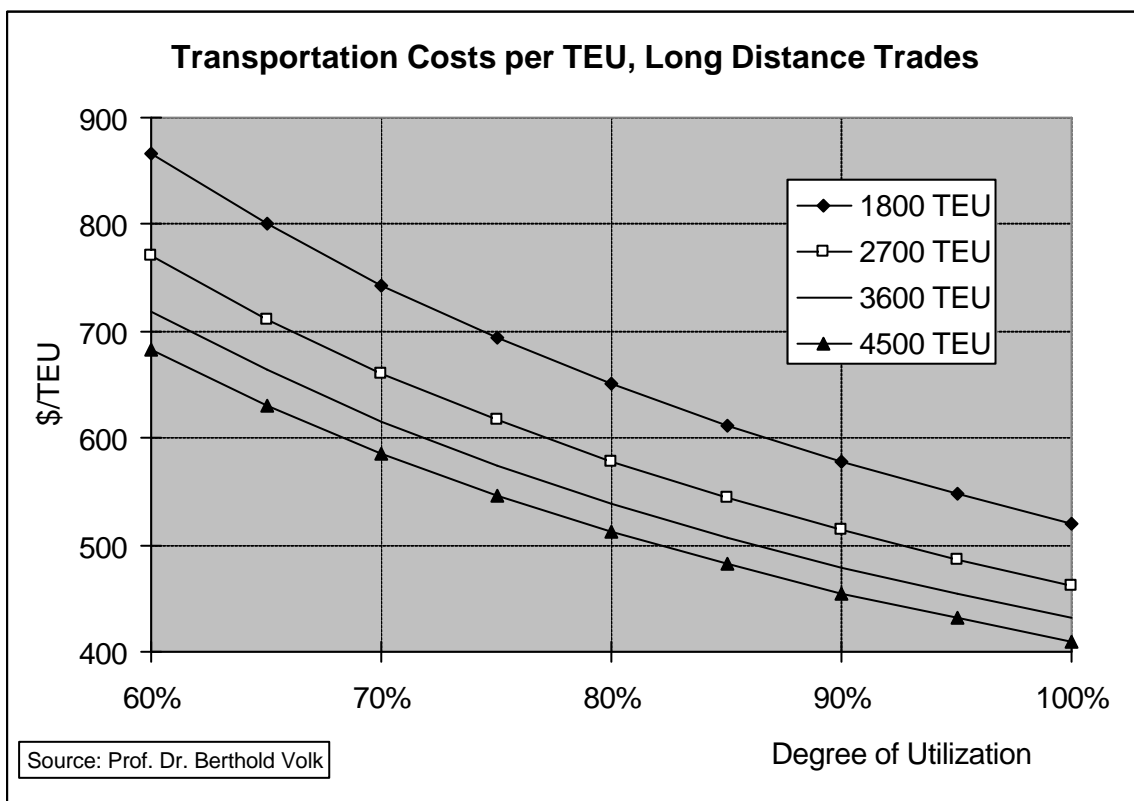
Another effect of the feeder system was to push also the transportation demand for ships. Substituting direct calls through feeder calls increases the seaborne transportation distances, in the example mentioned above (Liverpool-Calcutta) by 35 %.

Finally to mention is the effect of reduced transportation cost for certain trade relations which attracted additional cargo volumes to be intercontinentally exchanged. Due to limited cargo volumes, e. g. on the route between the Philippines and West Africa, no liner service has been established on this route in the past. Using the transshipment points of Singapore and Algeciras in Spain the cargo now is transported over a significant part of the total distance by the biggest containers ships available in the world which means that it profits from the high savings possible due to the economies of scale. As to the effects of the economies of scale please compare the following subchapter.

Success Factor No. 3: Increasing Trade Volumes Favouring Economies of Scale and Vice Versa

The high increases in container trade enabled the shipping companies to employ bigger ships. With bigger ships considerable economies of scale can be realised. As is shown by the graph below, which is based on long-distance trades, the transportation costs can be reduced by some 15-20 % if a 2700 TEU ship instead of a 1800 TEU ship is employed.

It is an immense advantage of seaborne transportation as against overland or airborne transportation that there exist nearly no physical or legislative limits as to the size of ships. For trucks, e. g., it would be impossible to increase in size because of the physical and legislative limitations of streets, bridges etc. Productivity gains as they were and still are possible in shipping are impossible for other transportation means. Limitations in shipping are, as a rule, only set by the economics.



If a shipping company decides to employ bigger ships, due to increased trade volumes and due to the fact that it wants to save on transportation costs or to increase profits (or to return to profits) it will not do in the way that each year the ships utilized will increase in size in line

with the increases in transportation volumes. This is impossible because a ship has an economical life time of some 25 years. Ordering a new ship from a shipyard presupposes to have an opinion as to the future cargo volumes available for the company. Shipping companies fear the situation that at given times they are not able to fully serve their customers which could lead to lose them. Therefore ships will be ordered with a capacity much higher than needed during the first years after delivery. Another group of shipowners aggressively tries to increase its market shares which lead them to order much bigger ships than would be justified by their cargo volumes attracted so far.

Experience in container shipping shows that enormous steps are made when new ships are ordered. Only a few years ago, most leading liner companies substituted their biggest ships of about 3000 TEU by units of 4500 TEU which signified an increase of capacity of more than 50 % for each of them within a period of only about one to two years. Just now (during 2001-2002), most big liner companies do the next step to go from about 4500 TEU to ships of about 6000-7500 TEU which is another increase of capacities by some 50 %, partly even more.

As can be seen from the graph above, however, it is not only size which lead to low transportation costs. A second condition must be met that is a high degree of utilization. A ship of 2700 TEU with a 70 % utilization (= 1890 TEU) causes still slightly higher transportation costs per TEU than a 1800 TEU ship with 80 % utilization (= 1440 TEU). Taking the advantages of the bigger ships requires the additional acquisition of several hundreds of containers. This only is achievable if market shares can be won. Because other shipping companies act in similar ways, the container shipping market has often been and is again currently flooded by new ships with high capacities which lead to cut-throat competition among liner shipping companies. This was and still is to the very advantage of the shippers which reap the benefits of continuously decreasing freight rates. It is said today that the part of shipping costs of end user prices of consumer goods from the Far East in Europe is 1-2 % only. Twenty years ago it were some 10 %. In the nineties, it became cheaper to transport certain consumer goods from Far East Asia to Hamburg than from Munich to Hamburg. An actual example reported last year in Containerisation International (Jan 01, p. 46) was the transportation of scotch whisky from UK to Japan. One box can load 15.500 bottles and the price for shipping of the container was US\$ 675 only. That workes out at four US cents per bottle!

Continuously decreasing transportation costs made more and more goods intercontinentally competitive. Container shipping has stimulated world trade growth which in turn stimulates container shipping. Today not only general cargoes are containerised but also break bulk cargo such as salt from Australia to the Northern Hemisphere or even minor amounts of bulk cargoes. Because of the overwhelming advantage of container shipping - apart from price also its reliability, speed, and big geographical coverage - industrial and agricultural companies change their production methods to be able to use the container for export. Please compare the charts on Japanese square melones (!) and New Zealand timber.

Because the average ship size of the world container fleet is still increasing, the average transportation costs of containers at sea will continue to decrease which is another argument for more than proportionate growth of container trade.

Success Factor No. 4: Growth Acceleration Through Deregulation and Liberalisation

In the nineties, most countries followed a policy of deregulation and liberalisation which helped to accelerate world trade growth. This particularly was true for a number of Asian and Latin American countries. It is self-understanding that container trade experienced an additional stimulus. The renewed increase in average growth rates of container port turnover figures in the nineties must be seen in this context. In the current decade container shipping will profit from the Chinese decision to enter the WTO which will result in Chinese import duties to be reduced significantly.

Taking all arguments from the foregoing it becomes clear that container shipping will continue to show growth rates considerably above those of other transportation means. The last graph shows the forecast of British Ocean Shipping Consultants for the container port turnover until 2015 in a conservative (II) and optimistic (I) scenario. For all regions high growth rates are forecasted. Highest growth is anticipated for South East Asian, Near East and South Asian as well as Latin American countries.

Japanese Square Melones Being Prepared for Transport to the USA



Japanische Bauern verpacken quadratische Melonen für den Schiffstransport in die USA

FOTO: AP/KYODO

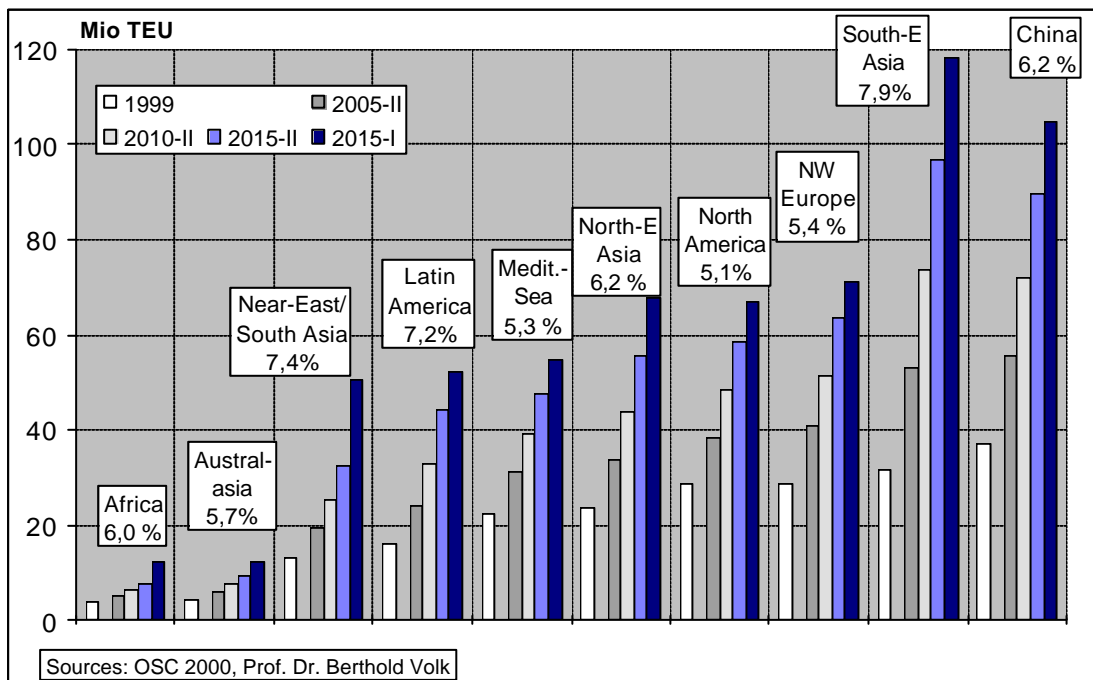
Source: Die Welt, June 15, 2001

Special Container for the Transport of Timber



Source: Schiff & Hafen, 10/2001, p. 10

Forecast of Container Turnover acc. to Regions Until 2015



Launceston, April 15, 2002