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Executive Summary

Study objective

This study is based on the application of the Integrated Transportation Planning Models (ITPM) developed by the Transport, Communications and Tourism Division of ESCAP and maintained by the Korean Maritime Institute. Its objective is to provide a planning context for decisions facing governments, shipping lines and port authorities in the ESCAP region. This is achieved by providing detailed, quantified and internally consistent structure forecasts of the maritime container transport system serving the ESCAP region through to the year 2015.

Study application for ESCAP

Development of the ITPM models was initially undertaken by ESCAP for the purpose of forecasting container volumes for its member nations. However the flexible nature of the ITPM allows portability in its application, lending itself well to this application for ESCAP. Focus in the analysis of output within this report has shifted from ESCAP nations, to those countries of the Land-lock countries and more specifically those that are member economies of ESCAP.

While this application of the ITPM focuses on the outcomes for ESCAP member economies, the model output considers all nations, producing a whole world scenario. Consequently, the forecasts of developments in ESCAP member countries are consistent with, and a component of, a coherent view of the major changes and/or trends that will characterise world liner shipping to 2015.

Economic assumptions

Although the world economy has displayed considerable resilience after the 1997 Asian currency crisis and the dot-com crash of the early 2000s, predicted growth rates for the coming decade are not expected to match those of the recent past. The underlying assumption is that average short term growth rates will remain similar to that of the recent past, while in the medium term an average growth rate similar to that of the last 30 years is assumed.

This may be interpreted as hypothesizing that long-term growth will continue along a path similar to that of the past. While there will be good and bad years within the forecast period, there is no indication of a major, prolonged economic slowdown on the scale of that of the early 1990s.

The global economy grew by 5.4 percent in 2006, up from a real GDP growth rate of 4.7 percent in 2005. Growth in 2006 was essentially driven by the strong performance of China and India, with real GDP growth rates of 10.7 percent and 9.2 respectively. Other significant GDP growth of ESCAP region economies were observed in Viet Nam (8.2%); Singapore (7.9%); Hong Kong, China (6.8%); and Russia (6.7%). China's intention to lower demand in its "overheated" sectors, and the continued impact of high oil prices, may cause some slowing of Asian growth in the near future.

Vessel Size

It has become increasingly clear that there are no insurmountable technical barriers to further increases in the size of container vessels, as observed in designs developed for vessels up to 18,000 TEU. The limits to this growth, if there are any, will be market-determined. However, there is a significant divergence of views amongst analysts as to how large containerships will become, and how rapid this increase in size will be. As a result, the issue of container ship size is one of the most topical

discussions in container shipping.

Some analysts have taken the view that the search for economies of scale is relentless, as vessels of greater than 11,000 TEU, such as the Emma Maersk, are entering into service[1]. In this view, the move to increasingly larger ships is driven by the inexorable search for economies of scale. It is believed that this trend will continue, and if anything accelerate. The need to maximize utilization of these vessels will in turn drive the radical reduction in number of port calls on major routes, and pushes for the development of global megaports served by fully integrated global networks.

The opposing view is that the gains from each increment in size grow smaller as vessels grow larger. In this view, the industry has already reached or surpassed the point at which additional feedering and inventory costs outweigh the further savings in slot costs to main line vessels. However, vessel size will continue to increase, albeit at a slower rate as lines try to balance slot cost reduction from larger vessels, with the cost and marketing advantages from maintaining a wide network of direct port calls. Other pressures, notably environment opposition, and resistance to continued concentration of operators on land transport systems will also influence limitations to ship size growth.

Container trade

The compound annual growth rate for global container trade volumes from 2005 to 2015 is estimated to be 7.6 percent, compared to 9.5 percent per annum during 1987~2006.

The share of ESCAP member economies in world container exports is expected to rise from 57 percent to 68 percent by 2015, mainly as a result of the increase expected in East Asia. Similarly, world market share of imports for ESCAP nations is expected to increase from 47 percent in 2005

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1) Officially, the Emma Maersk has a stated capacity of 11,000 TEU. In calculation, the capacity is greater ─ 14,300 TEU (AXS-Alphaliner 2006).

to 56 percent in 2015. East Asia's share of ESCAP container exports is expected to grow from 58 percent in 2005 to 69 percent by 2015, while imports will grow from 46 percent to 55 percent.

China's growth has been far in excess of the world average, registering growth of over 20 percent per annum over the last five years. This is expected to slow, but growth will remain very strong, and an expected compound annual growth in container trade through to 2015 of 13.6 percent is forecast.

Container traffic to and from ASEAN nations is expected to grow strongly, with an increase of approximately 7.2 percent per annum to 2015. Intra-Asian trade enjoyed spectacular growth in the decade prior to the 1997 currency crisis, with an average growth of 10 percent per annum for a decade. Intra-Asian trade will continue to outperform global container growth by some percentage points, recording an average of 10.4 percent per annum over the forecast period

Among the three major East-West trades (namely, Asia-North America, Asia-Europe, and North America-Europe), it is expected that Asia-Europe trade will show the strongest growth (8.4 percent annually) during the forecast period. The prospects for the growth of trans-Pacific trade seem somewhat lower, growing at an average rate of 6.8 percent per annum until 2015 to an export volume of 35.3 million TEU.

Since the Asian crisis the trans-Pacific and Asia-Europe trade growths have been very unbalanced, with strong growth in the Asian export trade coinciding with a slump in the Asian import volumes. As this imbalance of container flows is expected to continue, repositioning of empty containers will remain a major concern for carriers, in particular those operating on the trans-Pacific trade route. North-South and South-South trade over the forecast period is also expected to grow at 7.3 percent annually, reaching 36.3 million TEU in 2015. Of the North-South trade routes, strong growth will be observed in Asia-South America and Asia-Central America with expected annual growth in excess of 11

percent. However, growth in trade between North America and those nations in Central and South America is expected to be modest in comparison.

Container port throughputs

The total volume of international containers handled in the ports of ESCAP countries will increase from 159 million TEU in 2002 to 456 million TEU in 2015, at a compound annual growth rate of 8.5 percent. The most obvious feature is the increase in Asia's share of total port throughput, accounting for 81 percent of total container throughput of the Asia and Pacific in 2015.

Study estimates indicate that the total volume of containers transshipped will reach 173 million TEU by 2015. The share of transshipment in total port volume is expected to rise slightly from around 25.2 percent to 25.5 percent by 2015. Much of this growth will be in ESCAP, where transshipment volume will increase from an estimated 41.0 million TEU in 2002 to 110.0 million TEU in 2015.

In the Asia-Europe route, ports of Singapore, Hong Kong, Port Klangand Tanjung Pelepas are expected to continue their dominance on transshipment business. In the trans-Pacific route, the ports of Hong Kong, Kaohsiung, Shanghai and Busan will be the principal points of transshipment. In intra-Asian trade, Singapore will dominate transshipment, while transshipment at the intersection of east-west and north-south trade on the Pacific side of the Panama Canal, is expected to flourish.

In order to handle the anticipated port container traffic in 2015, it is estimated that 753 new container berths will be required world-wide, of which 400 will be required for East-Asia including China. To meet this level of forecast demand, it is estimated that a capital investment in the order of US $46 billion (including only the cost of developing the terminals) will be required by ESCAP nations. Substantial additional

investment will also be required to secure adequate access to the terminals by road, rail and inland waterways, which will be essential for the effective distribution of containers to expanded port hinterlands. The additional costs of dredging, the provision of breakwaters and the establishment of land transport links and intermodal interchanges could easily double this total.

Chapter Ⅰ. Introduction

1. Objective and Scope

The objective of this study is to provide a planning context for decisions facing governments, shipping lines and port authorities in the ESCAP region. It does this by providing detailed, quantified and internally consistent forecasts of the structure of maritime container transport servicing countries of the ESCAP region through to the year 2015. These forecasts cover three broad areas: the volume and direction of container flows, the shape of the shipping network, and the port facilities required to service the trade.

2.The ITPM Suite

This study is based on the application of the Integrated Transportation Planning Models (ITPM) developed by the Transport, Communications and Tourism Division of ESCAP and maintained by the Korean Maritime Institute. The ITPM suite was consciously developed with an open architecture that encourages user intervention at all stages of the modelling process.

In developing the models, ESCAP adopted the philosophy that the international trade and shipping system was too complex, both institutionally and operationally, to be reduced to a set of deterministic mathematical relationships. The fundamental strategy, however, is to allow the modeller to input as much information as can be reliably obtained from external sources, and present these to the models in the

form of a hypothesis. Using these conditions as constraints, the mathematical relationships embodied in the models are used to fill in the gaps, ensure internal consistency, and provide feedback on the credibility of the modeller's initial hypothesis, suggesting directions in which it should be revised.[2]

This approach means that producing forecasts is time-consuming, and demands both a high level of modelling expertise and industry knowledge on the part of the modeller. Additionally, it also allows for the introduction of numerous considerations that are not conducive to mathematical formulation, and hence produce forecasts that are genuinely realizable future outcomes, rather than idealized abstractions.

Two modules of the ITPM suite were applied in this study:

- The Trade module: used to produce forecasts of containerized cargo on a region to region basis, and to partition these trade flows into port-to-port cargo movements;

- The Transport Network Module: used to heuristically design a shipping network capable of accommodating those cargo flows, and add access routes and intermodal routes which should be link together to assign the cargo to the network, and to estimate the total costs of different transport mode system configurations, and estimate the number of additional infrastructure including container berths required to meet expected demand.

The full suite of models has been validated in previous studies:

- Prospects for container shipping and port development for ASAEN Subregion (1992), South Asia Subregion (1993), East Asia Subregion (1994) and intraregional study (1997); and

- Regional Shipping and Port Development Strategies under a Changing Maritime Environment (2001).

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2) For detailed explanation on the various model components, the reader is referred to the ITPM User Manuals available from Transport, Communications and Tourism Division, ESCAP.

3. Report Structure and Contents

The forecasts produced by the models are very detailed, and as a result, this report cannot attempt to comprehensively present the forecasts. Rather, it presents the salient features of the forecast in a readily interpretable form.

This Chapter (Chapter 1) provides an introduction to the report. Chapter 2 discusses some of the major changes that have occurred in the container shipping and port environment over the last decades. Chapter 3 discusses the economic growth assumptions that underpin the forecasts, and the impact of these on expected container volumes. Chapter 4 is dealt to discussion of the intermodal system of land-lock countries. Chapter 5 is devoted to discussion of the model's forecasts on structural changes in trade patterns. Chapter 6 examines the implications of changes in trade for the volume of containers that will need to be handled in the container facilities of the ESCAP region. Finally, the report concludes with estimates of container facilities required to meet projected container handling demand, and the associate investment implications in Chapter 7.

Chapter Ⅱ. Changes in International Container Shipping and Port Environment

1. Changes in International Container Trade

1) Increasing role of international trade

To comprehend the changes that have occurred within liner shipping and ports over the previous two decades, it is necessary to understand the context in which these changes have taken place. The core factor has been an increased acceptance of international trade as the primary engine of economic growth and development. This has been an ideological shift, as many economies including the Asian giants of India and China have in the past pursued development strategies that have emphasized self-sufficiency and import substitution. Recently however, there has been a growing consensus that success will be achieved through global economic integration.

As a result of this globalization trend, world trade volume has continued to grow with the gradual removal of trade barriers under the World Trade Organization (WTO), and through regional trade agreements (RTA). From 1950 through to 1990, the relationship between economic growth and growth in the value of international trade remained almost constant.

⟨Figure 2-1⟩   **Relationship between world trade growth and world
economic growth over the post-war period**

Trade Growth to World Growth Ratio
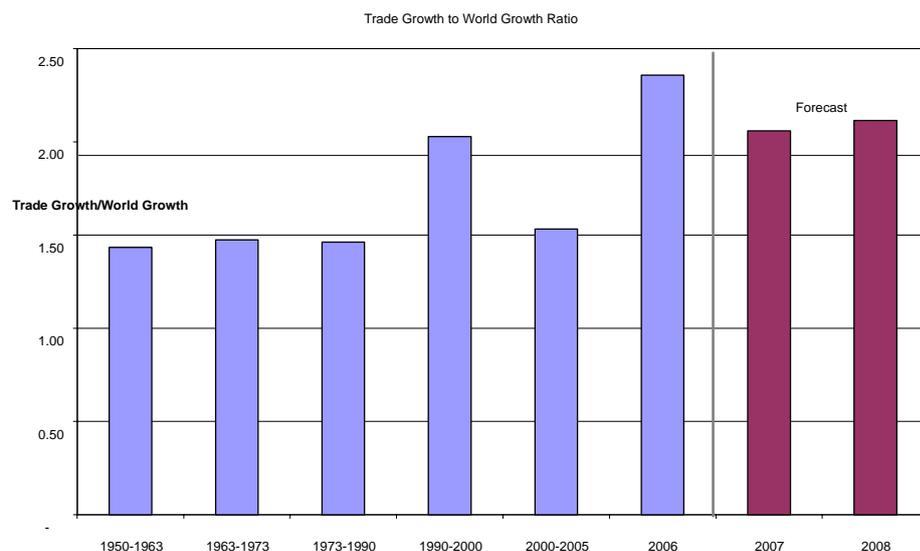
Source : IMF 2007, 2006, 2004, 2003, 2002, 2001.

    As shown in ⟨Figure 2-1⟩, the value of trade during this period grew
at approximately 1.5 times that of the world economy. However, from 1990
to 1998 there was a significant upward shift, as the value of trade grew
at a rate of over twice that of the world economy. In the following period
from 2000 to 2005, the ratio returned to that of the previous 40 years,
suggesting a moderation of the effect on the globalization on trade
growth. However, 2006 saw strong growth in world trade, rising by
approximately 8% ― in excess of twice the rate of global economic growth
in the same year. IMF forecasts for 2007 and 2008 indicate that strong
growth in world trade will continue, with the ratio of trade growth to
economic growth remaining over two in both of these years.

    Although world trade has, on average, grown more strongly than the
global economy, trade growth has also been more volatile. ⟨Table 2-1⟩
shows that, during the period 1998 to 2006, annual growth reached a high

of 10.4% in 2000, but this exceptional performance was followed immediately by negative growth of in 2001. Differences between regions in the rate of trade growth are also both high and variable.

〈Table 2-1〉 **Growth of world merchandise exports by selected region**

	1998	1999	2000	2001	2002	2003	2004	2005	2006
World	4.7	4.7	10.4	−0.6	3.4	4.8	9.5	6.0	8.0
North America	4.6	6.9	9.6	−5.0	−2.7	1.1	8.0	6.0	8.5
South and Central America	9.0	−0.4	4.4	5.0	1.9	6.0	13.0	8.5	2.0
Europe	5.5	3.3	9.3	2.4	1.9	1.8	7.0	3.5	7.5
Commonwealth of Independent States	0.9	−8.8	11.8	4.5	8.7	12.8	13.0	4.5	3.0
Asia	3.8	7.3	14.2	−3.4	11.2	11.4	14.5	10.0	13.5

Source : WTO 2007.

2) Growth of container trades

During the 1980s, a large portion of growth in the container trade, recorded at an annual average rate of 7.8 percent, could be attributed to an increase in the container penetration rate. In this period, much of the cargo that previously travelled in loose form was converted to containers; at the same time ports developed infrastructure, and acquired handling equipment to cater for the increasing number (and growing size) of container vessels. However, international container trade has continued to increase at a rate far exceeding that of maritime trade as a whole long after this effect has begun to wane.

〈Figure 2-2〉 shows worldwide growth in maritime and container trade volumes over the period 1987 through to 2006. Total international maritime trade volumes grew at an average of 4.1 percent per annum over the period, with the result that by 2006 total seaborne trade was at almost

double 1990 volumes. Containerized cargoes by contrast have grown at an annual average rate of 9.5 percent over that same period, resulting in a five-fold increase in container movements.

〈Figure 2-2〉 **Growth of world maritime trade (1987-2006) (Index: 1987 =100)**
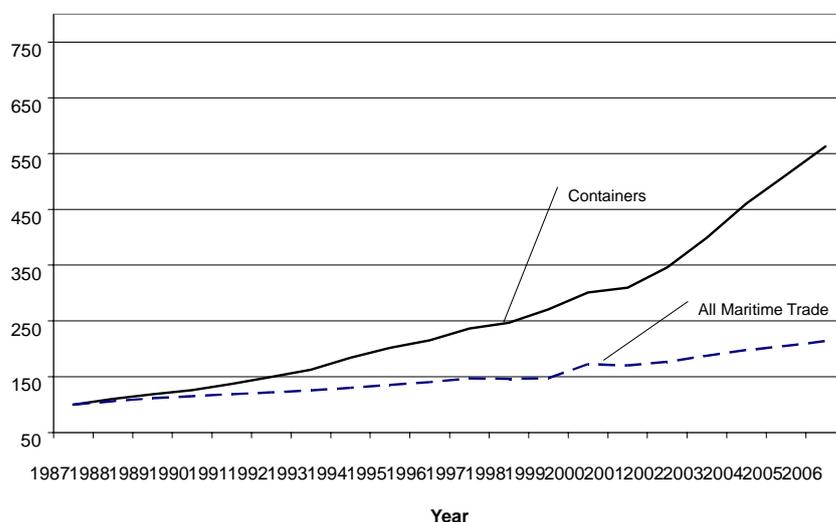
Source : Drewry Shipping Consultants; Fearnleys; UNCTAD 2007.

Growth over the past few years has been exceptionally strong. 〈Figure 2-3〉 shows that the average rate of growth in the number of containers handled in the world's ports exceeded 10% over 2000-2005 period, with growth in 2006 again reaching double-digit levels. Recent estimates by Drewry Shipping consultants are that ccontainer trade growth in 2007 has again been strong, with world container traffic expected to reach 142.9 million TEU[3].

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3) This is the number of full containers shipped, not the number of handling movements in port. Drewry Shipping Consultants 2007, *Annual Container Market Review and Forecasts 2007/8.*

The period between 2004 and 2005 was a strong one for the liner shipping operators, with container volume in excess of ship capacity for the majority of the period. However, traditional winter lows, and a surge in capacity with the delivery of the large vessel ordered at the height of the boom, initiated a reduction in rates towards the end of 2005. This reduction in freight rates had a serious impact on the financial performance of ocean shipping companies, where almost all posted weaker profits for the last half of 2006, with some reporting losses.

To accommodate the drop in container rates, liner companies in late 2006 began to reduce capacity by removing strings on several trade lanes and/or slowing their vessels to absorb excess tonnage. This response by shipping lines was an effort to minimise the cost impact from the massive capital investment in super post-Panamax vessels. However, the low freight rates experienced in 2006 have persisted in the face of strong growth in volumes in 2007. Efforts at rate restoration appear to have had little effect on rates; attempts to balance supply/demand on the trans-Pacific route in the second quarter of 2007 produced little movement in freight rates.

〈Figure 2-3〉　　**World Container Trade Growth (1980-2006)**

World Container Growth

Source : UNCTAD 2007.
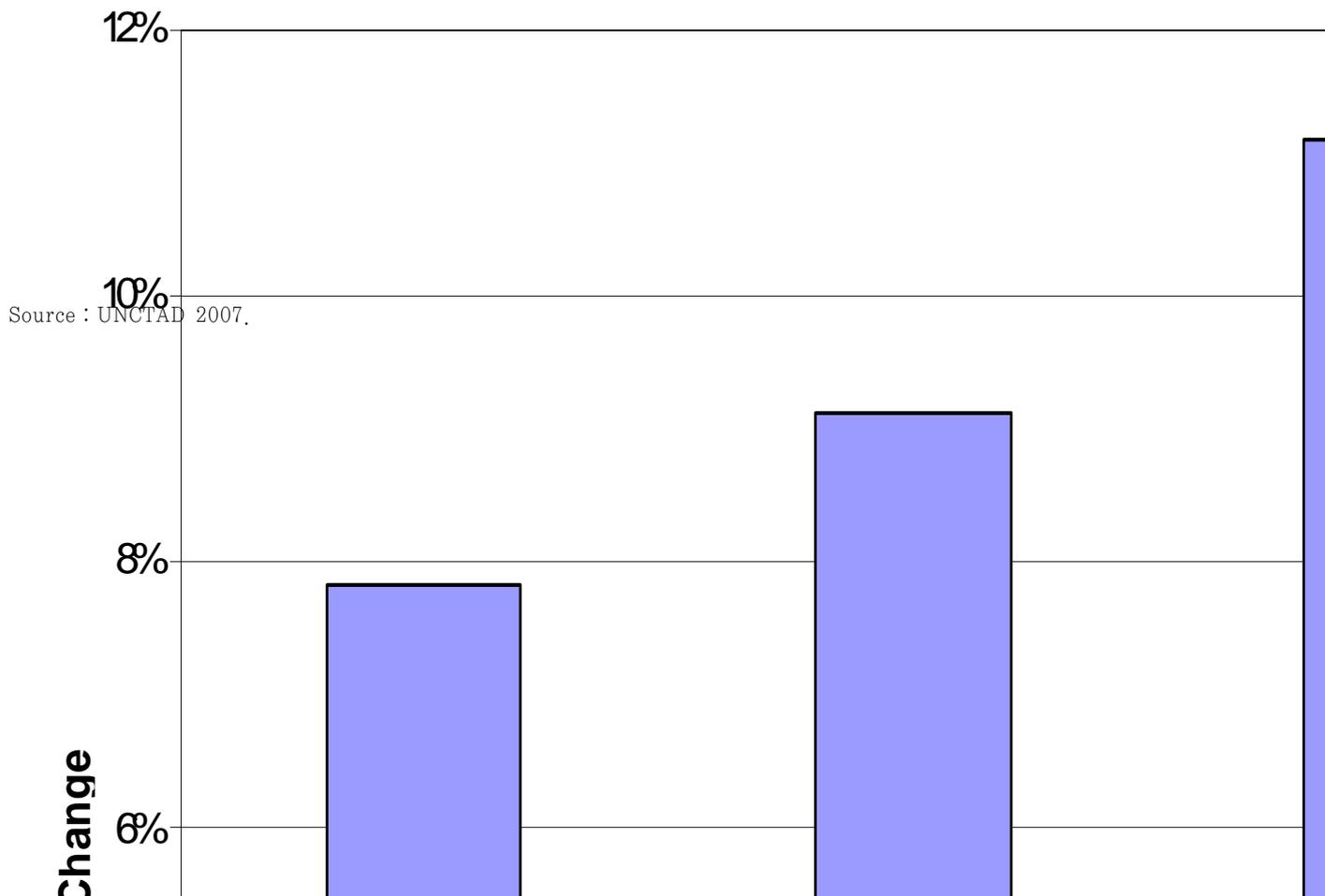
Drewry has indicated that given the continued strong growth, the outcome of 2008 shipper contract negotiations could change this (Drewry 2007a)However, a great deal of new capacity is scheduled for delivery over the next few years, and this will keep downward pressure on rates. The effect of the delivery of this new capacity will be exacerbated by the fact that it will not be balanced by scrapping of old tonnage. The relatively rapid increase in the container fleet has meant that container ships are, on average, significantly younger than other major components of the world fleet. Whereas the average age of the world merchant fleet at the end of 2006 was 12 years, the average age of the cellular container fleet was 9.1 years. (UNCTAD, 2007)

3) Geographical Diversification of Container Trade Growth

Another shaping factor of the ESCAP ports and shipping scene has been the series of transformations that have occurred in the geographical distribution of container trade. In the 1970's, Asia's container trade was dominated by Japan, which was the focal point for both the Europe-Asia and trans-Pacific trade. However, by 1985 this had changed dramatically, as diversification of Asian container trade entered a more mature phase. Container volumes from Hong Kong, China; Taiwan Province of China and the Republic of Korea comprised over 40 percent of the Asia total, while Japan's share declined to 31 percent.

By 1995, another profound change had occurred. The decade 1985-1995 saw container volumes through the ports of ASEAN countries increase six-fold, and by the end of the decade they collectively handled approximately one-third of the Asian total.

During the 1995~2005, the principal change was emergence of the China market. The number of containers handled by the mainland ports of China increased from 1 million TEU in 1983 to 43.6 million TEU in 2005 — a remarkable sustained growth rate of approximately 31 percent a year. As

a result of this spectacular growth, the mainland Chinese container market (excluding Hong Kong and Taiwan Province of China) has overtaken Japan and the United States as the world's largest container market.

The spotlight is now clearly on India, where progress towards market reform and an open economy continues. Productivity growth is strong and container volumes are expected to grow strongly. In a bid to ensure future growth, India is also looking to strengthen the overall logistics chain by improving port and landside infrastructure and integration. A number of major port projects are underway such as the new container port at Krishnapatnam Port, and the construction of a rail line linking India and Myanmar.

4) Relative container trade intensity

〈Figure 2-4〉 shows the container trade intensity (defined as containerised trade ― including both imports and exports but excluding transshipment ― generated per thousand head of population) for various regions in 2005[4]. The influence of the level of economic development on container trade intensity is clear; as shown in the figure, container trade intensity is highest in regions dominated by developed economies, such as North America and Europe and Central Asia, where over 100 containers of trade is generated for every 1,000 people. The lowest amount of container trade generated was in South Asia, where the combination of low levels of economic development and historically inward-looking approach to development in India has resulted in less than 2 containers per 1000 head of population in 2005.

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4) The regions used in this and similar figures and tables in this report are those used by the World Bank in its publications. Definitions of these regions can be found in a number of World Bank publications, such as *World Development Indicators 2007.*

〈Figure 2-4〉 **TEU trade per '000 population - World Bank region**
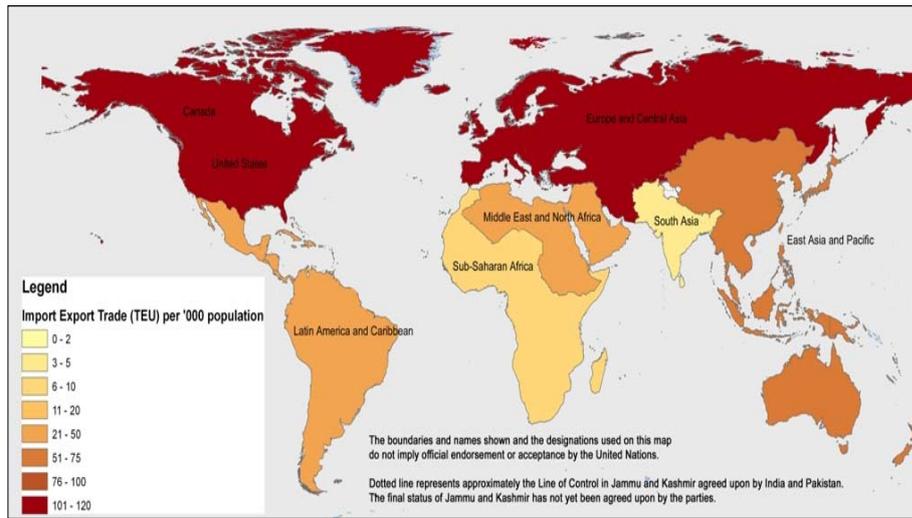
Source : Study estimates based on IMF and other sources.

2. Competition Regulation of Liner Shipping

International liner operators have been faced with a changing regulatory environment in many countries in the recent past. This has included new regulations enforced by the United States with the Ocean Shipping Reform Act (OSRA) in 1998, and recent rulings on Regulation 4056/86 by the European Commission. In addition to recent amendments to the two major anti-trust regimes, changes to an array of competition policies by other nations within the ESCAP region have clearly influenced the environment within which shippers and carriers operate.

1) EU/United States

The European Union competition regime consists of two block exemptions from anti-trust policy; an exemption that covers the activities

of conferences; and an exemption that covers the activities of consortia. Regulation 4056/86 enables the Commission to apply Articles 81 and 82 of the EC Treaty directly to the maritime sector. This mechanism provides a block exemption for liner conferences; however price-fixing and supply (particularly across modes) are regulated within conferences. The consortium block exemption, Regulation 870/95, 823/2000, and most recently Regulation 611/2005 recognise improved productivity and quality of liner transport services by rationalising the activities of member companies.

Both of these have been subject to recent reviews. The Commission has extended the consortium block exemption (by Regulation 611/2005) but abolished the general conference exemption as of October 2008.

The US regulatory regime differs from the European regime in a number of important respects. Historically, the US has favoured 'open' conferences, ensuring easy entry and exit with conference arrangements, whereas European regulation has been built around closed conferences. The US regime has been relatively interventionist, with high information disclosure requirements and strict filing obligations. Regulation of linershipping in the US is effected by specific industry regulation (the Shipping Act 1984 as amended by the Ocean Shipping Reform Act 1999), whereas in Europe it is affected by block exemption issued under general competition law. The US regime is accepting of the extension of shipping line collaboration to intermodal movements; in contrast, the EU has been consistently hostile to such extension. Despite these differences, both jurisdictions have in recent years taken steps that have weakened conference influence, and there is a common view that the two major global regulatory regimes are converging (Fitzgerald, 1999).

2) Australia

Australia's competition policy regime is embodied in the *Trade Practices*

Act 1974. The Trade Practices Act outlaws various types of anti-competitive conduct, including misuse of market power and price fixing by competitors. The competition policy regime relating to liner shipping is specified in Part Ⅹ of the Trade Practices Act, with shipping conferences receiving limited exemption. A recent review by the Productivity Commission recommended abolition of Part Ⅹ, but the government decided instead to narrow its scope of application, excluding discussion agreements from the protections offered by it.

3) China

In China, international liner shipping is regulated by the Regulations on International Maritime Transportation. This set of laws regulates and governs international maritime transport operation (including non-vessel-operating carriers). China, in August 2007, passed an anti-trust law which has no provision for exemption for the liner industry. This may affect the behaviour of liner conferences in China; however, collective agreements between vessel lines are still allowed under the current maritime regulation.

4) Japan

The Marine Transportation Law provides that an agreement between shipping lines on freight rates, routes, sailing and/or loading, shall be exempted from the provisions of the Act Concerning Private Monopoly and Maintenance of Fair Trade. There have not been significant changes to the Japanese regulatory framework on international liner shipping since those made in 2000 through amendments to the Marine Transportation Law. The two principal changes made at that time were the establishment of a procedure to allow: 1) authorities to take certain actions against a party to a conference agreement if it is unduly restrictive of competition; 2) the Ministry to revise or abolish conference agreements if they do not meet

certain requirements. However, according to Article 29 of the Marine Transportation Law, the Ministry will not grant the exemption approval if it can be proved that the shipowners substantively reduce competition, unduly increase freight rates or apply "unfair methods of transaction".

5) Korea

*The Maritime Transport Act*p rovides that an ocean-going cargo transportation business may enter into a contract concerning freight rates, vessel allocation, cargo transport and other transport conditions and engage in joint activities. Korea exempts conferences and other forms of agreement practised in liner shipping from anti-trust prosecution, on the grounds that such agreements make a positive contribution in terms of freight rates, service stability and the maintenance of order in shipping markets.

6) New Zealand

Outwards liner shipping is exempt from sections of the *Commerce Act 1986* covering restrictive trade practices and price control. However, outward shipping is subjected to regulation under the Shipping Act 1987. The Shipping Act 1987 recognises that the commercial relations between shippers and carriers should be self-regulating providing that there is a satisfactory balance of advantage between the parties.

7) Indonesia

In principle, the activities of liner shipping conferences are subject to Law No. 5/1999 *Prohibition of Monopolistic Practices and Unfair Business Competition*. This law became effective in March 2000 and contains anti-competition provisions and establishes a Commission on Business

Competition Supervision.

8) Thailand

Significant changes were made to competition legislation in Thailand in 1999. Thailand enacted the *Prices of Goods and Services Act B.E. 2542 (1999)* and the *Trade Competition Act B.E. 2542 (1999)* with a view to ensuring free and fair competition in trade in goods and services.

The Thai Government has not pursued an active anti-trust policy in the maritime sector. The activities of conferences, consortia and stabilisation agreements, especially with respect to joint pricing and monopolisation, appear to come under the aegis of the Act. However, under s. 35(2) of the Act, enterprises must be declared 'controlled businesses' before action can be taken. The Maritime Sector has not been declared a controlled business.

9) Singapore

Until recently, the operation of shipping conferences had not been regulated in Singapore. However, the introduction of generally applicable anti-trust legislation created a situation in which traditional conference behaviors would have been illegal. A review undertaken by the Competition Commission of Singapore resulted in a wide-ranging block exemption that in practice means that any activities permitted by either the European or the US legislation will be legal in Singapore.

3. Increasing ship size

Containerisation has witnessed a progressive increase in maximum vessel size. By the mid-1970's, the 1,000 and 1,500 TEU ships of the first

and second generation were being replaced by ships of 2,000+ TEU, signalling a trend of gradual increase that led eventually to the 4,000+ TEU Panamax vessels which most major lines ordered in the early1990's. However, as shown in ⟨Figure 2-5⟩, the rate of increase in vessel size accelerated during the mid-1990s, as lines increasingly decided to focus their trans-Pacific services on the west coast of the United States, and as a result were able to deploy vessels too large to transit the Panama Canal ("post-Panamax" vessels). By 1996, vessels of around 6,000 TEU had appeared on the scene. This rapid increase in containership size has continued unabated, and vessel size has continued to grow to the point where vessels exceeding 11,000 TEU are now in service.

The containership order book is now dominated by large vessels: container ships of over 7,000 TEU accounting for 39% of the capacity currently on order (see ⟨Table 2-2⟩). Planned investment seems to be particularly strong for ships with a capacity of 10,000 TEU and above. Over the next 3 years, the world container ship fleet greater than 4,000 TEU is expected to grow by 19 percent per annum, opposed to 7 percent per year for ships under 4,000 TEU. According to Containerisation International the largest vessels on order at the end of 2007 were 13,300 TEU ships for CSCL, with the first due for completion from the Samsung Heavy Industries yard in December 2010 (Containerisation International website, accessed 12 Dec 2007). In recent reports Samsung Heavy Industries is believed to building a 400 metre floating dock on which to construct the first of the 16,000 TEU ships, and is likely to be operating early in 2009.

〈Figure 2-5〉   **Increase in containership size (1980-2015)**
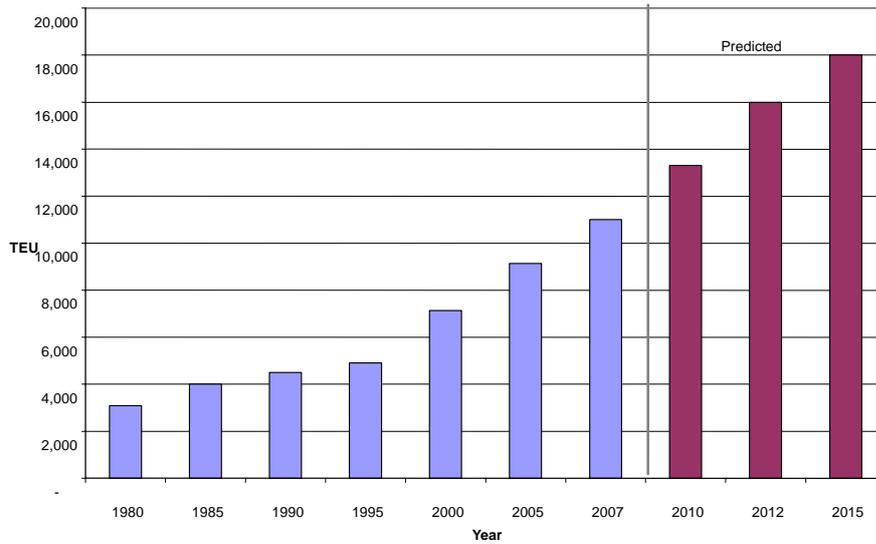
Source : Historical series compiled from Containerisation International, various years.

〈Table 2-2〉   **Global container ship fleet and existing orders**
- in July 2007

Size Class (TEU)	Existing Fleet		Ordered		Orders/Fleet (TEU)
	No of Ships	'000 TEU	No of Ships	'000 TEU	
< 500	438	136	13	3	2%
500-999	752	549	155	128	23%
1000-1499	611	722	170	202	28%
1500-1999	486	826	120	207	25%
2000-2499	302	692	21	46	7%
2500-2999	348	947	137	362	38%
3000-3999	317	1082	80	273	25%
4000-4999	354	1553	217	944	61%
5000-5999	239	1300	59	310	24%
6000-6999	114	740	121	788	160%
7000-7999	49	360	6	42	12%
8000-8999	93	767	95	798	104%
9000-9999	36	336	38	355	106%
10000+	5	68	77	857	1260%
Total	4144	10077	1309	5315	53%

Source : Drewry Shipping Consultants 2007.

The average size of new vessels entering the fleet in 2006 grew by 3.6 percent to 3,732 TEU.

There are divided opinions on where vessel size will go from here. A review by LSE suggests that the limit using a single engine, given the marine propulsion technology currently available, would be for a 12,500 TEU vessel with installed power of 81,000 KW and a speed of 23.5 knots (Payer 2002). Beyond that, it appears likely that twin engines and propellers will be needed: this will reduce the ability to lower unit costs by increasing vessel size.

However, there are no insurmountable technical barriers: concept designs already exist for ships over 18,000 TEU (see 〈Table 2-3〉). Certainly there does not appear to be anyclear indication that the trend to even-larger container ships has as yet run its course. The limits to growth, if there are any, will be market-determined.

〈Table 2-3〉   **Specification of Very Large Container Ships**

Ship	Malacca-max (project)	Emma Maersk (in operation)
TEU capacity	18,154	11,000
Length (m / feet)	400 / 1,312	397 / 1302
Breadth (m / feet)	60 / 197	56 / 184
Draft (m / feet)	21 / 69	15.5 / 51
Depth (m/ feet)	35 / 115	30 / 98
Deadweight (tonnes)	243,600	156,907
Vessel speed (knots)	25	25.5

Source : American Shipper, Lloyds - Fairplay.

It has been argued by some analysts that the search for economies of scale is inexorable, and will continue to drive vessel size increases. Larger ships typically have a lower cost per TEU-mile than smaller units with the same load factor:

- Samsung demonstrated that a vessel of 12,000 TEU on the Europe-Far East route would generate an 11 percent cost saving per container slot compared to an 8,000 TEU vessel, and 23 percent when compared to a 4,000 TEU unit.
- Drewry Shipping Consultants (2001) also made similar calculations to point to potential cost differences of around 50 percent between a Panamax unit of 4,000 TEU and a mega post-Panamax unit of 10,000 TEU (Notteboom, 2004).
- One source estimates that savings of up to 16 percent could be made on the Asia-Europe route through the deployment of vessels of up to 18,000TEU (the so-called Malacca-max vessels). (Containerisation International, 2002)

Adding post-Panamax capacity can give a short term competitive edge to pioneer implementers putting pressure on the followers in the market to upgrade their container fleet and avoid unit cost disadvantage.

But some commentators have pointed to other considerations which may serve to set limits to this seemingly inexorable increase in container ship size. They point out ultra-large container ships can be deployed efficiently on the major trade lanes, provided they are full. However, many carriers have not been able to realize a continuous high utilization of available slot capacity on their bigger vessels. Drewry warns however that over investing in vessels of 10,000+ TEU for simple fear of being left behind on the Asia—Europe trade lane is a level of risk that should perhaps be reviewed. By the time vessels are delivered, trade boom would have to have lasted for at least five to six years to sustain trade.

Moreover, shipping lines have made a significant investment in establishing competitive networks to satisfy the service requirements of global shippers, such as a weekly departure at each port of call. Upgrading the vessel size on a specific route takes considerable time and demands massive investments.

It is clear that the largest ships will be deployed only on the Asia-Europe and, to a lesser extent, the trans-Pacific route. However, as the existing fleet in the major East-West trades is replaced by larger ships, many vessels of 3,000~4,000 TEU on East-West routes are expected to migrate to north-south trades - a phenomenon which has already been witnessed at the end of 2005 (BRS, 2006).

The view taken in this study is that vessel size on trans-Pacific and Europe-Asia routes will continue to increase, and that by 2015 super-post-Panamax vessels will be dominant on these major east-west routes. It is expected that on the Asia Pacific route more vessels of greater than 8,000 TEU will be the norm. This has been supported by introducing the Emma Maersk, and her recently constructed sister ship Estelle Maersk, to the Asia-Europe trade lane. Some indication of the way the market is reading developments can be gleaned from the fact that major port operators have been trying to upgrade port facilities to accommodate super-post-Panamax vessels, aiming to become hub ports even though the cost of such development is very high. Others feel constrained to match these efforts just to keep in touch.

4. Financial Performance

The financial performance of the container shipping industry is chronically weak when compared to other industries. This has been related to a combination of the capital-intensive nature of operations, and high risk regarding revenue. Shipping remains a very capital-intensive industry where some assets are owned, and others are leased. As a result, there exists a wide variability in cost base which contributes to the short-term instability in this industry (Brooks 2000).

The 1990s and early 2000s in particular saw severe price competition affect the profitability of the entire liner shipping industry, and container

carriers significantly under-perform financially.

Despite the efforts by shipping conferences[5] to achieve rate stability, a significant decline in rates has been observed since the mid 1990s on most major trade routes. This was due to a combination of different factors. These have included the introduction of large ships, increasing competition from non-conference carriers, the imbalance of container volume in trade routes, and difficulties in securing continual cargo volumes. For example, imbalance in trade, together with other factors, caused a significant decline in the freight rate of 42.2 percent between 1995 and 2000 in westbound freight on the trans-Pacific route (North America to Asia).

After a further decline in the period of 2001-2002, liner shipping companies enjoyed some respite during 2003 and 2004, when rates increased by nearly 25% during a cargo boom reflecting world economic recovery. As a result liner shipping companies performed relatively well financially in those years

However, rates have since softened: rate increase came to a halt in late 2005, and suffered a sharp decline in 2006. Moreover, the order book for new container vessels is at a record high. There is a widespread expectation in the industry that the next few years will be more difficult.

Howe Robinson and Company indicated at the 2006 Container Summit that current low charter rates for container vessels are expected to continue through to 2009, due to the excess supply of tonnage (3cent greater than demand) in 2006. While north-south and feeder trades have experienced an undersupply in new vessels, the East-West trades- with the deployment of new very large container ships (VLCS), are seeing

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5) Shipping conferences agree on and set freight rates different regions of the world. Shipping conferences, besides setting rates, adopt a wide number of policies such as allocation of customers, loyalty contracts, and open pricing contracts amongst others. In many jurisdictions, shipping conferences are exempt from the application of competition laws; however this position is changing to promote greater competition and choice for exporters (OECD 2003).

supply outstrip demand significantly.

Rates have in fact continued to decline in the first two quarters of 2007, although at a slower rate than in 2006.

Year to date and third quarter figures for 2007 have produced healthier financial results for most ocean carriers, up from end of year 2006 results. However, high oil prices, the devaluation of the US currency, flattening freight rates and new ship supply coming onto the market could impact future profitability. Capacity is expected to grow by roughly 13% next year, while demand is expected to be around 10% (Finance Asia Top 100 Index, 2007).

However, Drewry forecasts that the modest recovery in rates in the third and fourth quarters, due mainly to higher rates on the Far East/Europe trade lane (Drewry 2007a), followed by a period of rate stability in 2008. This view appears to be broadly consistent with that of Containerisation International (2007). The general view appears to be that the main short-term threat to profitability will come from cost pressures rather than rate declines: "Analysts seem to agree that container lines are likely to see strongrevenue growth in 2007 but they are equally in agreement that, 'uncontrollable costs' are the main obstacle preventing satisfying profitability." (Containerisation International website, accessed 13 Dec 2007).

Longer term forecasts through to 2013 are for a slight softening of rates in nominal terms, implying a decline in real terms of between 3% and 5% per annum (Drewry, 2007a). Carriers will therefore face a real challenge in increasing productivity rapidly enough to hold profitability at present levels.

5. Changes in Global Liner Shipping Operations

1) Increasing consolidation

The combination of competitive, economic and operational forces has created new and expanded challenges for liner shipping companies, while advances in global communications and logistics management have increased performance expectations of all transport enterprises. Part of the response to changes in the competitive environment, and changes in customer expectations, has been new forms of collaboration, some broader and more diffused than traditional conference arrangements, others narrower and deeper.

Discussion agreements — broad but loose arrangements covering most operators in a trade — and global alliances dominated the scene during the 1990s. However, as was pointed out in section 2 above, they have come under increasingly under pressure from regulators, first in Europe and recently in Australia.

A more significant development has been the formation of global alliances. Cooperation between liner companies in different forms of partnership, such as slot purchase and exchange, vessel-sharing agreements, and joint services have been an essential feature of the industry for a long time. These arrangements have served as a means to secure economies of scale, to broaden the range of services that a shipping line can offer and to spread risk associated with investment

However, these forms of carrier cooperation tend to be on a trade-specific basis. In recent years there has been a growing trend towards carrier alliances on a global basis, with carriers entering into partnerships that cover their operations worldwide, offering significant additional advantages in container logistics, while allowing shipping lines to retain their distinctive marketing identities and ownership. Alliances have also provided members with easier access to more loops or services

with relative low cost implications.

But despite these advantages of alliance formation, they have not become a stabilizing factor in liner shipping, due primarily to the organizational complexity and perceived intra-alliance competition which undermines trust between carriers involved. At the same, competition policy enforced under a variety of regulatory regimes has reduced the effectiveness of conference and alliance operations, as discussed in section 2.

Another more radical approach to securing the benefits of cooperation is through mergers and acquisitions. Merger and acquisition have been prominent in the container shipping industry since the 1990s, and there has recently been a new wave of activity.

〈Figure 2-6〉 **Share of top 20 liners in total global cellular capacity (1988-2007)**
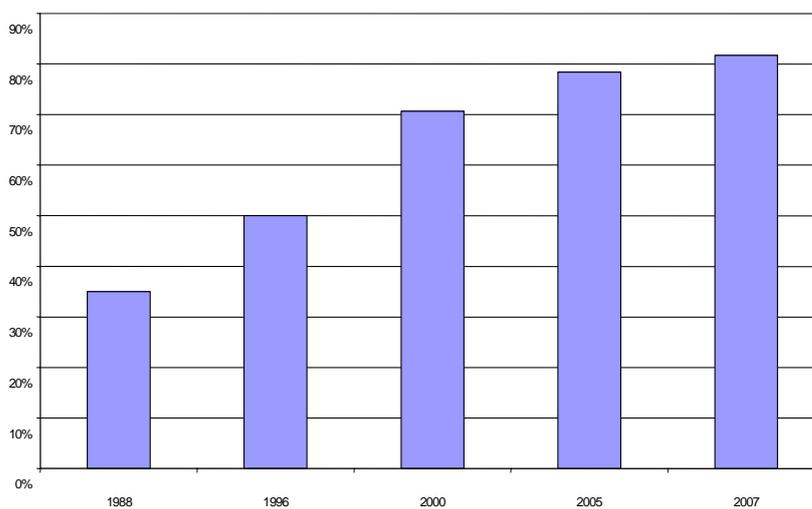
Source : Containerisation International.

〈Table 2-4〉   **Changes in the top 10 lines (1991-2007)**

Rank	Carrier	TEU 2007	TEU 1991	Growth Index
1	Maersk	1,638,898	220,000	7.4
2	MSC	1,200,668	30,000	40.0
3	CMA CGM SA	694,239	66,000	10.5
4	Evergreen	620,610	131,000	4.7
5	Hapag-Lloyd AG	491,954	57,000	8.6
6	Cosco	426,814	97,000	4.4
7	CSCL	418,858	0	na
8	APL	399,896	100,000	4.0
9	OOCL	351,542	na	na
10	NYK	331,083	107,000	3.1
	Average	657,456	80,800	10.4

Source : American Shipper; Containerisation International.

Although the majority of the carriers acquired have been second- or third-tier operators, some significant carriers, including APL and DSR-Senator, were taken over by NOL and Hanjin respectively. P&O Containers and Nedlloyd Lines merged in 1997 to create P&O Nedlloyd Container Line, which later took over Blue Star Line and Tasman Express Line. Evergreen became the second largest carrier in the world, in terms of TEU slots under its control, through the takeover of Lloyd Triestino in 1998. In 1999, Maersk Line acquired the international shipping operations of Sea-Land to form a company controlling 9.2 percent of the world container shipping fleet. After a decrease in merger and acquisition in early 2000's, a renewed interest was led by US $2.8 billion takeover of P&O Nedlloyd by AP Moeller- Maersk in 2005. After full integration, the enlarged Maersk and its associate companies has a fleet of approximately 1.8 million TEU (Drewry 2005). More recently, the parent company of Hapag Lloyd has taken over the container shipping interests of CP Ships. Eimskip purchased Kursiu Linija and 65 percent of Containerships in 2006. CMA CGM — itself the product of the merger of two major lines — has grown to the position of the world's third largest container line

partly through a string of purchases, including ANL, Delmas, MacAndrews and Cheng Lie Navigation Co; CMA CGM has is reported to have agreed to buy ANL's Californian-based transpacific partner, US Lines reported to be operating at a loss and in financial difficulty (Lloyds List DCN 2007).

Mergers and acquisitions has been a major contributing factor to the increase in market share of the leading container lines, as shown in ⟨Table 2⟩. In 1988, the top twenty container lines controlled approximately 35 percent of the total global capacity (This and subsequent similar statistics are based on the shares of cellular container ship capacity only). This figure slowly increased, until by 1996 it had reached around 50 percent of total global shipping capacity. Additionally, between 1996 and 1998 the share of the top twenty lines increased to 70 percent as the merger wave began in earnest. Since then there has been a further increase, and more than 82 percent of total global capacity is now controlled by the top twenty lines ⟨Figure 2-6⟩.

However, not all growth and consolidation has been due to mergers and acquisitions. The most notable TEU growth in the 1991 to 2006 period has been from CMA CGM, Hapag-Lloyd, A.P. Moeller-Maersk and MSC. While acquisitions have played a major role in the growth of the first three of these, MSC has managed to increase its capacity largely by organic growth.

By any standard, the liner shipping industry is far more concentrated than it was a decade ago, and it is likely to become more so in the future. But it is important to retain a sense of perspective. By comparison with other capital intensive industries operating in a global market — for instance, oil production or the manufacturing of aluminium — the container shipping industry is still very fragmented. In these industries, the focus is typically on the market share of the top four operators, rather that the top twenty, and concerns about concentration typically emerge when this ratio exceeds 70 percent. In the liner shipping industry, the share of the top four lines — Maersk, MSC, CMA CGM SA and Evergreen,

stood at around 38.5 percent in December 2007 (Containerisation International website, accessed 12 Dec 2007).

2) Structural Change in Shipping Service

During the last decades, successive waves of Asian economic development have brought with them progressive changes in structure of container shipping networks in the inter-continental trades to and from Asia as well as in the intra-Asian trades. In the early 1970s, inter-continental shipping networks serving Asia concentrated largely on the Japan; Hong Kong, China; and Singapore. Trans-Pacific services terminated in Japan, and the Far East/Asia services hubbed over the ports of Hong Kong and Singapore en route to Japan. As the economies of the Republic of Korea and Taiwan Province of China grew, an increasing number of lines began providing shipping services to these locations, initially in conjunction with services to Japan, and later with additional dedicated services. Kaohsiung and Busan were later developed as regional hubs and significant volumes of regional cargoes began to emerge on short-sea routes linking these new centres to Japanese main hubs. The spread of intermodal services in the United States then led to a decline in service transiting the Panama in favour of land bridging from West coast ports to the Midwest and even to East Coast destinations.

With rapid economic development in South-East Asia during the 1980s and early to mid 1990s, increasingly complex feeder services were introduced to link the regional ports to key hub ports of Hong Kong, Singapore and Kaohsiung. Shipping lines also began to experiment with additional calls at South-East Asian ports including Port Klang and Laem Chabang. Additionally, local routes were also developed linking Japan and East Asia initially to Singapore, then to other South-East Asian ports. With further growth in South-East Asia, a new strategy for serving the East Coast of the United States was introduced, with vessels proceeding

from Asia via the Suez Canal. This route proved to be attractive for cargoes from Taiwan Province of China and Hong Kong, China.

〈Figure 2-7〉 Mainland China calls on the major East-West routes
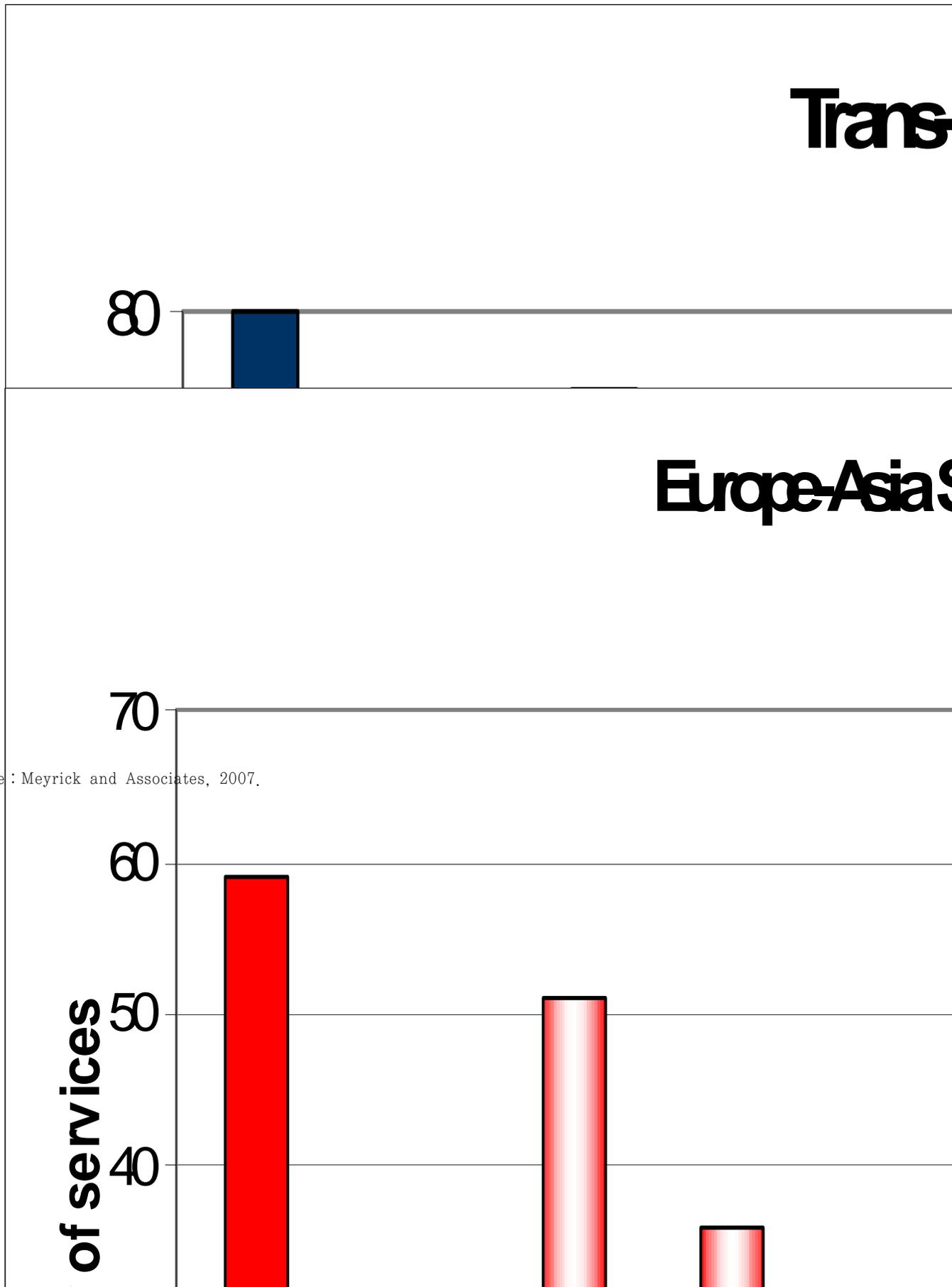
Source : Meyrick and Associates, 2007.

In the latter half of the 1990s, with the rapid growth of Chinese container trades, Chinese ports were included into new feeder shipping networks, adding further complexity to the Asian shipping system. Intense networks were developed between Pearl River delta ports and Hong Kong port. Busan and Japanese ports increased feeder links with Shanghai, and the central and the northern regions of China. Chinese cargoes bound for Japan, the Republic of Korea and Hong Kong mixed with feeder cargoes destined for transhipment at these locations. A number of shipping services between South-East Asian ports and Chinese ports were also developed.

Continuing pace and rapid growth in Chinese cargoes, improved handling facilities at the ports of mainland China and congestion in the port of Hong Kong, led major lines to trial direct calls at mainland ports, collecting cargoes previously transhipped over Hong Kong port or Japanese ports. This trend subsequently consolidated, with mainline services making direct calls at an increasing range of mainland ports. As shown in 〈Figure 2-7〉, the overwhelming majority of services on both the trans-Pacific and the Asia-Europe routes now make direct calls at ports on the mainland of China.

6. Rising Fuel Prices

Fuel management for containerships is a concern given that fuel costs make up a high proportion of fixed operating costs. Figures from Germanischer Lloyd show that fuel accounts for 63% of operating costs for an 8,000 TEU ship opposed to just three years ago where it accounted a third of the annual operating expenses (Lloyd's List DCN 2007).

The price of bunker fuel is closely linked to the price of crude oil, so recent record crude oil prices have inevitably been reflected in increased fuel costs to shipowners. Current bunker prices are close to $500 a tonne.

This compares to $295 at the beginning of 2007 and around $150 per tonne in the period between 2000 and 2005. The result is that the rising cost of fuel has prompted carriers to react by slowing vessel speeds in order to burn less fuel which in turn has created the need for additional vessels to maintain schedules. Maersk for example has announced that it will add four vessels to the Asia Europe service in 2008 to allow vessels to reduce their operating speeds while maintaining a weekly call frequency.

As operating costs climb relative to the fixed costs of vessel acquisition, shipowner decisions on the deployment of capacity, especially on long haul routes, are also occurring. Iin the face of an unprecedented rise in operating costs – particularly fuel — MOL has elected to reduce capacity on the trans-Pacific earlier than in previous years (MOL Website, accessed 13 Dec 2007). Future signs do not indicate a reduction in oil prices anytime soon. UNCTAD reports that

It is interesting to note that the US National Petroleum Council in a report entitled "Facing the Hard Truths about Energy", warns that there will be a shortage of oil and gas by 2015. (UNCTAD 2007).

Given the expectation is that high fuel prices are here to stay, the focus for the shipping industry in the short terms is for new ship design to improve fuel efficiency.

7. Reducing Emissions

Emissions from shipping operations have become a focus of attention, both within the shipping industry and at a global level. Specifically targeted for reduction have been sulphur dioxide and carbon dioxide (because of its contribution to global warming and climate change).

The IMO has played a role in assisting industry to manage their responsibility by enacting legislation which aims to prevent and control pollution caused by ships, universally know as MARPOL. Annex VI of

MARPOL, limits Sulphur oxide and Nitrogen Oxide from ship exhausts and caps sulphur content of fuel oil. It has been reported that legislation has prompted carriers to issue European shippers 'low sulphur fuel surcharge' (LSFS), in addition to normal bunker surcharges in order counteract some of the bunker fuel cost. (Lloyds List DCN, 2007)

The IMO have also enforced Sulphur Oxide Emission Control Areas (SECA). This legislation requires special mandatory measures be taken for the prevention of pollution in areas needing higher levels of protection due to their ecological or socio-economic significance.

No mandatory instrument covering greenhouse gas emissions has yet been enforced by the IMO. A study was conducted in 2000 and is currently undergoing an update in preparation for the Marine Environment Protection Committee's next meeting in March of 2008. However the EU is becoming impatient and has threatened to act unilaterally if the IMO does not move quickly.

Maritime emissions is not yet covered by the Kyoto protocol and the EU is currently drafting legislation to include shipping emissions as part of its Trading Emissions scheme to go through as early as January 2008.

Recent advances in technology offer the potential to deliver a reduction in the level of emissions through reduced energy consumption, the use of innovative fuel products, and engine and ship design improvements to maintain efficiency and reduce drag. Ocean carriers have been working to improve ship design, and to switch to the use of low sulphur bunker fuels despite the cost.

- Several carriers — including Evergreen, APL, NYK and Wallenius Wilhelmsen Line — have moved to reduce the environmental impact of their operations by using fuels that are lower in sulphur than that currently mandated by IMO, subsequently providing a reduced impact on the environment.
- NYK and APL are experimenting cold-ironing techniques on their vessels, where ships in port plug into a shore side power supply to

remove the need for auxiliary engines while at berth. The cost of converting an existing ship is believed to be up to USD 1,000,000 per ship.

■ Other initiative involves technology known as sea water scrubbing to remove sulphur and particulates. Krystallon sea water scrubbers have been recognised by the International Maritime Organisation (IMO) and EU as a solution to reducing emissions and are an accepted method for compliance.

■ K-Line retrofitted five vessels to curb a high proportion of pollution normally generated from the ships in an effort to comply with US west coast clean air rules. K-Line have also agreed to a 'green lease' agreement transforming the ITS facility at Long Beach to an environmentally friendly facility.

■ The Wallenius Wilhelmsen Line vessel E/S Orcelle (Green Flagship) is designed to produce no emissions into the air or sea by using renewable energy sources, including the sun, wind and waves.

■ Maersk recently launched Quality and Energy Efficiency in Storage and Transport (Quest) technology, to halve the energy used to cool refrigerated boxes.

8. Port Development

Globally, container ports are struggling to expand capacity fast enough to keep pace with trade requirements. Drewry estimates that there may be a serious terminal capacity shortage if additional plans are not confirmed soon and warns that utilisation rates could rise from 72 percent in 2006 to 97.5 percent by 2012. The imbalance between supply and demand in the container terminal sector could have devastating consequences if new capacity projects are not developed quickly. (Drewry 2007)

1) Private Investment

Increased private sector participation in ports has been one of the most widespread, and in some areas controversial, areas of change. The form which this increase has taken has varied greatly from port to port. The most extreme form was pioneered in Great Britain and Northern Ireland, where whole ports, including land, were sold on freehold to private sector interest. Few other countries have chosen to follow the British model. However, some ESCAP countries, for example Malaysia, have adopted models that closely resemble it with the sale of the port business at Johor. The main difference however, is that government retains a golden share, and the arrangement is through a long term lease rather than a freehold sale.

The more common activities are concessions for parts of ports, such as individual terminals or clusters of terminals. As many commentators have indicated, this is not novel, and has long been a popular form of port development in many parts of the world. However, for ESCAP countries, particularly those in Asia, that have historically funded port works solely from public funds, this is a new development.

Other countries (China provides the most conspicuous example) have chosen the joint venture route, maintaining a continuous involvement in the port facility whilst accessing private sector funds and expertise. In still other instances, ports have retained responsibility for, and revenues from, basic infrastructure, while contracting out the management of the facility, usually for a period much shorter than that of a typical concession. As a result of this liberalisation for entry into selected port service sectors, private firms have begun, in some instances, to operate in competition with and alongside port authority operations.

In other developments an increasing number of port investments are being made by organisations such as financial institutions, investment groups, infrastructure funds and other private equity type investors. In

the past two years such investors have included AIG, Goldman Sachs and Macquarie, perhaps the attracted by the strong and sustained growth of the container trade and the potential to gain additional revenue from transhipment cargoes (UNCTAD 2007).

Given the expected growth of trade, most ESCAP countries have terminal expansion and development projects that are either planned or currently underway within the ESCAP region. Many of these involve private sector investment. Some of these which have been driven by demand and high GDP growth in developing countries are highlighted below.

2) India

The Indian Government has proposed a 12.4 billion ports upgrade plan to enable India to keep pace with growth in traffic (Port Strategy, 2007). Examples of plans in the pipeline include:

- the deepening and widening of the main harbour for Jawaharlal Nehru Ports to cater to larger vessels entering the port
- a greenfieldsport to be developed as an all-weather, deepwater, multipurpose port for handling vessels with a draught of 18 to 20m at Gangavaram.
- the south eastern Indian port of Chennai, managed by the Chennai Port Trust (CPT), is planning a mega-container terminal capable of handling super post-Panamax container vessels of 13,000 to 15,000 TEU. The estimated cost of construction is INR 3,050 crore (USD 748 million) and if approved it will take about five years to build.

The performance of Indian ports does not compare favourably with that of efficient international ports on three important parameters– capacity, productivity and efficiency. This has led the governments at both national and state level to consider privatisation as an option (IndiaCore website, accessed 12 Dec 2007). A recent demonstration of this is the

announcement by the Kerala government that it will use private sector participation to develop five more ports in Kerala in addition to the proposed Vizinjam container transhipment terminal (Kerala Ports 2007).

3) China

Shanghai, Qingdao, Shenzhen and a number of other Chinese ports are now among the busiest in the world.

- DP World signed agreement with Qingdao Governmentto develop a new container terminal at green field site at Qingdao, China. The terminal, to be 100% owned by DP World, is expected to commence operations by 2008/09.

- Phase II of the Port of Shanghai Upgrade is now underway and by 2010 is planned to provide the river mouth with a navigable depth of 12.5m with Phase III of the Waigaoqiao Container Terminal project aiming to boost the cargo capacity of the terminal

- In the port of Tianjin, 385 million will be invested in the development of a fourth berth. The new facility is to be commissioned by 2012 and will be built in the ports Dongjiang area as a free trade zone (UNCTAD 2007).

- HPH and PSA have also committed to a number of expansion plans in the region with the joint venture as investment of choice in order to expand. HPH has signed 2 joint venture agreements to construct 2 new container berths in Huizhou port in southern China while PSA is developing a new terminal in Dongguan, which is expected to be operational by 2008 (Drewry 2007).

- CMA CGM has also recently signed an agreement to invest in the construction and development of a USD307 million container terminal at the port of Haicang, Xiamen. CMA CGM will take a 30% stake in a development consortium together with, Hong Kong-based New World Services Holding Ltd and Xiamen Haicang Investment General

Company. CMA CGM expects the facility – which it intends to establish as a transhipment hub for southern China – to be operational by 2009 (Containerisation International website, accessed 29 Nov 2007).

- Cosco is highly focused in domestic investment and has also announced a number of further investment projects in Hainan, Fuzhou and Yangzhou.

4) Vietnam

DP World has commenced construction of a terminal in Saigon, with APM also planning to develop a terminal in port Cai Mep, Saigon scheduled to open mid 2009.

HPH and PSA have once again chosen to use joint ventures in the region. HPH entered into an agreement with Saigon Investment Construction & Commerce Company Limited (SICC), to build, develop and operate a container terminal in Ba Ria Vung Tau Province. PSA entered into a joint venture with Saigon Port in Vung Tau to create a major hub for Indochina. The first phase should be operational by 2009 (Drewry 2007b).

5) Middle East and Central Asia

Russia is also expanding capacity in a number of ports. Construction work began on a container terminal in the port of Ust Luga in early 2007 to relieve congestion at St Petersburg. Two berths are expected to be completed by the end of 2007 and operations to begin in 2009. Eurogate will have a 26 percent share in the project, which will make it one of the very limited foreign investment interests involved in Russia. Other expansion plans are also in train for Novorossiysk, with a new port to be built a Nakhodka.

Turkey continues to expand capacity via privatisation. HPH as part of a consortium has agreed to develop and operate the Port of Izmir (Drewry 2007b).

9. Terminal Operations

1) Changing balance of power

One of the major implications for port operators resulting from the developments of the last decade or so has been the shift in balance of power between shipping lines and ports. This shift has been in favour of shipping lines.

Greater volumes that are now controlled by a single line or alliance mean that the capacity of an individual line can seriously affect the business of even a major port. One of the most dramatic examples was Maersk's Lines transfer of business to the port of Tanjung Pelepas. This decision of a single shipping line cost Singapore, the world's premier hub port, approximately 15 percent of its total business. Similarly, Hapag-Lloyd's takeover of CP Ships has seen redirection of container cargo from Fraser River Port to the Port of Vancouver. According to CI-Online this saw a 70 percent decrease in the first half of 2006 for Fraser River Port and a 21 percent gain for Vancouver.

One of the main considerations in this, and a number of other recent shifts, is control. An increasing number of lines are seeking dedicated terminal facilities and directcontrol over landside operations. As a result, a change in the basic paradigm of port-carrier relations has been observed. The traditional paradigm that ports serve local trade, and shipping lines come to the cargo is no longer the case. Under the emerging paradigm, shipping lines serve regional, largely non-local trade, where the cargo is moved, by feeder or intermodal services to the ship.

2) The emergence of global terminal operators

Private investment in the port sector has given rise to what has been termed the 'global terminal operator'. Historically, national firms of the country in which the port was located provided the port service. The emergence of major global players has changed this radically.

In its recent detailed analysis of global container terminal operators, on which this section draws heavily, Drewry defines the global terminal operator as an organisation with container terminal interests in more than one geographical region (Drewry, 2007b).

In 2006 the global terminal operator share of world container throughput was just over 61 percent. In same year, the top five companies handled 50.7 percent of total world throughput. These companies were: Hutchison Port Holdings (HPH); AP Moeller Terminals (APMT); PSA Corporation (PSA); Dubai Ports World (DPW); and Cosco. In terms of geographical spread, global operators accounted for the larger share of container traffic in the Northern Europe and South East Asia regions in 2006 (Drewry 2007b).

Mergers and acquisitions are playing an important role in driving further concentration at the global level. DPW acquired P&O Ports in 2006, placing DP World in the top three global port operators. After being out-bid by DPW for P&O Ports, PSA decided to invest in HPH, securing a 20 percent stake in 2006 (Drewry 2007b). Purchasing the stake allowed PSA to expand operations outside of Singapore and Europe, by acquiring access to port facilities in Asia, particularly in the key growth markets of China and India.

3) Container volumes handled by global terminal operators

Drewry divides global terminal operators into two main groups:
- Global stevedores, whose primary business is in the operation of

container terminals.

■ Global carriers, whose terminal operations are derived from and to some extent remain ancillary to their liner shipping operations.

〈Figure 2-8〉　　　　　Global terminal operators - 2006

Source : Drewry Shipping Consultants, 2007.

In 〈Figure 2-8〉, the volume handled by each global terminal operator in 2006 is shown, and the operator is classified into one of these two groups. Classification is not always as simple matter. APMT, for instance, is classified by Drewry as a 'hybrid' operator, as the AP Moeller group has gone to considerable effort to separate its terminal operations from those of its container carrier, Maersk Line), led this group, followed by Cosco and Evergreen. More generally, the stance of carrier-controlled operators with respect to third-party business is varied. Some carriers such as Evergreen seem focused on controlling stevedoring for their own vessels, while others have developed facilities intended to serve a range of shipping lines, be they allies or competitors, such as Contship's Gioia Tauro Terminal. Still others lines that have had extensive involvement in

terminals, such as OOCL and Hanjin, have recently sold some of their terminal interests.

Most of the global stevedoring operators have expanded internationally from a clearly identifiable historical base in one port. For the global stevedores, 〈Figure 2-8〉 therefore also shows the share of total volume contributed by operations in this original home port.

Chapter Ⅲ. Container Trade Growth

1. Economic Assumptions

Growth in container trade is ultimately driven by economic growth. An underlying assumption of this study is that, for the next decade at least, the structural relationships between growth in container trade and economic growth will remain basically unchanged.[6] The starting point for this analysis was therefore based on expectations of future economic growth.

For its underlying economic assumptions, this study has relied as far as possible on the economic projections of the IMF. The IMF projections estimate major economies, however only extend through to 2010, whereas this study period runs to 2015. For some countries, it was possible to obtain longer term economic growth estimates from national sources. Where this was possible, these estimates have been accepted as authoritative. Otherwise, in extending the projections for this study's forecast period, the average growth rate for IMF projections over the

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6) The economic relationship between GDP and trade volume is considered useful in forecasting the development of the container sector, although the relationship is not considered a sufficient explanation of the growth. There are a wide range of factors that impact on the volume of container imports and exports, including exchange rate fluctuations, changes in economic structure etc. However, for forecasting purposes it is necessary to use very simplified relationships, as many of the causal variables are themselves even harder to predict than container volumes. Container imports and exports are, for instance, undoubtedly greatly affected by exchange rate movements. However, the uncertainties involved in estimating exchange rates are immense. The forecasting relationships used in this study in fact are simple, linear relationships between container volumes and GDP. In most cases, the regression analysis provided a good fit for these simple relationships. Further testing indicated that this was not simply because both variables tended to rise over time.

2006-2010 period was applied for the remainder.

The resulting economic growth estimates are shown in 〈Figure 3-1〉. They embody a view of future economic growth that is reasonably optimistic: that the average growth rate in the short term is similar to that of the recent past if the economic downturn of the early 2000's is omitted, and in the medium term it approximates the long-term cumulative average growth rate for the world economy over the last 30 years.

The time horizon for these forecasts is medium term, eight years from now; it is impossible to predict timing of the economic cycles that will inevitably occur within this period. The economic growth assumptions that underpins this study may therefore be interpreted as hypothesizing that growth will continue along a path similar to that of the recent past. Although there may be both good and bad years within the forecast period, the assumption is made that there will not be a major, prolonged economic slowdown on the scale of that of the early 1990s.

〈Figure 3-1〉 **Economic growth estimates underlying container forecasts**

6.0%

IMF Estimates
and forecasts

Study estimates
Based on average

5.0%

Source : Study estimates based on IMF and other sources.

4.0%

3.0%

2.0%
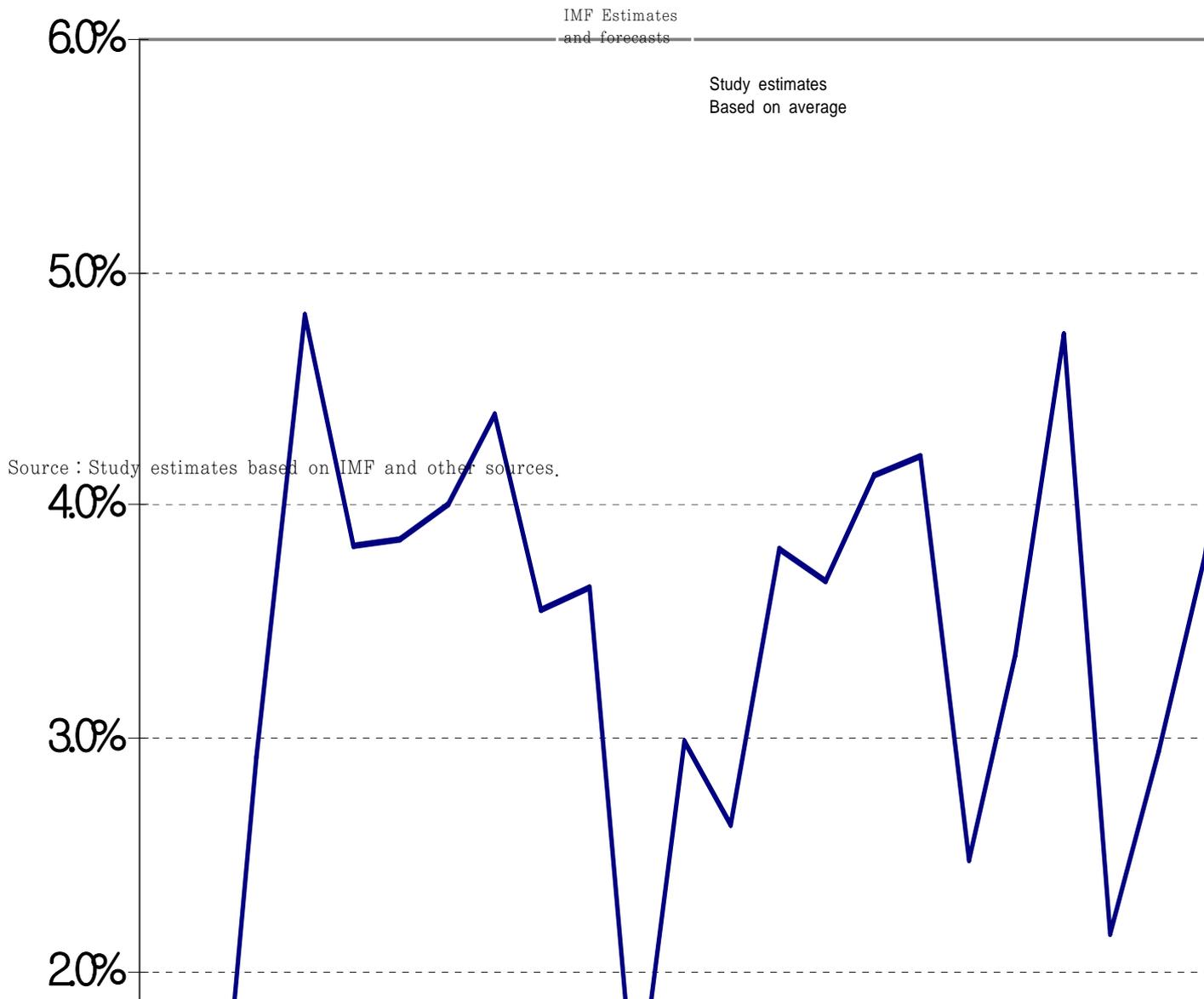
GDP growth in the ESCAP region, within the forecast period, remains steadily above that of the world GDP growth rate. As shown in 〈Figure 3-2〉, the expected GDP growth rate for the ESCAP region moves in line with that of the rest of the world with only minor convergence towards the end of the forecast period.

〈Figure 3-2〉   Forecast GDP For the ESCAP region and the world
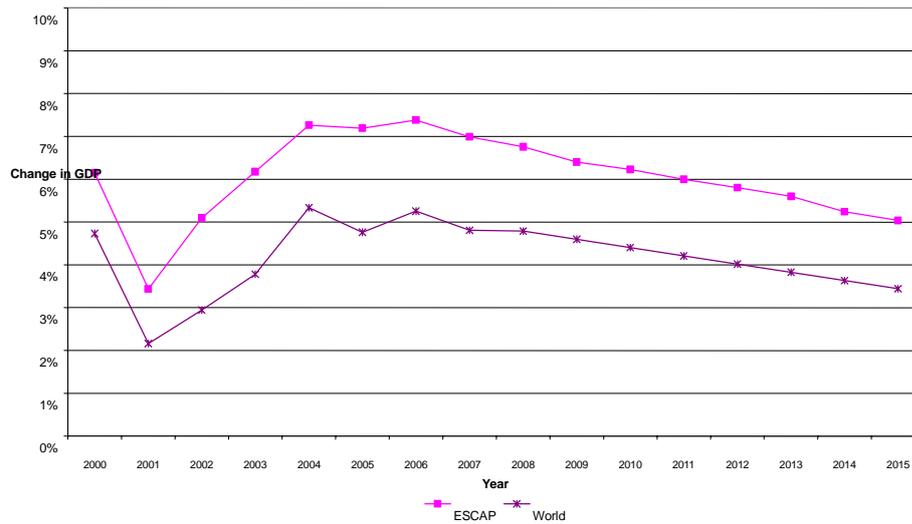
Source : Study estimates based on IMF and other sources.

Growth rates amongst the OECD, high income, economies expected to be relatively low, while developing countries in Asia continue to grow strongly, as shown in 〈Figure 3-3〉. While the largest growth is expected in the lower to middle income countries, as classified by the World Bank, growth in the high income non-OECD countries are expected to moderate after a period of particularly high growth observed between 2003 and 2007.

Growth estimates based on World Bank defined regions, as shown in 〈Figure 3-4〉, show a similar trend to those based on income. Greatest growth is expected in South Asia, as well as the developing nations of East Asia and the Pacific.

The forecast average annual GDP growth rates for each ITPM modelling region over the 2005~2015 period are presented in 〈Figure 3-5〉. It can be seen from the figure that the highest level of growth is in the developing Asian nations, the Commonwealth of Independent States, Central Africa, and Eastern South America. Lowest growth is expected in the more developed economies.

〈Figure 3-3〉   **Forecast GDP growth by World Bank Income Class**
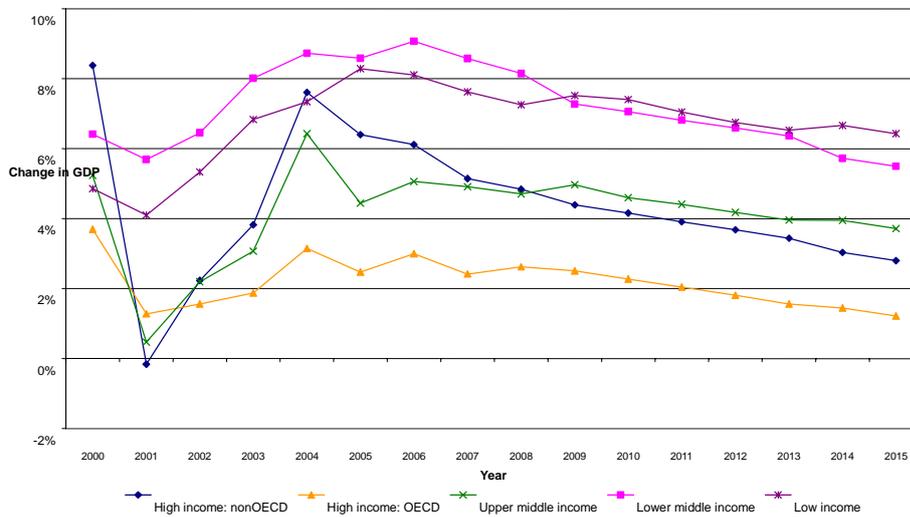
Source : Study estimates based on IMF and other sources.

〈Figure 3-4〉   **Forecast GDP growth by region**
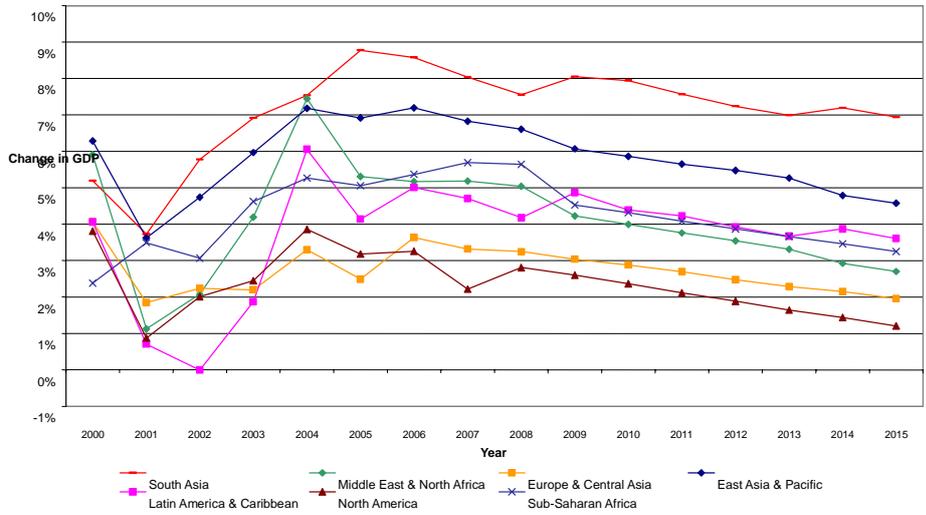
Source : Study estimates based on IMF and other sources.

〈Figure 3-5〉   **Forecast Annual GDP growth by ITPM Region**

Source : Study estimates based on IMF and other sources.

2. Global Container Forecasts

The next step of the forecasting process is the conversion of economic growth rates to projected full container volumes. Imports and export volumes were estimated from independent equations for individual countries.[7]

⟨Figure 3-6⟩ **Past and forecast global container volumes (1980-2015)**
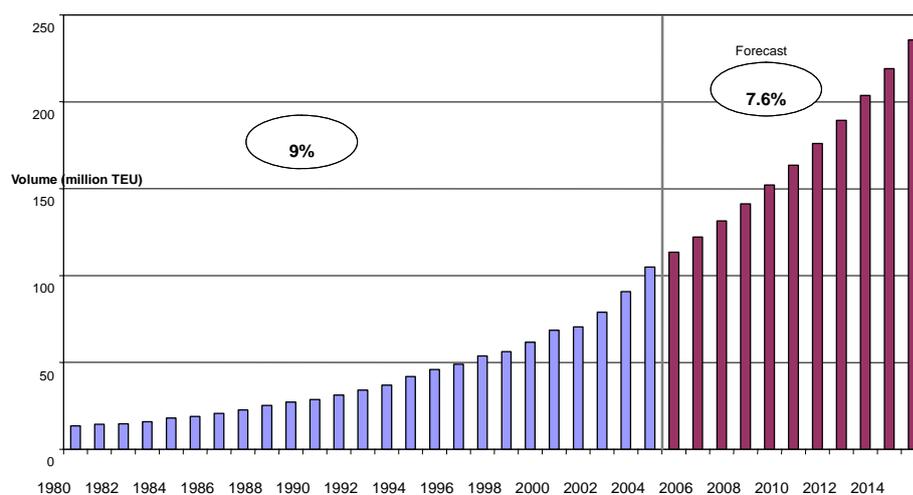
Source : Study estimates.

⟨Figure 3-6⟩ shows the global container forecasts that resulted from this process. The volumes shown in the figure are full origin-destination

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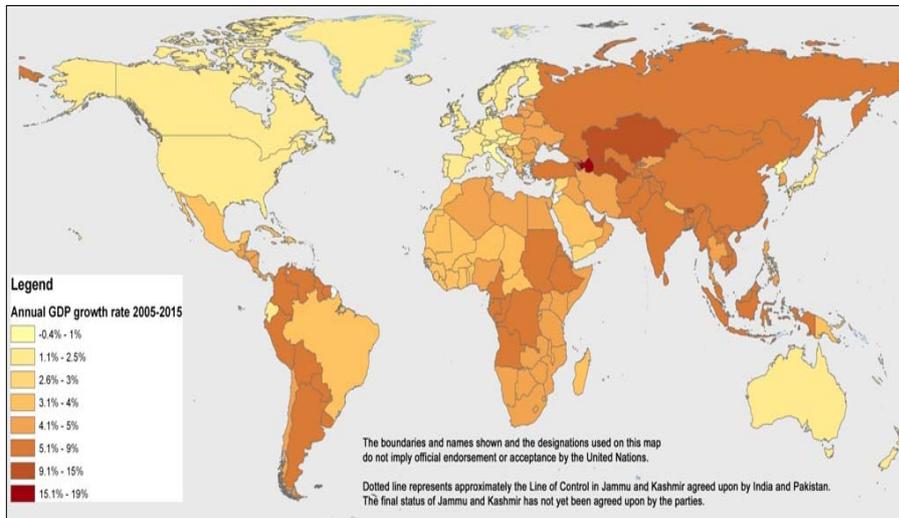7) This was done by estimating separate forecasting equations for individual countries in the ESCAP region. For the countries outside of ESCAP, separate equations were estimated for each 'region', which was defined as a group of countries. In a number of cases, however, the historical time series data was simply not able to support a formal regression process. This is the case in particular where the country is still in the very early stages of containerization. In such cases, there was little alternative but to use professional judgement, informed by an examination of the history of containerization in similar countries during a similar phase of economic development.

containers only: that is, empty containers are not included, and each container is counted only once during its entire journey, regardless of how many times it may be handled.

The total number of full containers shipped internationally is expected to grow to 235.7 million TEU by 2015, up from 113.6 million TEU in 2005 (the base year for the cargo forecasts). The compound growth rate during the period 2005~2015 is 7.6 percent per annum, decreasing from 9.5 percent per annum in the period 1987 to 2006.

Comparison of model forecasts with those provided by private consulting firms suggest that these global level estimates lie within the range of expert opinions, but slightly towards the more conservative end of that range.

〈Table 3-1〉　**Estimated and forecast growth rates for full container trade (1980-2015)**

Year	Container volumes (million TEU)	Compound average growth rate over period
1980	13.5	–
1990	28.7	7.8%
2000	68.7	9.1%
2005	116.6*/113.6	11.2%
2015	235.7	7.6%

Source : UNCTAD 2006, *Drewry 2007, Study estimates.

Past and predicted future global container volumes are summarised in 〈Table 3-1〉. The table shows that growth over the 2000-2005 period had been unexpectedly strong. (For consistency with the early years, the value shown in the table for the 2005 base year for both Drewry Shipping Consultants ― the source of the estimates for 1980 through to 2000 ― and the ITPM database, which is used as the base figure for global container flow forecasts).

It should be noted that these forecasts depend critically on the

assumptions that are made about future world economic growth. Analysis conducted during the course of the study suggests that, for every 1 percent per annum increase or decrease in estimated global economic growth, the rate of growth in container volumes will change by approximately 1.5 percent per annum.

3. Geographical Distribution of Container Volumes

〈Figure 3-7〉 and 〈Figure 3-8〉 show the estimated contribution made to total global full container flows by each major geographical region in the year 2005. 〈Figure 3-7〉 shows that North and East Asia is the most significant driver of global container trade, generating 50 percent of world export trade, with Europe and North America contributing another 35 percent. By 2015 the geographical distribution of export trade is expected to change with North and East Asia increasing its world export share by 12 percentage points, with a further increase of 1 percentage point to South Asia. On the other hand both of the two other largest markets, North America and Europe are expected to lose export market share by 5 and 7 percentage points respectively.

As shown in 〈Figure 3-8〉, regional share of world imports shows a similar trend, with the majority of the market attributable to North and East Asia, and considerable market share to Europe and North America. It is expected in 2015, that East and North Asia will dominate import growth, increasing by 8 percentage points to 48 percent, while North America and Europe will drop to 14 and 16 percent respectively of the world import market.

The volumes of imports and exports in 2005 and 2015 for each of the modelled regions are presented in 〈Figure 3-9〉 and 〈Figure 3-10〉. The resulting spatial representation of trade volumes shows the dramatic increase in China's trade; however, it also shows significant growth for

Kazakhstan and India.

4. ESCAP Trade

Study estimates for the ESCAP region show an average annual increase of 9.5 percent through to 2015, reaching 146.8 million TEU of trade. As a result, the share of ESCAP economies in world container exports, as shown in 〈Figure 3-11〉, is expected to rise from 57 percent to 68 percent by 2015, mainly as a result of the increase expected in East Asia. Similarly, world market share of imports for ESCAP nations is expected to increase from 47 percent in 2005 to 56 percent in 2015.
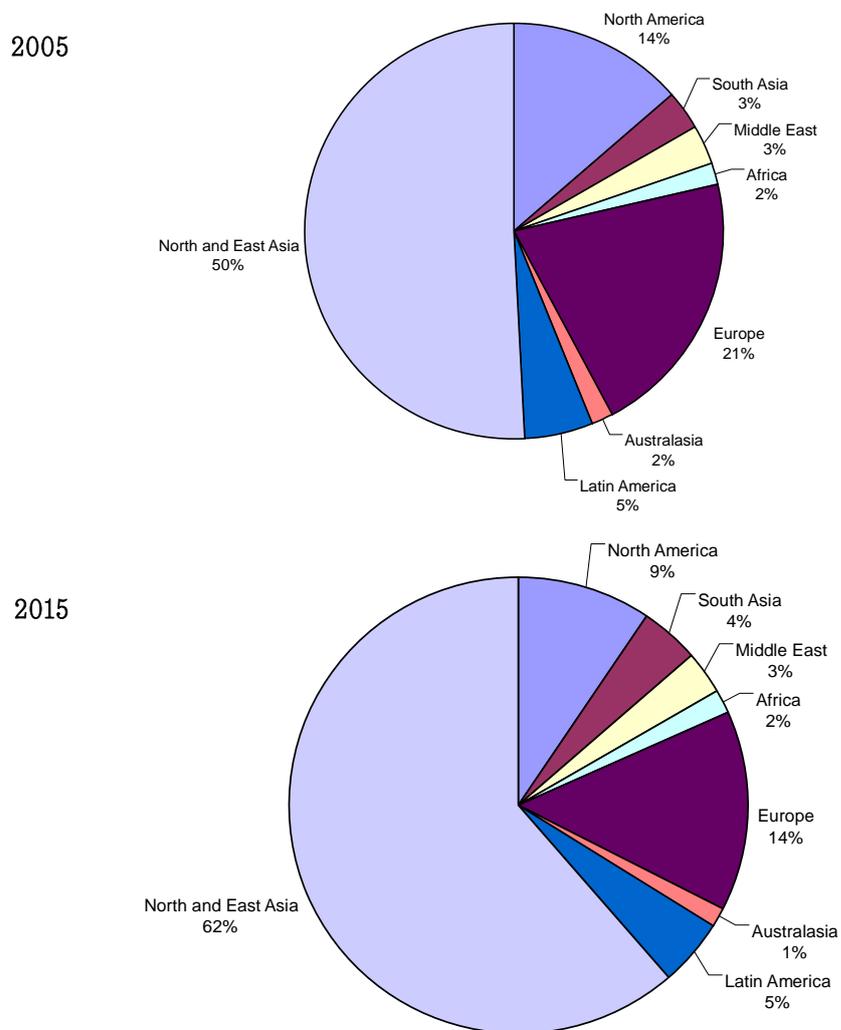
Within the ESCAP region, the balance of exports and imports is expected to change. As shown in Figure 3-12, exports are dominated by East Asia accounting for 58 percent of the ESCAP market. This is expected to increase by 11 percent in 2015 to 69 percent, with corresponding reduction is the share South-East Asia and North Asia in the ESCAP market. Imports are expected to show a similar trend, with East Asia increasing its market share of ESCAP imports to 55 percent, with South-East Asia and North Asia losing 3 percent and 6 percent respectively.

Within the ESCAP region, as shown in 〈Figure 3-12〉, the highest concentration of 2005 trade activity is in China, with high trade volume also seen in Japan and the Republic of Korea. Study estimates show significant trade growth in South Asia, with Pakistan increasing at 14.6% and India at 12.2% to reach 12.7 million TEU of import and export trade in 2015. In the Eastern areas of Asia, China and Viet Nam are estimated to grow at 13.5% and 13.2% respectively, with mainland China reaching 155.3 million TEU in 2015. However, trade growth for Taiwan Province of China, Japan and the Democratic Peoples Republic of Korea are expected to be low, at less than 4% per annum.

Trade growth is expected to be modest for ESCAP nations in the

Australasia and the Pacific region, growing at less than the world average, with Fiji and Papua New Guinea registering growth of only 3.0% per annum.

〈Figure 3-7〉 **Regional share of world export trade 2005 and 2015**

2005

2015

Source : Study estimates.

〈Figure 3-8〉   **Regional share of world import trade 2005 and 2015**

2005

North America
18%

South Asia
3%

Middle East
6%

Africa
3%

Europe
21%

Australasia
3%

Latin America
6%

North and East Asia
40%

2015

North America
14%

South Asia
5%

Middle East
6%

Africa
3%

Europe
16%

Australasia
2%

Latin America
6%

North and East Asia
48%
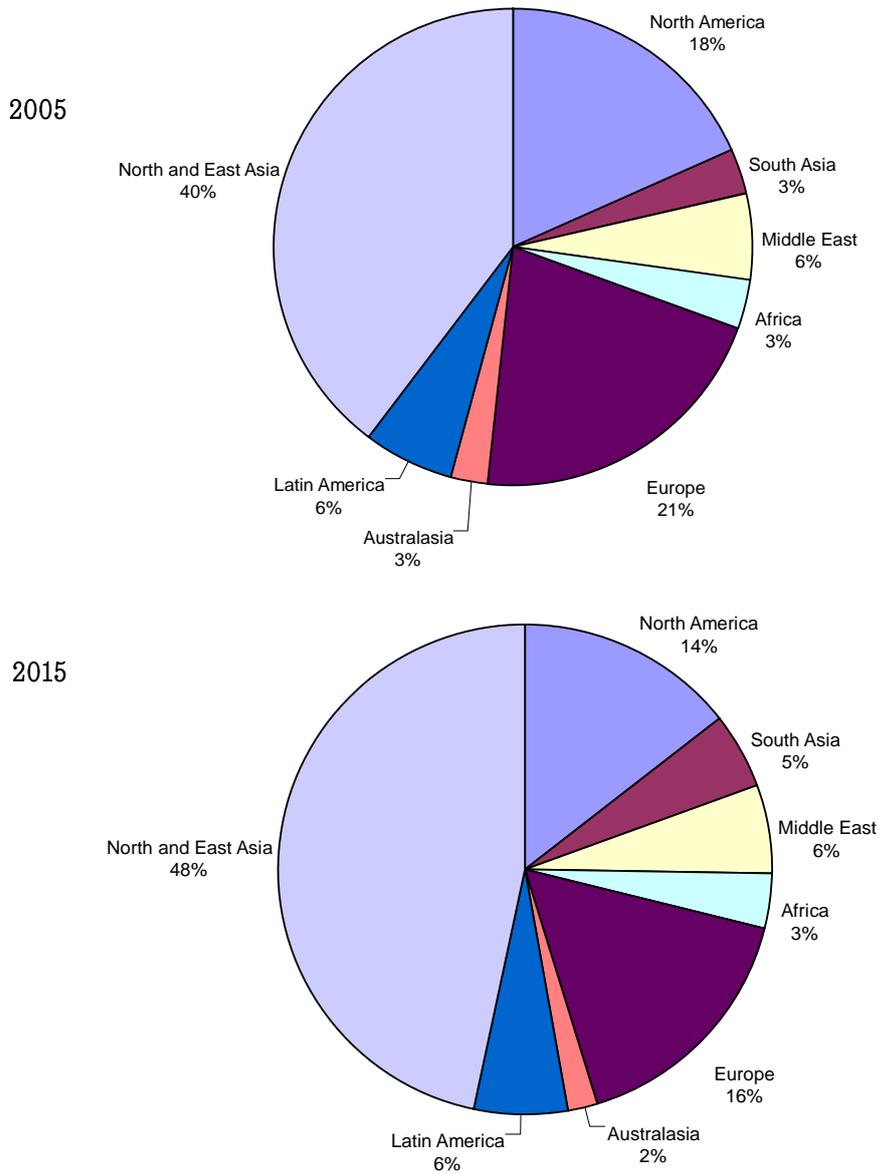
Source : Study estimates.

〈Figure 3-9〉　　　　　**2005 Trade volume by ITPM region**
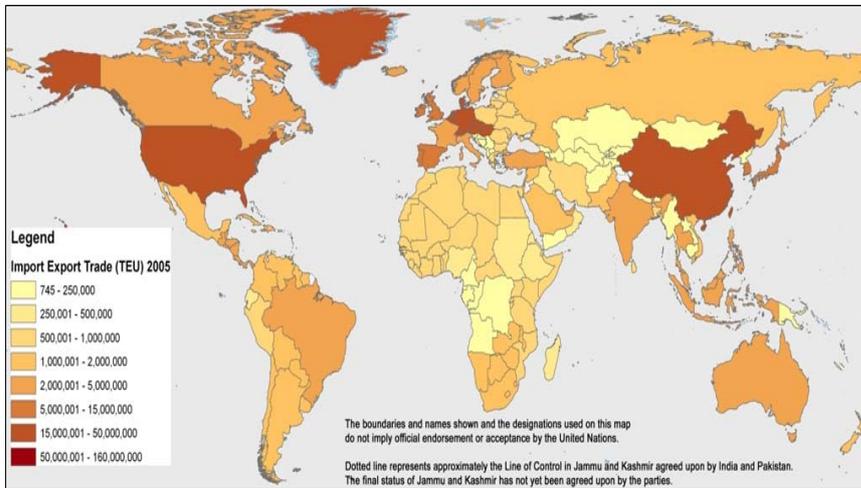
Source：Study estimates.

〈Figure 3-10〉　　　　**2015 Trade volume by ITPM region**
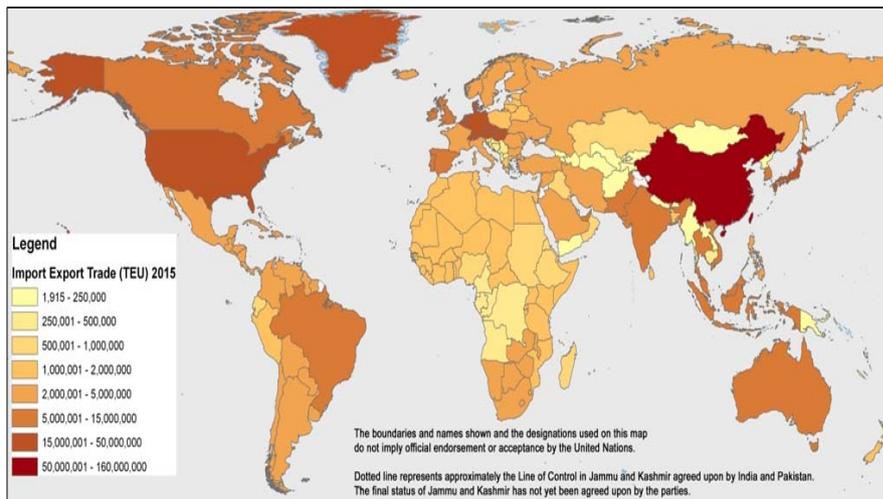
Source：Study estimates.

〈Figure 3-11〉   **ESCAP share of world import and export trade**
(2005 and 2015)

Exports

Imports
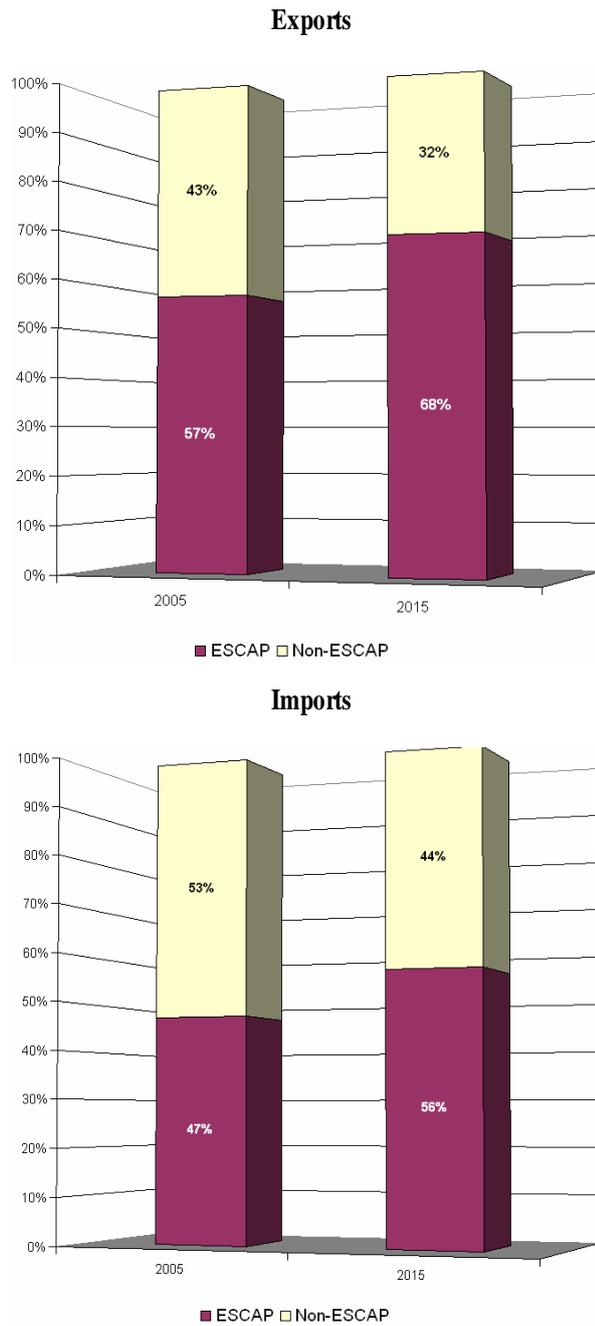
Source : Study estimates.

⟨Figure 3-12⟩   **Subregional shares of ESCAP container trade (2005 and 2015)**

Exports

Imports
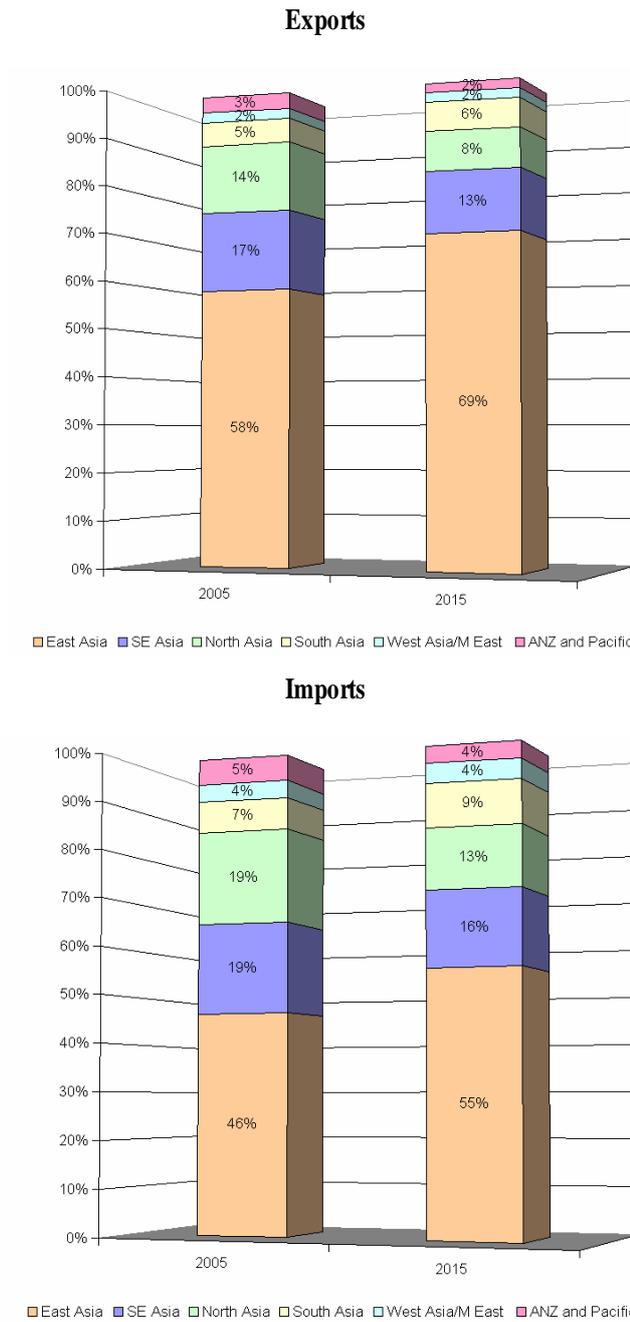
Source : Study estimates.

Chapter Ⅳ. Landlocked Countries

1. The Special Situation of Landlocked Countries

The maritime trading system has played a vital role in the economic development of the ESCAP region, but twelve of ESCAP's member countries have no direct access to the sea. Four of these ─ Afghanistan, Bhutan, the Lao People's Democratic Republic and Nepal ─ area mongst the least developed countries of Asia. Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan and Uzbekistan are classifies as 'economies in transition'.

The disadvantages countries suffer from the lack of maritime access is well-recognised:

"Each of these landlocked countries is disadvantaged by its lack of access to and distance from the sea. Dependence on a limited member of commodities for their export earnings, lack of territorial access to the sea, and remoteness from world markets make landlocked developing countries as a group among the poorest of developing countries" (UN ESCAP, 2007).

The 1998 Almaty Declaration highlighted the importance of trade to the economic development of landlocked countries, and the critical that improved transport and logistics will play in facilitating the trade of these countries and hence supporting their economic growth (UNECE, 2007).

Considerable progress has been made since that time in negotiating cross-border and transit agreements, and in developing the road and rail infrastructure that will allow the landlocked countries of the ESCAP region to be fully integrated into the global trading system. However, much still remains to be done.

2. Estimated Future Container Volumes of ESCAP Landlocked Countries

Estimation of future volumes of containers moving to and from landlocked countries is made particularly difficult by the lack of reliable time series data on past and present container movements. Whereas port statistics provide a readily available and usually accurate source of data for maritime countries, there is no equivalent source for cross-border movements of container cargoes to and from landlocked countries.

This lack of reliable baseline data means that the regression approach usually employed in ITPM studies to produce estimates of future container flows was not viable in these cases. Instead, estimates were made inferentially, combining the limited available data with benchmarks for countries with similar levels of population and economic development. The resulting estimates are presented in 〈Figure 4-1〉 to 〈Figure 4-4〉 below.

〈Figure 4-1〉   **Landlocked country imports – 2005**
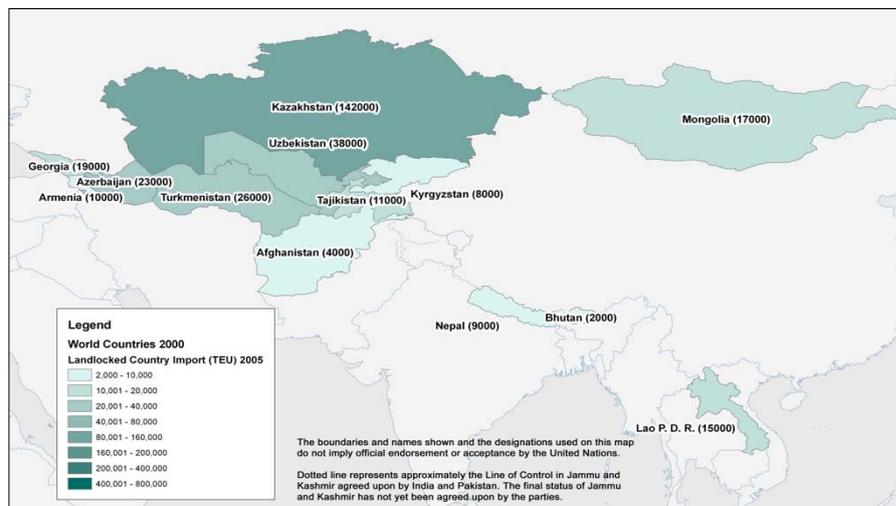
Source : Study estimates.

〈Figure 4-2〉   **Landlocked country imports - 2015**
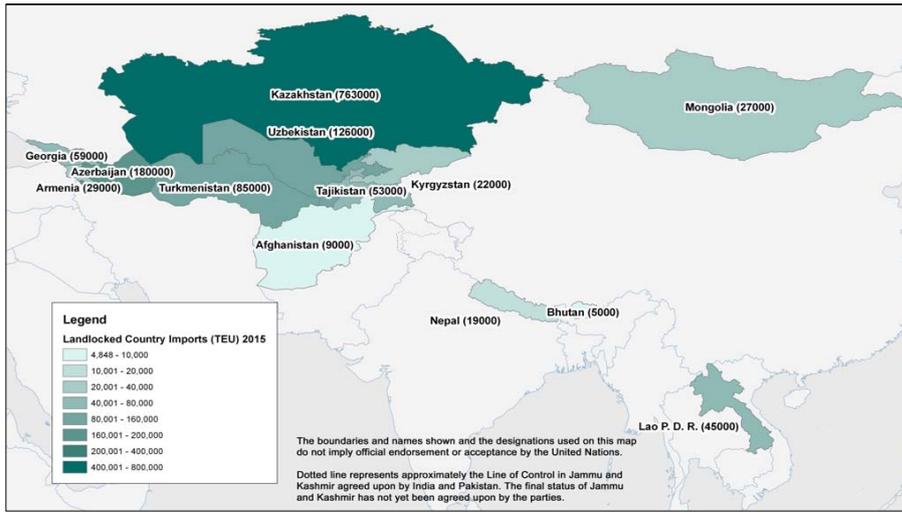
Source : Study estimates.

〈Figure 4-3〉   **Landlocked country exports - 2005**
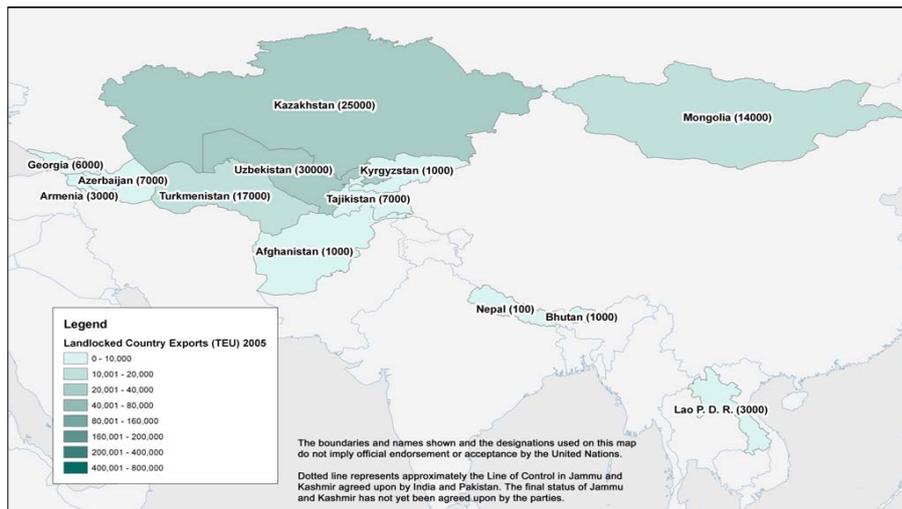
Source : Study estimates.

〈Figure 4-4〉　　　　Landlocked country exports – 2015
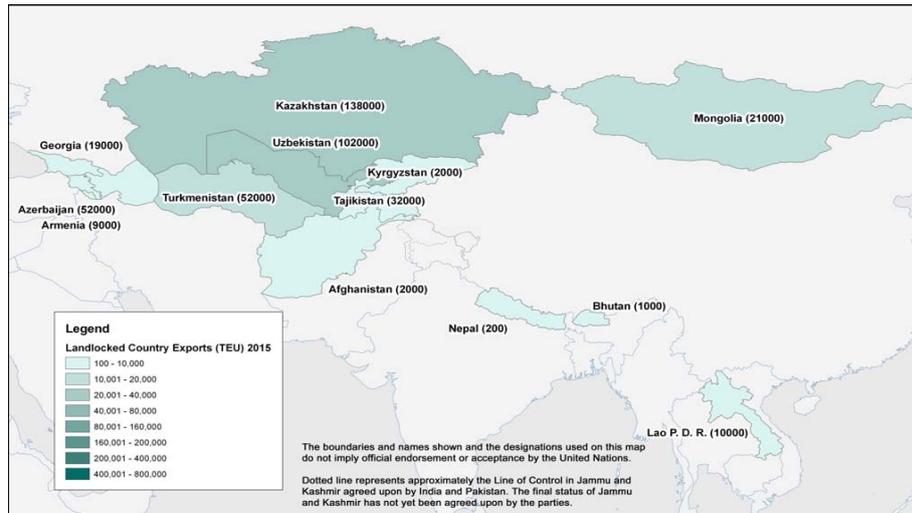
Source : Study estimates.

Chapter Ⅴ. Trade Structure

1. Changing Nature of Global Container Trade

Container shipping routes can be divided into three main groups: (1) East-West trades, which circle the globe in the Northern Hemisphere linking the major industrial centres of North America, Western Europe and Asia; (2) North-South trades articulating around major production and consumption centres of Europe, Asia and North America, and linking these centres with developing countries in the Southern Hemisphere; and (3) intraregional trades operating in shorter hauls and with smaller ships.

〈Figure 5-1〉 **Container Trade by Trade Group (2005 and 2015)**
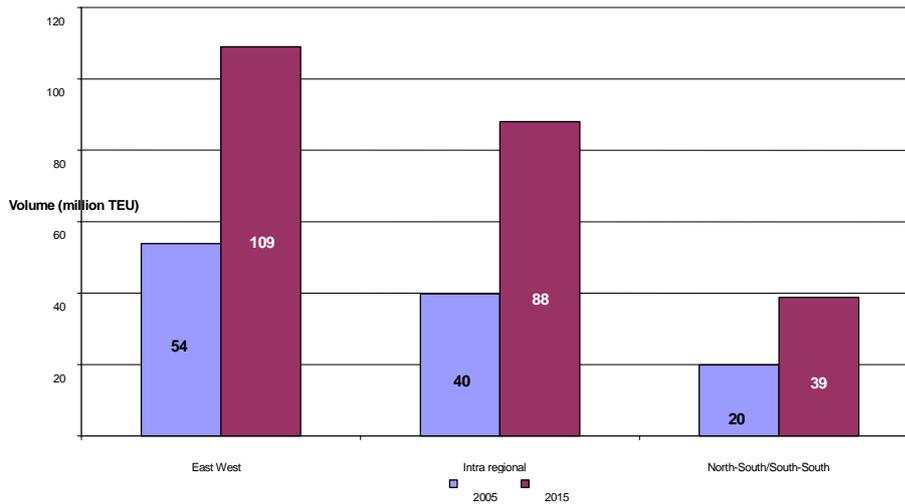
Source : Study estimates.

〈Figure 5-1〉 shows study estimates of the container trade volumes (full containers only) in 2005 and 2015 of each of trade groups. Container trade

volumes on the East-West routes will increase from 54 million TEU in 2005 to 109 million TEU by 2015, representing a 7.3 percent annual growth rate. The study forecasts suggest that the intraregional trades will show solid growth from 40 million TEU to 88 million TEU with a compound average growth rate of 8.3 percent over the same period. The North-South and South-South trade is also expected to grow to 39 million TEU at a rate of 6.9 percent per annum on average.

Global container trade in 2015 will be dominated by trade with and within Asia. 〈Figure 5-2〉 shows the importance of trade with Asia for all of the partner regions ─ including Asia itself (intra-Asian trade).

〈Figure 5-2〉 **Inter Regional Container Trade - 2015**
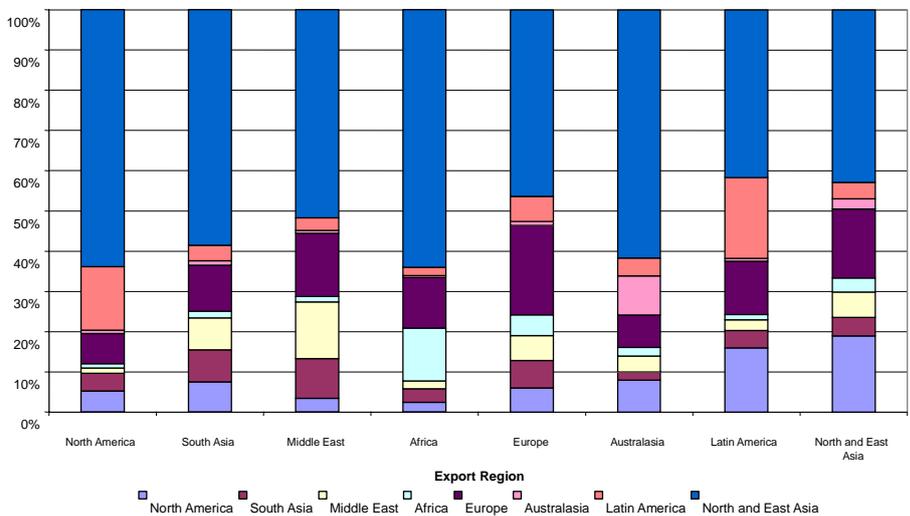
Source : Study estimates.

2. Asia - North America

The biggest deep sea liner route is the trans-Pacific trade between Asia and North America, representing 21.7 million TEU in 2005, equivalent to

40 percent of the total East-West trade and 19 percent of the world total. These services operate between the North American ports on the East Coast, the Gulf and the West Coast and the industrial centres of Asian countries, with some services extending to the Middle East.

As shown in 〈Figure 5-3〉, it is expected that the trans-Pacific trade will show an annual growth rate of 7.2 percent per annum. The trans-Pacific trade is no longer expected to remain the largest of the East-West trades being overtaken by the Asia Europe trade despite reaching 43.4 million TEU in 2015.

〈Figure 5-3〉   **Trade Lane Growth (2005-2015)**
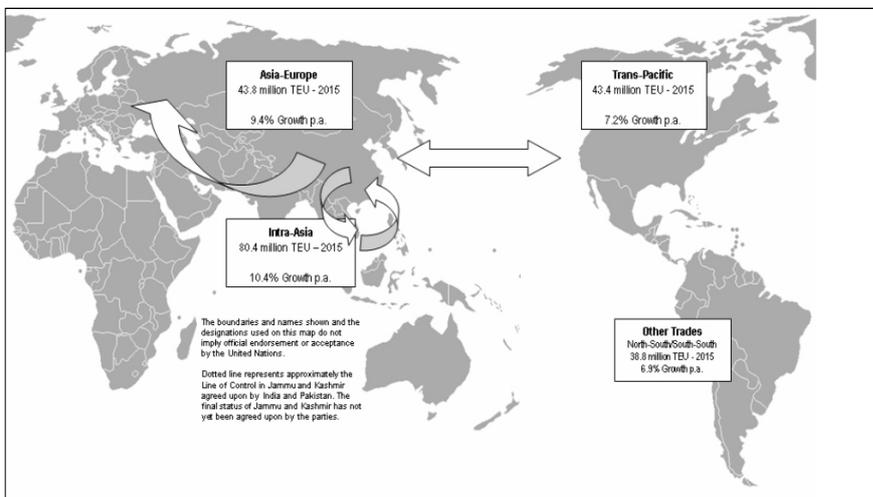
Source : Study estimates.

Since the Asian crisis the trans-Pacific trade growth has been very unbalanced, with strong growth in the eastbound trade coinciding with a deep and protracted slump in westbound volumes. Container flowson the dominant leg, Asia to North America, reached 13.6 million TEU in 2005, while in the opposite westbound direction the flow stood at 8.1 million TEU.

The study forecasts suggest that the current trade imbalance is likely to be a long-term feature of the trans-Pacific trade, as shown in 〈Figure 5-4〉. An average growth rate of 6.5 percent per annum until 2015 is forecast for the westbound trade, compared with a growth rate of 7.6 percent per annum in the eastbound trade. It is expected that in 2015 the container volume of westbound trade on the trans-Pacific route will be around 15.1 million TEU, which is a little greater than half of the eastbound trade, 28.3 million TEU. As the imbalance of container flows is expected to continue, repositioning of empty containers will remain a major concern for carriers, in particular those operating on the trans-Pacific trade route.

〈Figure 5-4〉   Trade Imbalance on East-West Routes – 2015

Source : Study estimates.

Trade direction on East West Routes 2

	Volume (million TEU)
30	
25	
20	
15	
10	

28.3

26.1
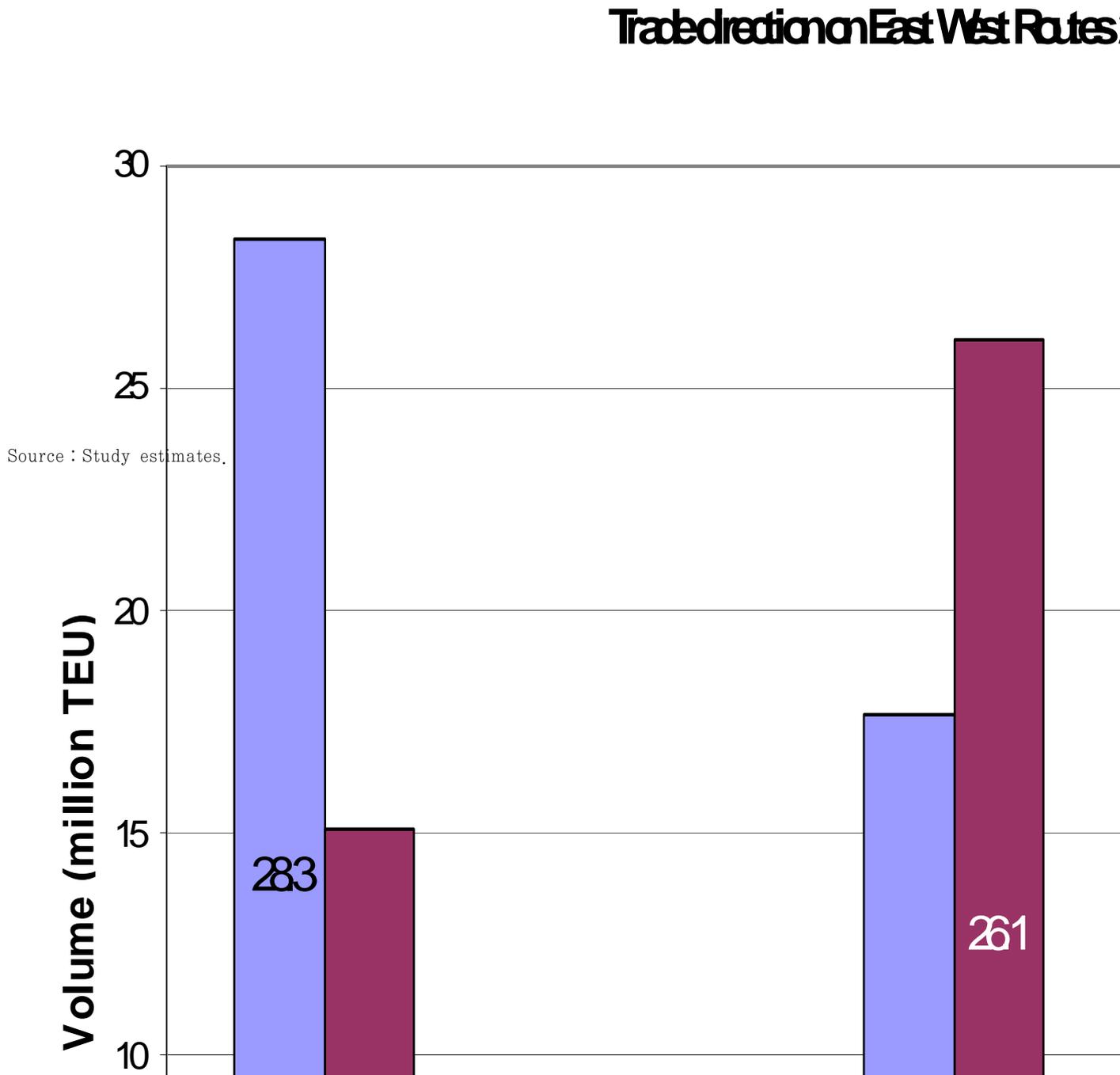
3. Asia - Europe

The prospects for the growth of Asia-Europe trade appear stronger than trans-Pacific trade, growing at an average rate of 9.4 percent per annum until 2015 〈Figure 5-3〉. It should be noted however that this growth rate covers the whole of the Asia-Europe trade, including some very mature markets such as Northern Europe-Japan, which are expected to grow only slowly. Some other components — for instance, trade between East Asia and the Mediterranean, and between India and all parts of Europe, are expected to grow more rapidly than the rate quoted above.

Like the trans-Pacific trade, this Asia-Europe trade has also become unbalanced since the 1997 Asian currency crises. In the early 1990s, the volume of cargo carried in each direction in this trade lane was relatively even: although westbound TEU numbers exceeded eastbound by around 10 percent, this was offset by the fact that eastbound containers were, on average, significantly heavier.

By 2005, this had changed greatly, particularly with respect to Asian trade with Northern Europe. According to the study forecasts, the trade imbalance on the Asia-Europe route will, like the imbalance on the trans-Pacific route, continue through to 2015. Westbound volumes are expected to increase from 10.5 million TEU to 26.1 million TEU at an average of 9.5 percent per annum over the forecast period, compared to the estimated rate of growth of 9.2 percent for eastbound volumes from 7.4 million TEU to 17.7 million TEU during the same period.

4. Intra-ESCAP

In the growth model for almost all of the principal Asian economies trade, and particularly exports, plays a pivotal role. Trade growth has

occurred at the same time as a burgeoning of FDI in manufacturing plants located in lower labour cost countries by the more wealthy Asian economies: initially Japan, but subsequently the Republic of Korea; Taiwan Province of China; Hong Kong; and Singapore. This, together with trends in manufacturing processes that have favoured the two-way trade in components and sub-assemblies, led to spectacular levels of growth in the intra-Asian container trades during the early and mid-1990s, until the Asian economies were hit by the 1997 crisis.

It seems however that regionalisation and the lessons learned form the crisis have since assisted a rebound Asian trade. A number of factors suggest that long-term growth prospects for the intra-Asian trade remain strong:

- Sound medium to long term growth prospects for most Asian economies;
- Close proximity of a number of economies at very different levels of economic development;
- The continued importance of more economically advanced Asian economies as sources of FDI for the less developed economies of the region;
- Regional free trade agreements such as ASEAN's Common Effective Preferential Tariff Scheme (CEPT).

Model estimates in this study suggest that the intra-Asian trades are set for sustained solid growth, with a compound average growth rate of 10.4 percent per annum over the period 2005-2015.

Within the intra-Asian trades, growth of trade to and from East Asia, South Asia and North Asia hold out great promise for the future. China, including Hong Kong, China and Taiwan Province of China, will continue to dominate intra-Asian trade with an expected growth rate of 11.4 percent per annum from 2005 to 2015. The flow of container trade between the Asian regions is shown in ⟨Figure 5-5⟩.

〈Figure 5-5〉 **Intra Trade flow - 2015 (million teu)**

Source : Study estimates

5. Minor Routes

North-South routes are articulated around the major production and consumption centres of Europe, Asia and North America, and link these centres with developing countries. It is estimated that in 2005, the container traffic circulation in the North-South and South-South routes was around 19.9 million TEU. Through to 2015, study estimates show an increase of approximately 6.9% to 38.8 million TEU 〈Figure 5-3〉.

Asia's container trade with Africa and Latin America and Australia is expected to grow at rates well in excess of the world average throughout the forecast period, averaging 12.7 and 15.6 percent per annum respectively percent per annum. This reflects improved economic performance and a greater acceptance of containerization in these partner regions.
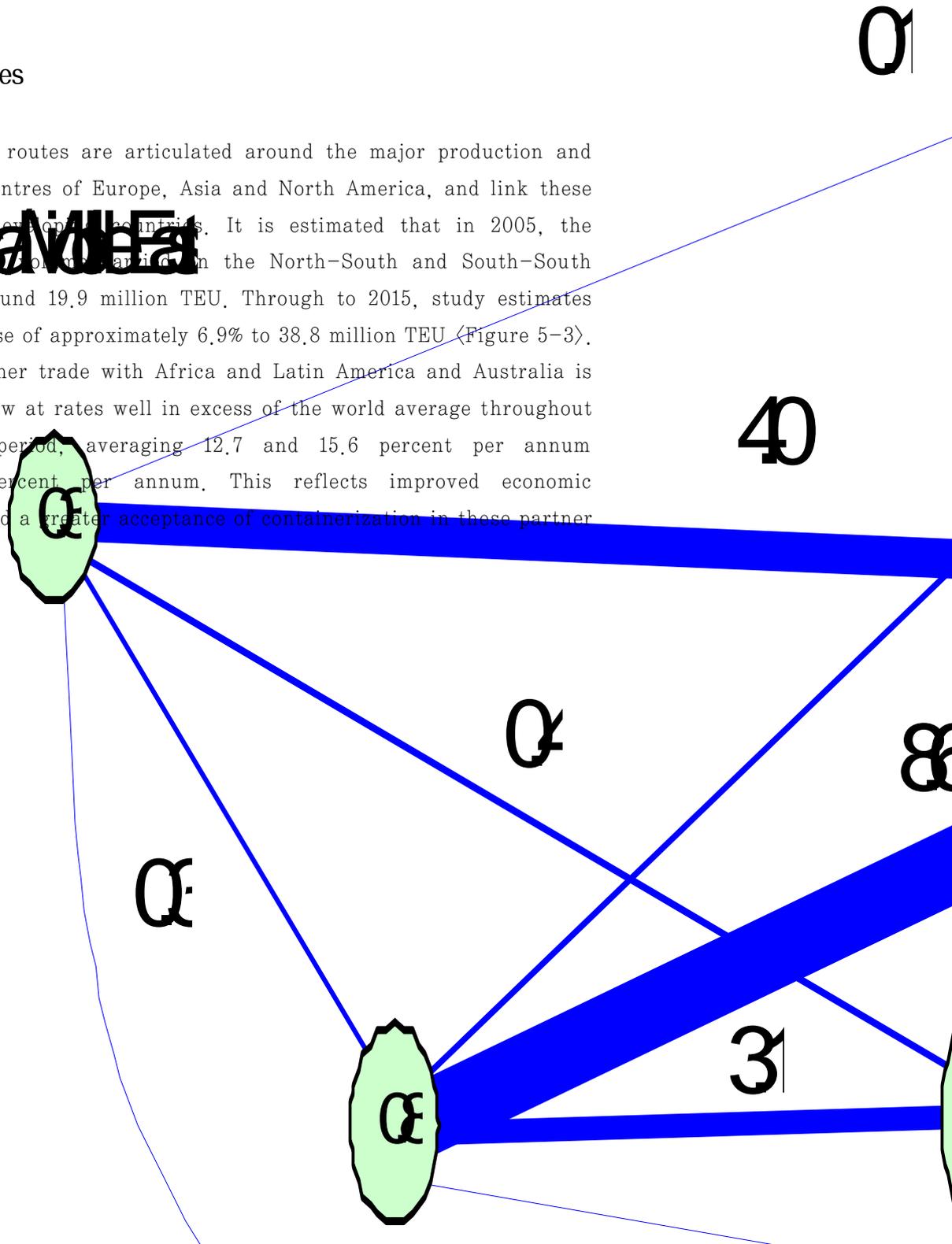
Chapter VI. Container Port Volumes

1. From Container Flows to Port Volumes

The forecasts discussed in previous chapters refer to the volume of containerized cargo that is shipped internationally. This information is difficult to obtain, and the values are subject to considerable measurement error. The most commonly quoted statistics on the size of the global container market refer to the number of container handling movements in ports, which is a more readily observable magnitude.

Port cargo handling volumes differ from the number of container movements because:

- Each container is counted at least twice, once at the port of export and once at the port of import;
- Some containers are transhipped at intermediate ports en route to their destination, in which case the container is counted twice more in port statistics: once as it is taken off the vessel and once as it is put back on;
- Port statistics also include empty containers loaded and unloaded in the port;

In addition, port statistics also include the movement of domestic containers, which are not included in the current study.

2. Empty Containers

Empty container movements at present constitute approximately 20

percent of the world total international container port throughputs. Excess capacity is likely to be a feature of liner shipping for the foreseeable future. This will continue to place pressure on operating margins, and provide a strong incentive for shipping lines to minimize logistics costs, of which empty container movements are a major component. At the same time, increasingly sophisticated container tracking and management procedures should provide opportunities for realizing economies in this area.

On the other hand, as discussed in Chapter 5, trade imbalance on the trans-Pacific and Asia-Europe routes is expected to become more pronounced as export growth continues to outstrip line growth of imports. The pattern of increasing imbalances is mirrored in a number of important North-South trades, including the intra-ESCAP routes between Asia and Australasia. Therefore it seems inevitable that carriers are going to be faced with the challenge of managing very large volumes of empty containers.

The ITPM model's approach is to estimate the volume of empty containers handled in each port. This approach is illustrated diagrammatically in ⟨Figure 6-1⟩.

- The major direction for container movements is identified at each port: these may be either import direction, or the export direction.

- A percentage of empty containers is added to this major flow. The ITPM models have the ability to adjust this percentage from port to port, however it is difficult to predict with confidence. In this study, we have therefore chosen to apply a global average percentage to most ports of 3.5 percent.

- Thirdly, the number of empty containers in the minor flow direction is estimated by subtracting the number of full containers in the minor flow direction from the total number of containers in the major flow direction. The assumption, therefore is that total flows (full plus empties) are balanced in each port. This assumption is

unrealistic with regard to any particular port in any particular year. However, given the challenge of predicting the actual ratio in future years, the minor impact that imbalances have on overall volumes, and the fact that globally a balance must be maintained, the simplifying assumption was justified.

〈Figure 6-1〉 **Estimation of empty container movements: ITPM models**
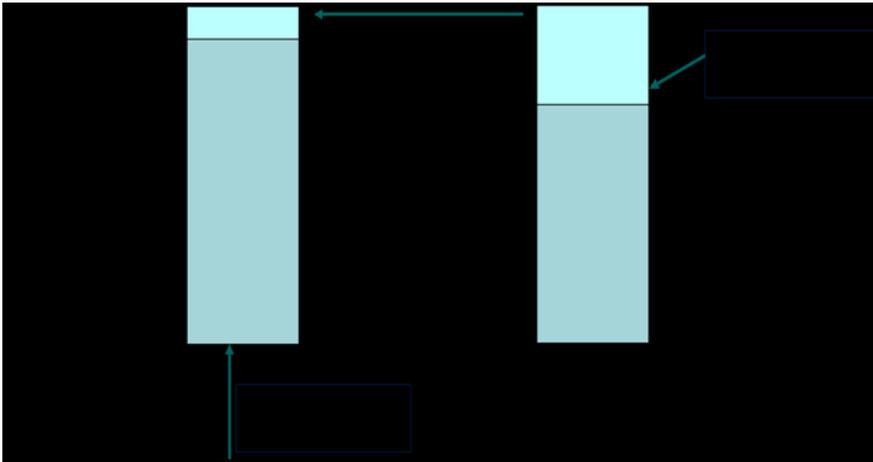
〈Figure 6-2〉 shows the ratio of empty containers to total containers handled in ports over the last 20 years. It can be seen that until approximately 1996 there was a clear declining trend in the ratio of empty to full containers, as increasingly sophisticated container logistics gradually reduced the number of empty container movements. In 1998, the ratio increased to well over 20%. This was due to the emergence of very pronounced imbalance in the two main Asian trades with Europe and North America caused by the Asian currency crisis. This imbalance has persisted though to see present day.

⟨Figure 6-2⟩ **Empty share of container movements
(1985-2006, 2015)**
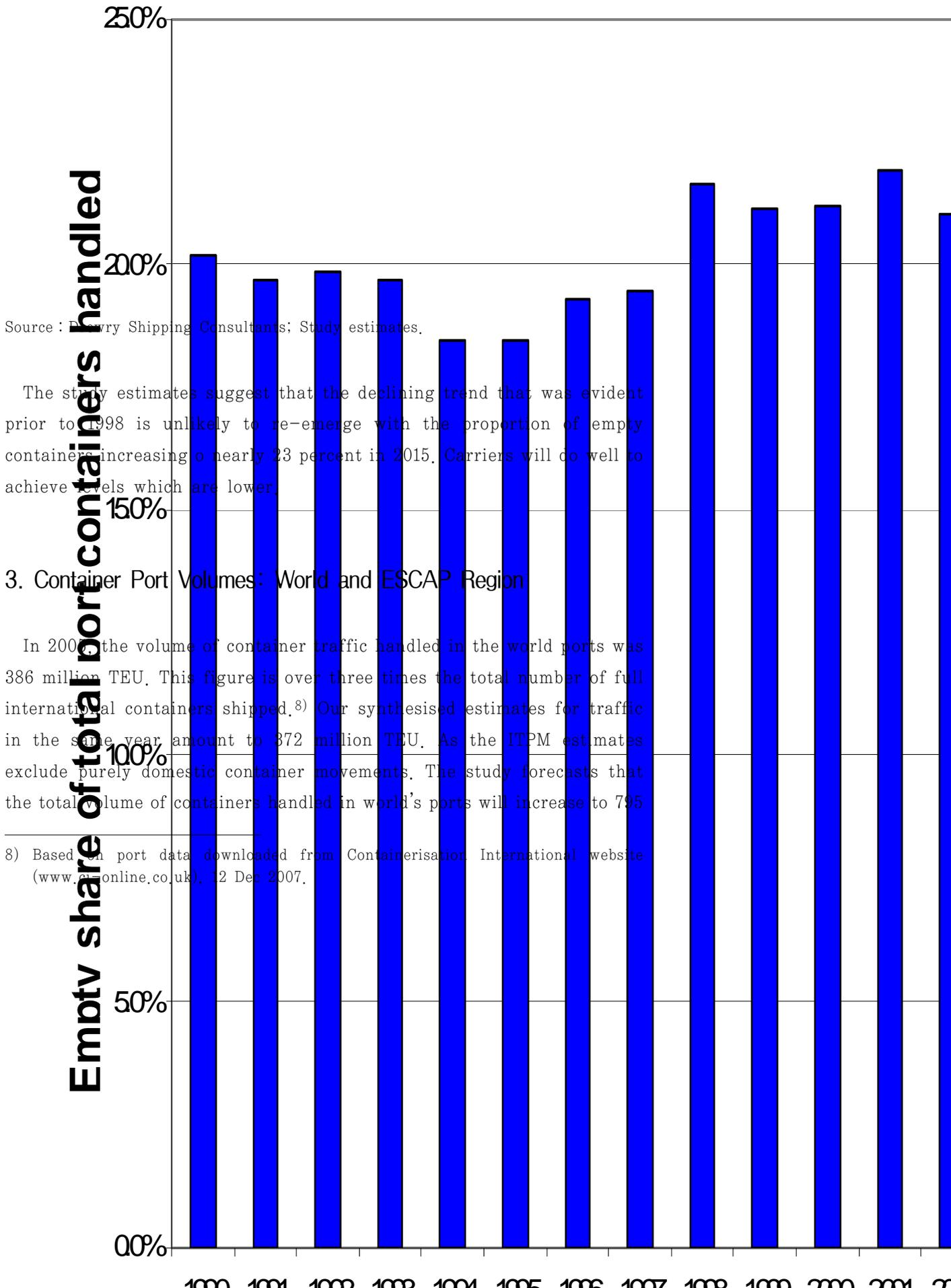
Source : Drewry Shipping Consultants; Study estimates.

The study estimates suggest that the declining trend that was evident prior to 1998 is unlikely to re-emerge with the proportion of empty containers increasing to nearly 23 percent in 2015. Carriers will do well to achieve levels which are lower.

3. Container Port Volumes: World and ESCAP Region

In 2006 the volume of container traffic handled in the world ports was 386 million TEU. This figure is over three times the total number of full international containers shipped.[8] Our synthesised estimates for traffic in the same year amount to 372 million TEU. As the ITPM estimates exclude purely domestic container movements. The study forecasts that the total volume of containers handled in world's ports will increase to 795

8) Based on port data downloaded from Containerisation International website (www.ci-online.co.uk), 12 Dec 2007.

million TEU by the year 2015. This implies an annual average growth rate over the period of 7.9 percent.

The ESCAP region will dominate this growth. The total volume of international import/export container handling in the ports of the ESCAP region will increase from 152 million TEU in 2005 to 383 million TEU in 2015 at an annual average growth rate of 9.7 percent. By 2015, non-transhipment movements through ports of the ESCAP region will account for 63% of the global total.

〈Figure 6-3〉　　　Total container throughput of ESCAP economies - 2015 (miilion TEU)

Source : Study estimates.

Mainland China ports, 216.5
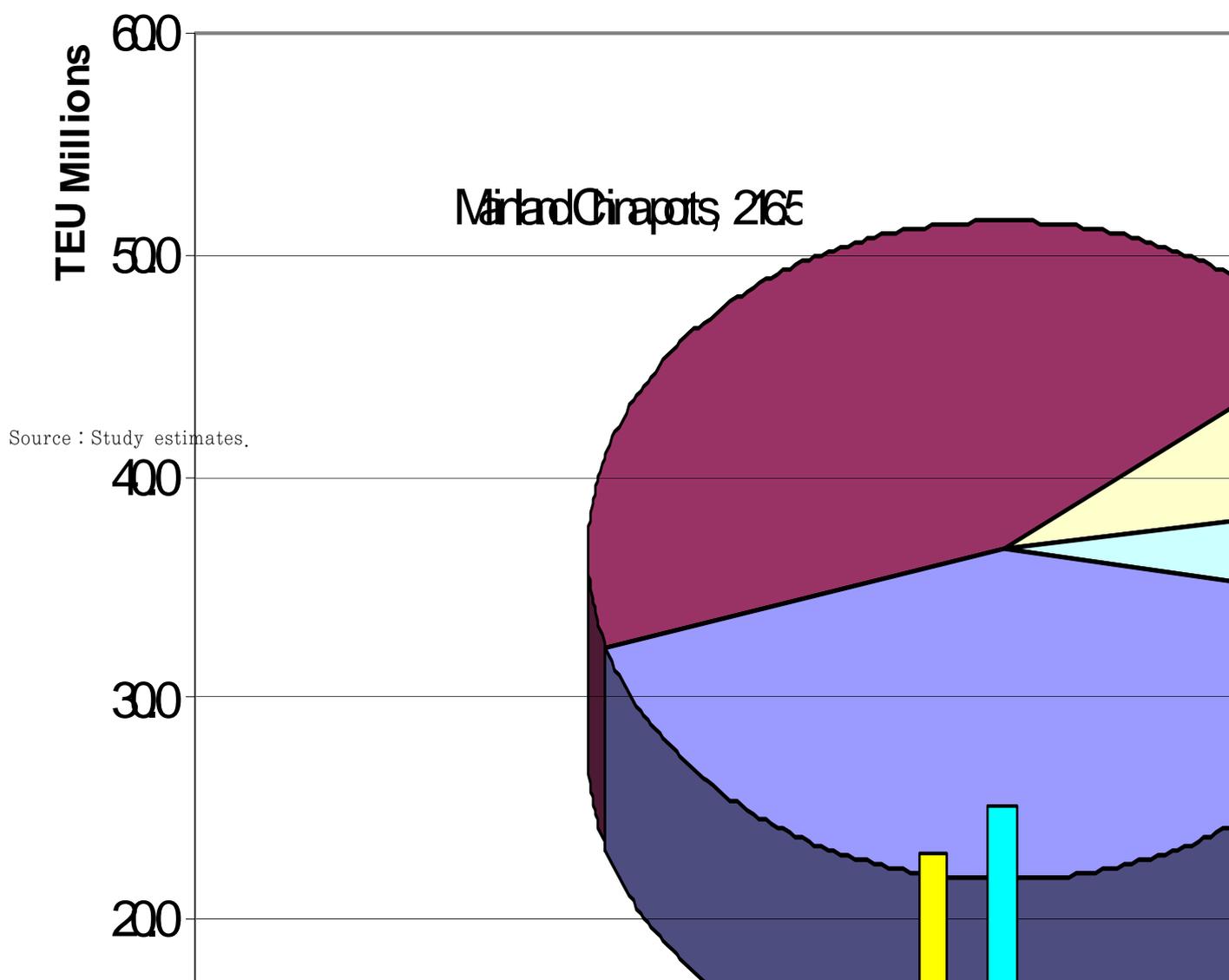
⟨Figure 6-3⟩ shows forecast container port throughput (including transhipment) of most of the major economies of the ESCAP region. By 2015, the mainland ports of China are expected to handle 216.5 million TEU, or 44% of the total regional volume. In addition, 65 million TEU is expected to pass though the ports of Hong Kong and Taiwan province of China.

The rest of the region is expected to account for a total of 207 million TEU, with Singapore by far the largest contributor, with a throughput of around 48 million TEU. Malaysia, Japan and Korea are each expected to handle between 20 and 25 million TEU, with India's volume increasing rapidly from current modest levels to over 14 million TEU.

⟨Figure 6-4⟩   Total container throughput annual growth rate of ESCAP economies (2005-2015)
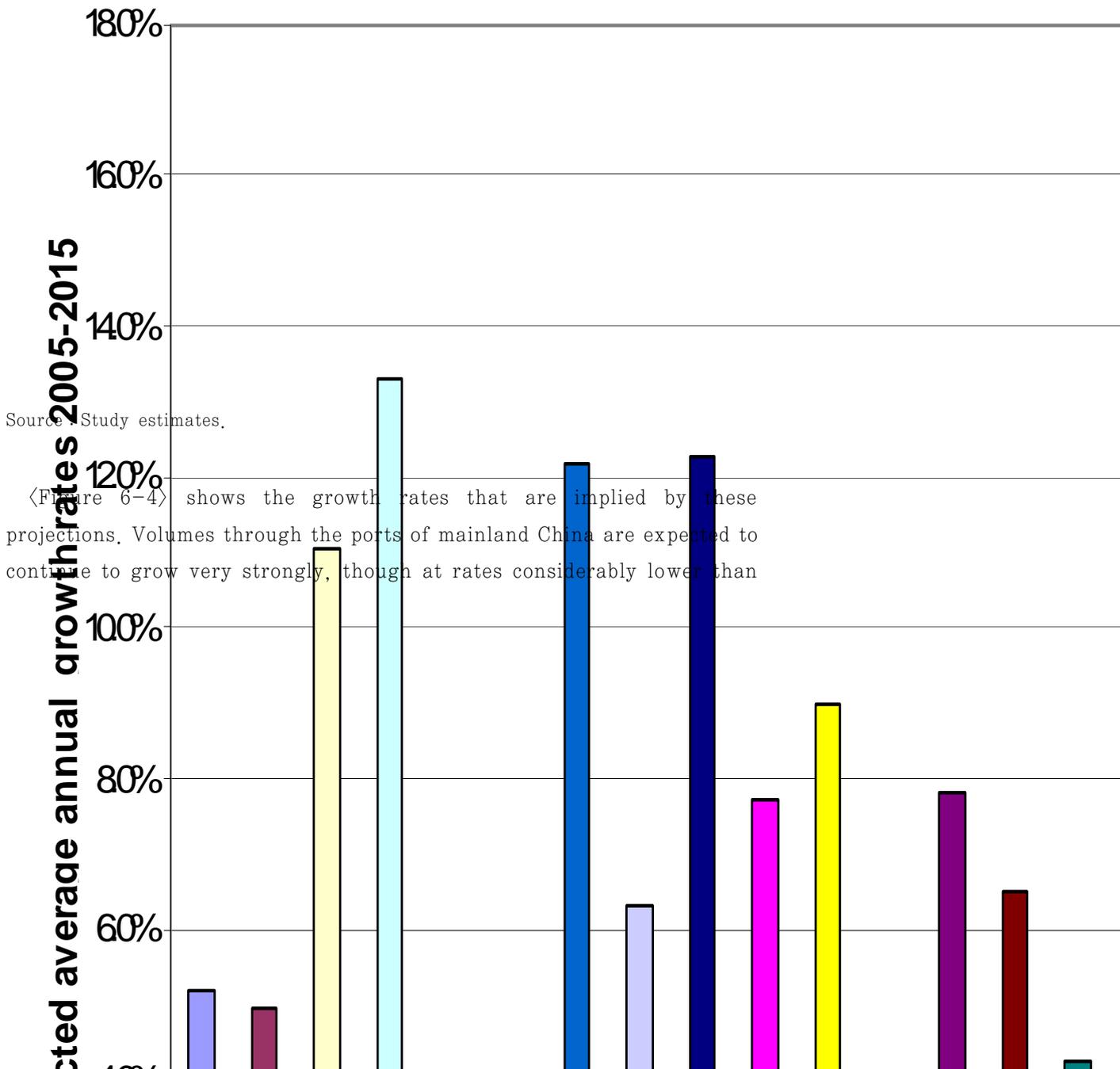
Source : Study estimates.

⟨Figure 6-4⟩ shows the growth rates that are implied by these projections. Volumes through the ports of mainland China are expected to continue to grow very strongly, though at rates considerably lower than

those experienced during the last decade. The rapid growth of China will be continue to be a major of the driving forces behind the predicted strong growth of port throughput in other economies of the region. But strong growth is also predicted for South Asia, with Bangladesh, India, Pakistan and Sri Lanka all expected to register annual growth rates approaching or exceeding 10% throughout the period.

Within South-East, growth is expected to be led by the least developed economies, with Vietnam and Cambodia both expected to grow at rates in excess of 10% throughout this period.

4. Patterns of Transhipment

1) Transhipment growth

Historical trend

〈Figure 6-5〉 shows estimates made by Drewry Shipping Consultants (2007) of the historical trend in the growth of transhipment volumes since 1990. According to these estimates during the 1990s, transhipment volumes, as a proportion of the total container volume handled in the world's ports, increased steadily, rising from 18% in 1990 to 25% in 2005. Since then, however, transhipment volumes increasing at roughly the same rate as total port volumes.[9]

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9) The ITPM estimates of global transhipment volumes in 2005 are considerably lower than those of Drewry (85 million compared to 100 million TEU). The shares shown in 〈Figure 6-5〉 are therefore not strictly compatible with the shares quoted in the next subsection, which are taken from the ITPM study.

〈Figure 6-5〉   **Trends in transhipment**
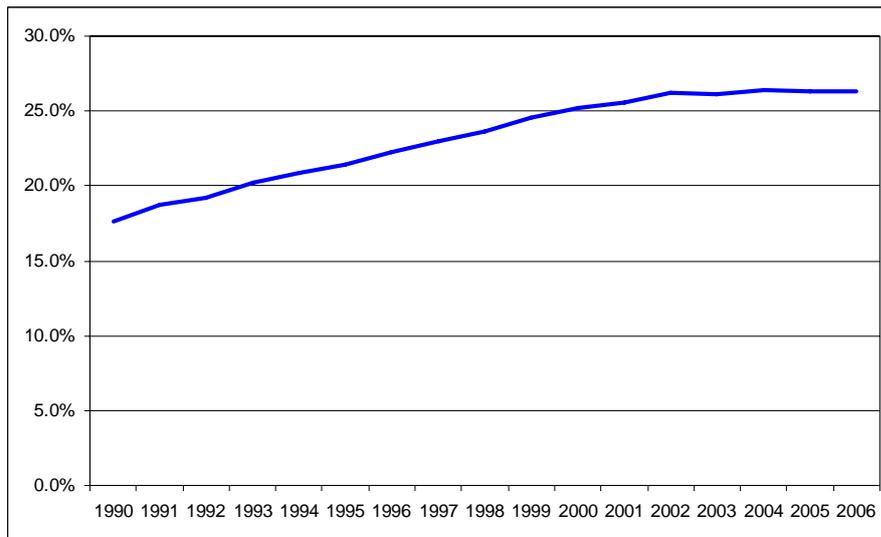
Source : Drewry Shipping Consultants, 2007.

Drivers

While containership size has increased, and container volume has grown, shipping networks have increased in complexity as well as in scale. The key development has been the evolution of hub-and-spoke systems (with cargoes are carried from tributary ports by feeder vessels) loaded on to large mainline vessels calling at major transhipment hubs.

However, using a hub and spoke system means incurring the costs of feeder services and of extra handling movements in the hub port. In many cases, it means longer transit times, and, where common carrier feeder services are used, a less visible presence in the port of origin (or destination) of the cargo.

Shipping lines are therefore required to constantly balance the benefits of transhipping over a hub port against those calling directly at the port of origin (or destination) of the cargo. For any particular market, this will change over time -as volumes increase, making direct calls becomes more

attractive. From ⟨Figure 6-5⟩, it appears that during the 1990s, the momentum was clearly in favour of increased use of transhipment hubs. Over the past five years, however, the tow opposing forces appear to have been almost in equilibrium.

Transhipment cargoes offer port authorities and terminal operators an opportunity to develop their businesses at a faster rate than the development of their economic hinterlands permit. Therefore it is not surprising that competition for transhipment business is fierce, and volumes can be very volatile. It is, therefore, useful to obtain some assessment of both the overall scale of this important market sector, and the extent to which individual ports are likely to be successful in it. The study has attempted to explore these issues. It should be kept in mind, however, that it is possible to do so only in so far as the competitive position of individual ports is determined by their quantifiable characteristics, such as location and cost structure. Policy variables, such as the priority that a terminal is willing to accord a shipping line or willingness to make dedicated terminals available to shipping lines, are likely to have an equally important bearing on eventual outcomes.

2) Global transhipment volumes

The study estimates that the world total transhipment volume of containers will increase from around 85 million TEU in 2005 to 184 million TEU in 2015 at an average growth rate of 7.6 percent per annum. At that time, the share of transhipment in total port volume is expected to be approximately 23.1% percent of the total volumes handled in the world's ports, as shown in ⟨Figure 5-5⟩. This is virtually unchanged from the ITPM estimates of transhipment shares in 2005 (22.9% of the global total).[10]

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10) As noted previously, this differs from the Drewry estimate of the global transhipment share at 26.1% in 2005.

〈Figure 6-6〉   **Total container volume by movement type - 2015**

<div align="right">unit : million TEU</div>

Transhipment, 183.9

M/O/D containers, 139.9

Source : Study estimates.

3) Global distribution of container volumes

〈Figure 6-7〉   **Transhipment volumes by global region**

Africa

Source : Study estimates.
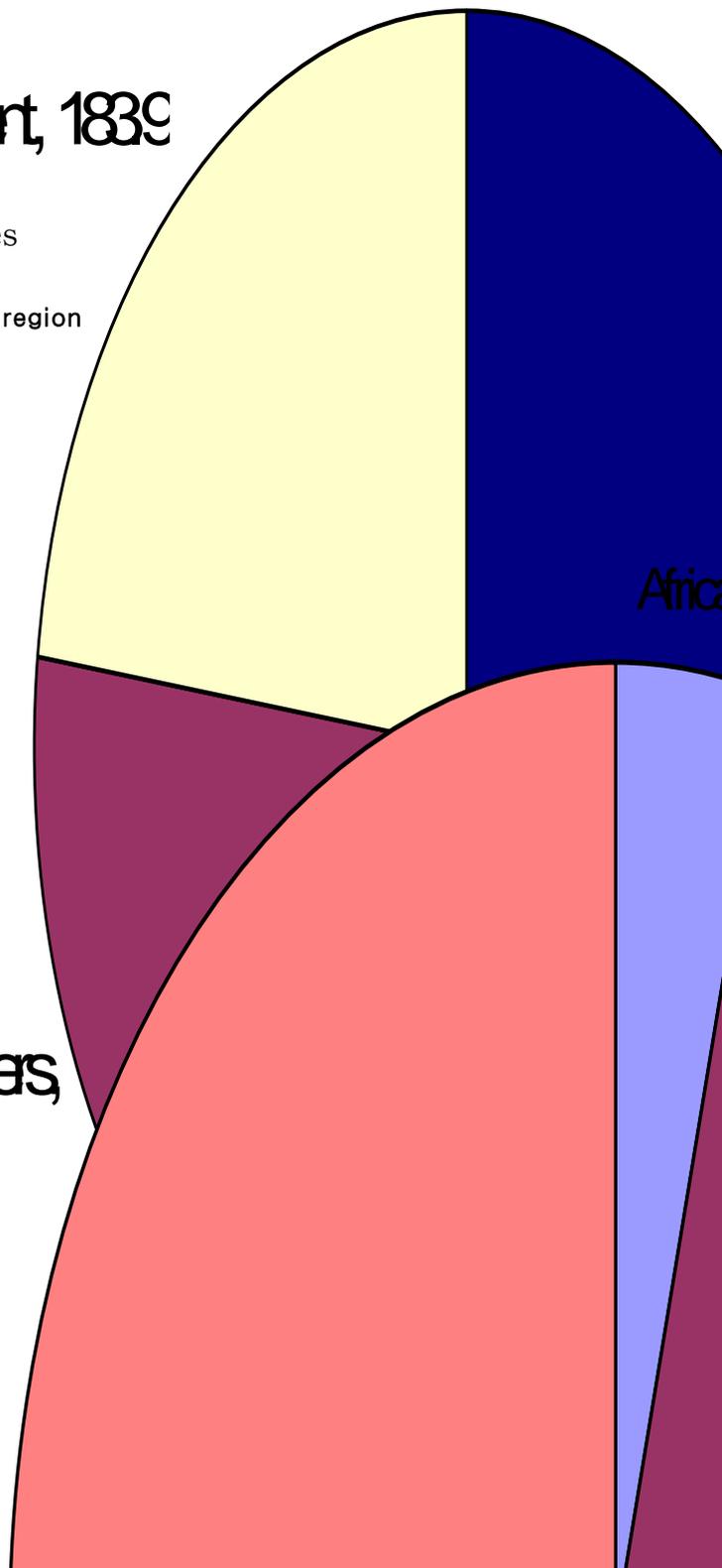
Asia has led the world in the development of transhipment operations. Singapore emerged in the late 1980s as the first port in the world that was dependant primarily on transhipment cargoes for its existence. Since then it has been joined by other ports in Asia, including Colombo, several ports in the Persian Gulf, and the new ports of Salalah, Aden, Tanjung Pelepas and Gwangyang. In addition, a number of ports that have substantial volumes of hinterland cargo also play a major role in the transhipment system: these include ports of Hong Kong, Kaohsiung, Busan, and Port Klang.

〈Figure 6-7〉 suggests that this dominance is expected to continue ─ if fact, to increase ─throughout the forecast period. The total volume of containers transhipped in ports of the ESCAP region is expected to reach 109 million TEU by the end of the forecast period. This is almost 60% of the total expected global transhipment volumes.

4) Major transhipment centres

〈Figure 6-8〉 shows the ITPM's estimates for transhipment volumes by economy within the ESCAP region. The forecasts emphasise the rise of the Malaysian ports of Port Klang and Tanjung Pelepas as alternatives to the traditional Southeast Asian hub of Singapore. However, the figure also shows that, despite the increasingly important role of these ports, Singapore is likely to remain the premier transhipment port of Southeast Asia.

All three of these ports are likely to gain significantly from the continued increase in the number of very large ships operating on highly streamlined routes, as well as from continued economic growth in the countries in the neighbouring economies.

〈Figure 6-8〉   **Asian transhipment throughput distribution (2015)**
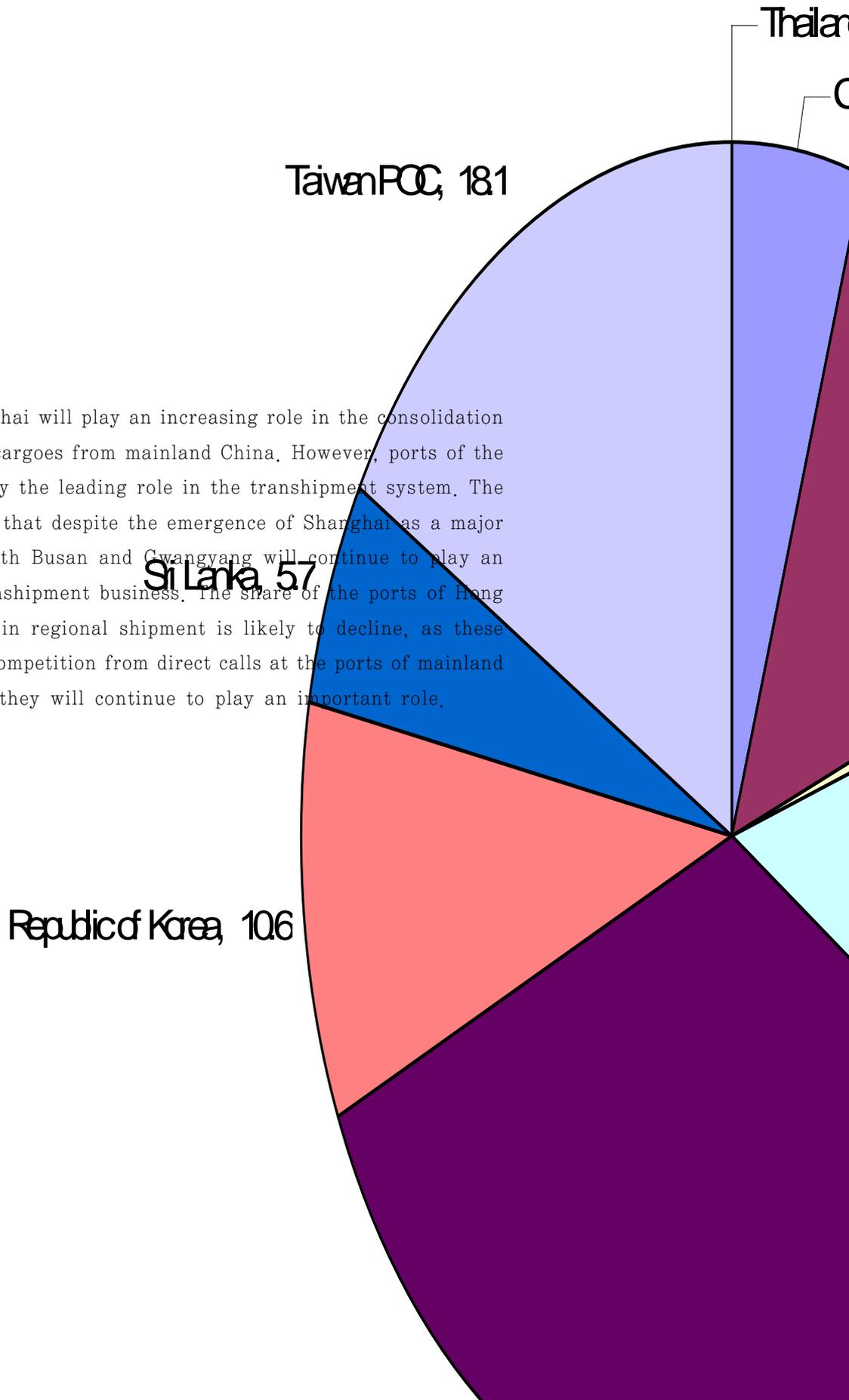
Source : Study estimates.

   In East Asia, Shanghai will play an increasing role in the consolidation and transhipment of cargoes from mainland China. However, ports of the Republic of Korea play the leading role in the transhipment system. The study estimates show that despite the emergence of Shanghai as a major transhipment hub, both Busan and Gwangyang will continue to play an important role in transhipment business. The share of the ports of Hong Kong and Kaohsiung in regional shipment is likely to decline, as these ports face increased competition from direct calls at the ports of mainland China. Nevertheless, they will continue to play an important role.

Thailan

C

Taiwan POC, 18.1

Sri Lanka, 5.7

Republic of Korea, 10.6

Chapter Ⅶ. Container Berth Requirements

The study estimates that the numbers of containers handled within the ESCAP region will increase by almost 150% between 2005 and 2015. While there remains room for productivity improvements in some ports of the region, in many instances port productivity in Asian ports — as measured by throughput per metre of berth provided —is already high. The expected increase in port throughput will therefore demand considerable investment in additional container berths.

Estimating port capacity is a complex, and often contentious issue, and precise estimates require the application of detailed simulation models, data on vessel arrival patterns, and service times. Such detailed analysis is clearly beyond the scope of the present study. However, it is possible to obtain a good overall appreciation of the scale of the task that will be faced by port managers of the ESCAP region using a simple methodology.

In general, the throughput that can be achieved per berth at a particular port will increase with the size of the average container exchange, the average size of ships visiting the port, and the level of port equipment. In general, there is a systematic correlation between the 'status' of the port and these factors, as global hub ports tend to handle large ships discharging high box numbers at well-equipped terminals. Local ports however, tend to handle small, often semi-container ships discharging modest volumes of containers at multi-purpose berths. It is not difficult to derive reasonable indicative performance benchmarks for each type of port. Applying these benchmarks to the expected increase in container volumes provides a reasonable estimate of the number of additional berths that will be required over the next decade.

On the other hand, due to the fact that berths at major hubs need to provide extensive land backing, deep water alongside the berth, and sufficient lifting performance to handle large volumes in a short period, the cost of providing an additional berth at such ports is generally higher.

For the purpose of estimating future berth requirements, ports were divided into five different classes, and an indicative throughput per berth and construction cost per berth assigned to ports in each class, as shown in ⟨Table 7-1⟩.

⟨Table 7-1⟩　**Port classification and indicative throughput per berth**

Port Class	Description	Throughput per berth (TEU)	Indicative cost per berth ($US m)
1	World class hub port	680,000	100
2	Major port with mainline services	460,000	80
3	Important secondary port	300,000	60
4	Feeder or regional port	230,000	40
5	Minor port using multipurpose facilities	180,000	40

⟨Figure 7-1⟩　**Regional shares of new container berth requirements (2005-2015)**

Source: Study estimates.
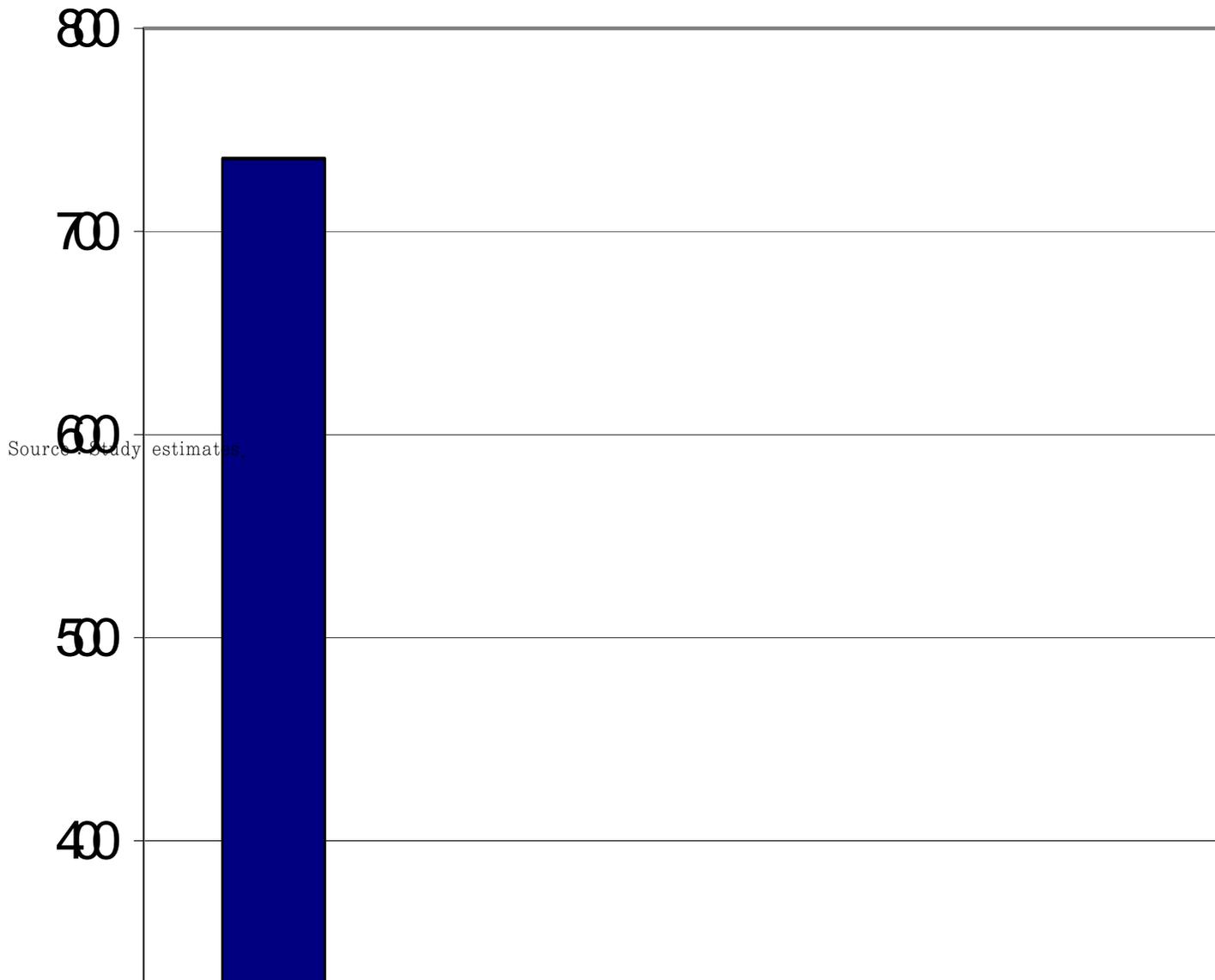
The study estimates that, in total, 1,264 new container berths 〈Figure 7-1〉 will be required to meet anticipated world demand in 2015. East Asia and the Pacific will account for approximately 740 of this total, with a further 85 berths required in South Asia. It is clear therefore that, although substantial new capacity will be required in all major regions of the world, the ESCAP region will dominate the requirements for new berths during this period.

Within the ESCAP region, East Asia clearly dominates future berth requirements over this period. The expected continued strong growth in China's container trades will create a need for 530 berths in the East Asian subregion by 2015 (see 〈Figure 7-2〉).

〈Figure 7-2〉 **Subregional share of new container berth requirements (2005-2015)**

West Asia/MEast, 24

ANZa

South Asia, 85

SE Asia, 154
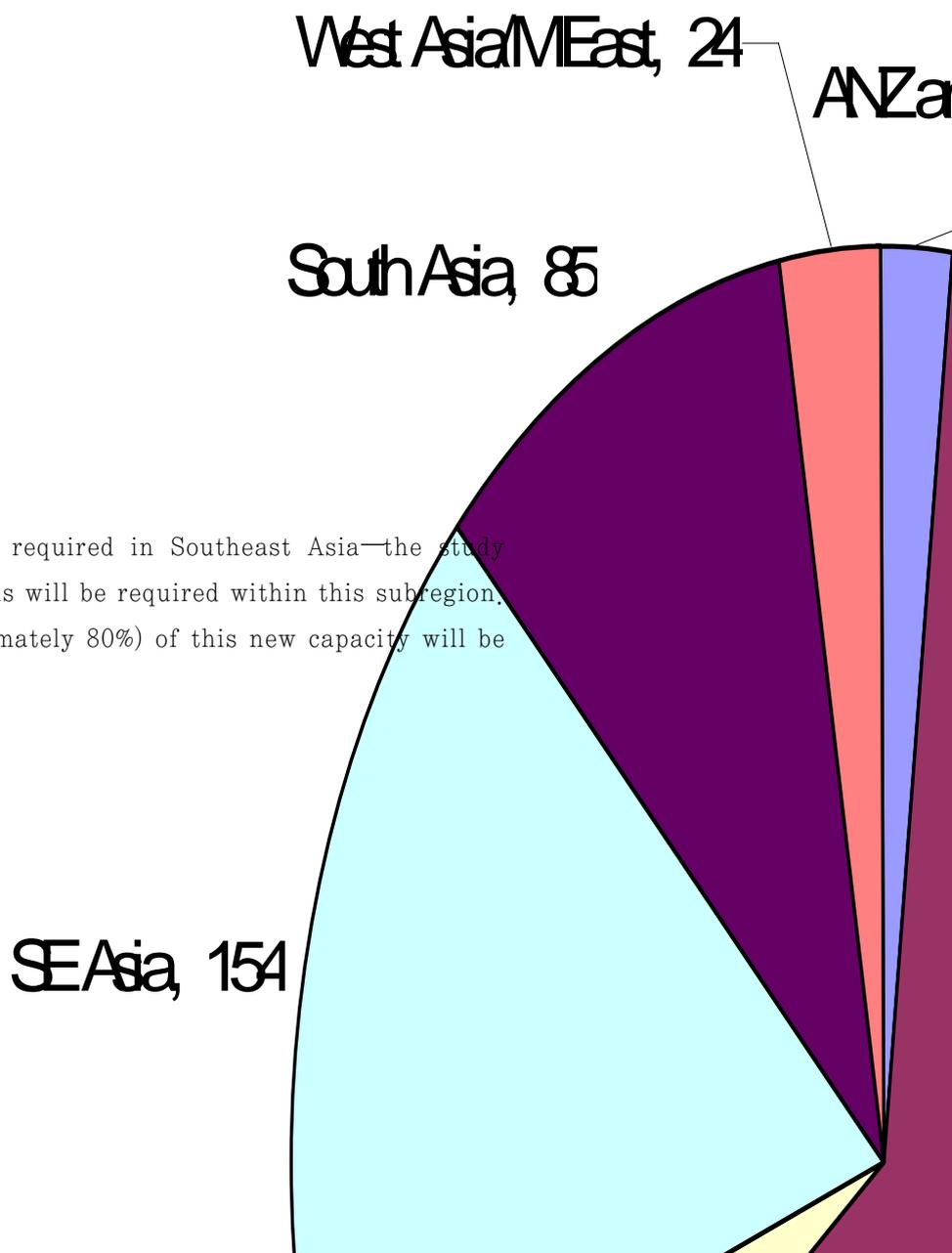
Source : Study estimates.

Many new berths will also be required in Southeast Asia—the study estimates that over 150 new berths will be required within this subregion. It is expected that most (approximately 80%) of this new capacity will be

developed in Singapore, Malaysia and Vietnam. South Asia is expected to require approximately 85 new berths over this period. The largest economy of the subregion, India, will account for over half of this total.

　Obviously, this will entail very significant capital expenditure. Precise investment requirements will depend on the particular conditions that prevail at each new development site. However, based on typical costs to develop new infrastructure and procure the handling equipment required to allow the terminal to operate at a satisfactory level of efficiency, the total capital required has been estimated at approximately US$73 billion, of which US $51 billion for the ports in the ESCAP region.

〈Figure 7-3〉　**Estimated cost of additional berth provision in the ESCAP region ($M, 2005-2015)**
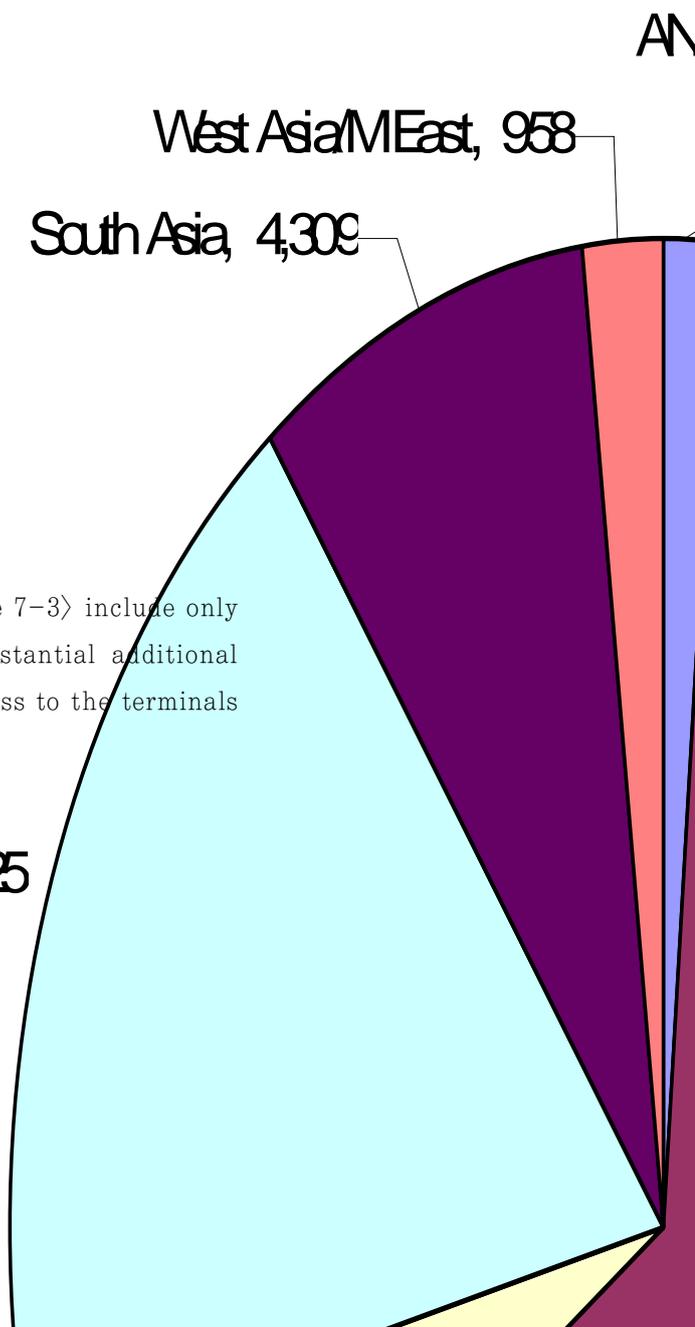
Source : Study estimates.

　It should be noted that the costs presented in 〈Figure 7-3〉 include only the cost of developing the terminals themselves. Substantial additional investment will also be required to secure adequate access to the terminals

by road, rail and inland waterways, which will be essential for the effective distribution of containers to expanded port hinterlands. The additional costs of dredging, the provision of breakwaters and the establishment of land transport links and intermodal interchanges could easily double this total. Devising appropriate strategies to mobilize this investment will be a major challenge for the governments of the region over the next decade.

REFERENCES

Andersen, Walter and Mansingh, Surjit, "The Asian Century: India-China Friendship Could Usher in a New Economic Era", *Saisphere*, Johns Hopkins University, 2006.

AXS Alphaliner, *Emma Maersk - TEU Capacity Analysis*, accessed 15 December 2006, 2006.

Brooks, M, "Sea Change in Liner Shipping: Regulation and Managerial Decision-Making in a Global Industry", 2000.

BRS, *Cellular Fleet Growth 2004-2007,* 2004.

___, *The Containership Market in 2005,* 2006.

Containerisation International, *Revolution Now*!, 2002.

_____, Market Analysis Future Supply and Demand for Liner Services, 2007. 9.

_____, *Are ocean carriers' 2008 business plans under threat from spiralling costs?*, November, 2007b.

Drewry Shipping Consultants, *Post-Panamax containership: the next generation,* 2001.

_____, *Intra-Asia Container Trade: Dynamism Beyond Bounds,* 2003.

_____, *Annual Review of Global Container Terminal Operators,* 2004.

_____, *Annual Container Market Review and Forecast 2005/06,* 2005.

_____, *Annual Container Market Review and Forecast 2007/08,* 2007a.

_____, *Annual Review of Global Container Terminal Operators 2007,* 2007b.

ESCAP, *Prospects for Container Shipping and Port Development (ASAEN Subregion),* 1992.

_____, *Prospects for Container Shipping and Port Development (South Asia Subregion)*, 1993a.

_____, *ESCAP/UNDP Maritime Policy Planning Model: Manual and Computer Software for Regional Container Flows and Shipping Requirements*, 1993b.

_____, *Prospects for Container Shipping and Port Development (East Asia Subregion)*, 1994.

_____, *Prospects for Container Shipping and Port Development (Intraregional Study)*, 1997.

_____, *Regional Shipping and Port Development Strategies under a Changing Maritime Environment*, 2001.

Fearnleys, *Review 2004*, 2005.

Finance Asia top 100 index 2007, *Plane sailing?*, accessed at www.fa100index.comon, 12 Dec 2007.

FitzGerald, E., "Stability v Competitiveness", *Transasia 99 Conference*, 1999.

Frankel, Ernest J., "The Challenge of Container Transshipment in the Caribbean", *IAME Panama – 2002*, 2002.

International Monetary Fund 2001, *World Economic Outlook April 2001*.

_____, *World Economic Outlook April 2002*, 2002.

_____, *World Economic Outlook April 2003*, 2003.

_____, *World Economic Outlook April 2004*, 2004.

_____, *World Economic Outlook – Financial Systems and Economic Cycles September*, 2006.

_____, *World Economic Outlook, Spillovers and Cycles in the Global Economy*, April, 2007.

Kerala Ports, Approach of Government of Kerala towards Investment in Ports, www.keralaports.gov.in, viewed 12 Dec 2007, 2007.

Lloyds List DCN, *ANL to swallow Pacific partner*, 6 December, 2007.

Lloyds Register – Fairplay, Sea-Web Register of Ships, 2006. http://www.sea-web.com/seaweb_ships.html

Meyrick and Associates, Presentation to Joint Meeting of UN ESCAP and ISPK, Bangkok, 2002.

Meyrick and Associates, Liner Shipping in the APEC Region, Presentation to AusIntermodal, Sydney, 29 November, 2007.

Mitsui OSK Line (MOL), www.mol.co.jp, accessed 10 December 2007, 2007.

MLIT, *The Amendment of the Marine Transportation Law by the Law for the Adjustment of the Immunity System from the Anti-Monopoly Law*, http://www.mlit.go.jp, 15 February 2006.

Notteboom, Theo E., "Container Shipping and Ports: An Overview", *Review of Network Economics*, June 2004, Vol. 3, No. 2, 2004.

Organisation for Economic Cooperation and Development (OECD) 2003, *Shipping conferences*, http://stats.oecd.org , accessed 15 December 2006.

Ocean Shipping Consultants (OSC), East Asian Container Port Markets to 2020, OSC, Chertey (Surrey), 2006a.

_____, *Sustaining Containerport Demand In the Americas,* P&O Ports, 'Dubai Ports World, http://portal.pohub.com, accessed 15 December 2006b.

Payer, H.G., *Economic and Technical Aspects of Mega-Container Ships*, Paper presented to Conference of the International Association of Maritime Economists, Panama, 2002.

Roberts, Victoria, "India must improve transport links to connect to GDP growth", *Containerisation International*, October, 2005.

Transport Canada, 'The Shipping Conference Exemption Act', downloaded from *Transport Canada*, http://www.tc.gc.ca, 15 February 2006.

United Nations Economic Commission for Europe (UNECE), *Almaty Declaration*, downloaded from UNECE website, 16 Dec 2007.

United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), *Transit Transport Issues and Landlocked Countries*,

http://www.unescap.org, viewed 16 Dec 2007, 2007.

UNCTAD, *Review of Maritime Transport 2004,* 2004.

————, *Review of Maritime Transport 2006,* 2006.

————, *Review of Maritime Transport 2007,* 2007.

World Bank World Development Indicators, World Bank, Washington, 2007.

World Trade Organisation (WTO), *International Trade Statistics 2006,* 2006,

Websites and magazines from which various statistics information was sourced

American Shipper

Containerisation International

Containerisation International Yearbook.

Containerisation International Website, http://www.ci-online.co.uk

Lloyd's List Daily Commercial News website, http://www.lloyslistdcn.com.au

Port Strategy, various issues

IndiaCore website, http://www.indiacore.com

<Appendix> Intermodal Rortes Informaion by country

Armenia

Route description	Mode (rail, road, waterway)	Distance (km)	Frequency of services (per month)	Transit time	Cost per TEU	% of total import	% of total export
Poti/Batumi – Sadakhlo/Airum – Erevan	Rail	650	800 container	110 hours	760 USD	10 %	25%
Novorosiysk-Poti-Airum-Karmir Blur	Road	780	800 container	110 hours	760 USD	10 %	25%

Name of IC	Location	Is transshipment generally allowed?	Unit handling charge (per EU)	Transshipment charge (per EU)	Average time at the ICD	Terminal capacity (TEU)
Karmir -Blur	Yerevan	yes	6000 AMD (12.5 euro)	18000AMD (37.5 euro)	4 hours	Unlimited
Other (please specify)	Is possible on the customer's access way	yes	11 000 AMD (22.5 euro)	23 000 AMD (47.9 euro)	4 hours	Unlimited

Azerbaijan

Route description	Mode (rail, road, waterway)	Distance (km)	Frequency of services (per month)	Transit time	Cost per TEU	% of total import	% of total export
Bandar-Abbas –Astara – Baku (**Astara – Baku**)	Rail	**327**	150	7	16.11		0.6
	Road	**313**					
Batumi / Poti – Tbilisi – Gardabani – Beyuk-Kyasik – Baku (**Beyuk-Kyasik – Baku**)	Rail	**503**	700	17	20.86	36.7	93.8
	Road	**503**					
Novorossiysk [or other Black Sea ports] – Yalama – Baku (**Yalama – Baku**)	Rail	**205**	210	5	6.99	63.3	5.6
	Road	**208**					

Name of ICD	Location	Is transshipment generally allowed?	Unit Handling charge (per TEU)	Transshipment charge (per TEU)	Average time at the ICD	Terminal capacity (TEU)
Baku	7 Aerodromnaya St, Baku 99412-499-55-27 99412-564-5280	**allowed**	**32 AZN/ USD** 36.91	**377 AZN/ USD** 434.83	**2 hour**	50
Baku port	99412-493-0268 99412-493-3672 office@bakukaport.az	**allowed**		**257 AZN/ USD** 296.42		80
Astara	99412-4991165 99412-4991168	**allowed**	32 AZN/ USD 36.91	**535 AZN/ USD** 617.07		20

1 AZN = 1.1534 USD

Georgia

Route description	Mode (rail, road, waterway)	Distance (km)	Frequency of services (per month)	Transit time	Cost per TEU	% of total import	% of total export
Poti – Tbilisi – Gardabani/Beyuk-Kyasik (border of Azerbaijan)	Rail	360	there is no regular route* , approximately 15-20 containers in a mixed train	18-22	$ 149 (From Poti)/ $ 119.2 (to Poti)	N/a	N/a
Poti – Tbilisi – Sadaxlo/Airum (border of Armenia)	Rail	387		20-24	$ 268.52 (from Poti)/ $ 214.56 (to Poti)	N/a	N/a

Name of ICD	Location	Is transshipment generally allowed?	Unit Handling charge (per TEU)	Transshipment charge (per TEU)	Average time at the ICD (hour)	Terminal capacity (TEU in a year)
Poti	Poti	**yes**	-	**$ 50**	4-6	140000
Tbilisi	Tbilisi	**yes**	-	**$ 17**	6-8	73000

Islamic Republic of Iran

Route description	Mode (rail, road, waterway)	Distance (km)	Frequency of services (per month)	Transit time (day)	Cost per TEU
Bandar-Abbas – Bafq – Meshhed – Sarakhs – Chardzhou – Chengeldy - Almaty	Rail	3776	3	25-30	2350**
	Road	3503	-	7	5600*
Bandar-Abbas – Bafq – Qum – Astara – Baku	Road only	2101	-	3-4	1350*
Bandar-Abbas – Bafq – Qum – Bandar Anzali – Turkmenbashi - Ashghabad	Road only	1690	-	5-6	1800**
Bandar-Abbas – Bafq – Qum – Bandar-Amirabad – Aktau – Beyneu - Tashkent	Rail	2796		15-20	1900*
	Road	2850		10-15	3200*
Bandar-Abbas - Bishkek	Rail	3502		20-25	2200*
	Road	3400		35-40	5600*

* note: all costs are one way, including the return of empty containers

** One way without return of empty containers

Name of ICD	Location	Is transshipment generally allowed?	Unit Handling charge (per TEU) Tajik Somoni (US dollar)	Transshipment charge (per TEU) Tajik Somoni (US dollar)	Average time at the ICD Hours	Terminal capacity (TEU)
Aprin	SW Tehran	No	-	-	-	700 ha
West	SW Tehran	Yes	20 foot = USD 40 40 foot = USD 65	According to Customs tariff	Max 24 hours	50 ha
Shahryar	W Tehran	No	-	-	-	100 ha

Kazakhstan

Route description	Mode (rail, road, waterway)	Distance (km)	Frequency of services (per month) for container train	Transit time	Cost per TEU		% of total import	% of total export
					COC	SOC		
Nakhodka – Lokot – Almaty	Rail	7730	8 (2006 – 97 trains)	44hour37 min	707$	531$	3,6 (through the Lokot)	1,2 (through the Lokot)
Lianyungang – Dostyk - Almaty	Rail	4977	8-12 (2006 –123 trains)	26hour40 min	705$	557$	10,8 (through the Dostyk)	11,2 (through the Dostyk)
Almaty – Alashankou	Rail	873	24 (2006-298 trains)	25hour55min	612$	464$	10,8 (through the Dostyk)	11,2 (through the Dostyk)
Tianjin – Dostyk – Almaty	Rail	4852	12 (2006 –155)	26hour40min	705$	557$	10,8 (through the Dostyk)	11,2 (through the Dostyk)
Nakhodka – Lokot –Saryagash – Assake	Rail	9171	5 (2006 – 61)	71hour36min	658$	576$	3,6 (through the Lokot)	1,2 (through the Lokot)
Lianyungang – Dostyk - Saryagash – Assake	Rail	6012	train generation (2006 – 9)	53hour02min	596$	538$	10,8 (through the Dostyk)	11,2 (through the Dostyk)
Almaty – Lokot - Nakhodka	Rail	7730	train generation (2006 – 6)	42hour09min	695$	519$	3,6 (through the Lokot)	1,2 (through the Lokot)

Name of ICD	Location	Is transshipment generally allowed?	Unit Handling charge (per TEU) Kazakh Tenge		Unit Handling charge (per TEU) In USD		Average time at the ICD	Terminal capacity (TEU)
			20 ton	40 ton	20 ton	40 ton		
Aktau	Mangishlak station Aktau (3292) 46-57-20 (3292) 46-59-15 Aktau_keden@nursat.kz	yes	8,385	16,014	69.30 USD	132.35 USD		In CY 60 TEU per day
Aktobe	41 razyezd Aktobe (3132) 21-89-80 (3132) 31-87-06 Aktubinsk_keden@nursat.kz	yes	8,385	15,950	69.30 USD	131.82 USD		In CY 60 TEU per day

Almaty-1	57, Severnoye kolco st. Almaty (3272) 36-35-91 (3272) 96-35-91 Almaty_keden@nursat.kz	yes	10,063	15,507	83.17 USD	128.16 USD		In CY 80 TEU per day
Almaty-2	32, Polezhaev street Almaty (3272) 60-42-60 (3272) 96-42-62	yes	10,063	15,507	83.17 USD	128.16 USD		In CY 60 TEU per day
Astana	Zhubanova 63/А Astana (3172) 37-25-37 (3172) 37-10-54 Astana_keden@nursat.kz	yes	7,367	12,982	60.88 USD	107.29 USD		In CY 100 TEU per day
Astana-Contract	Almaty, Astana-Contract company, 170 G, Krasnogvardeiski Tract St. 52-87-45, 52-96-84 iast@nursat.kz beyon@arna.kz	yes	4,800	6,720	39.67 USD	55.54 USD		In CY 90 TEU per day
Atyrau	Atyrau station, Atyrau (3122) 26-08-10 (3122) 36-40-43 Atyrau_keden@nursat.kz	yes	8,224	16,634	67.97 USD	137.47 USD		In CY 60 TEU per day
Dostyk	Privokzalnaya 11 Dostyk station (32830) 1-20-32 (32830) 1-21-13	yes	10,063	15,507	83.17 USD	128.16 USD		In CY 350 TEU per day
Karaganda	Skladskaya 13 Karaganda (3212) 43-30-06 (3212) 43-46-78 Karaganda_keden@nursat.kz	yes	8,791	13,832	72.65 USD	114.31 USD		In CY 150 TEU per day
Kokshetau	Vernadskogo 1/34 Kokshetau (3162) 25-25-89 (3162) 25-25-89 Keden_kokshetau@mail.ru	yes	6,131	9,559	50.67 USD	79.00 USD		In CY 100 TEU per day
Kostanai	Peronnaya 1 Kostanai (3142) 31-28-23 (3142) 53-58-88 Kostanay_keden@mail.kz	yes	8,161	12,210	67.45 USD	100.91 USD		In CY 50 TEU per day
Kyzylorda	Zhanadilova Kysylorda (3242) 27-08-86 (3242) 27-08-86	yes	5,221	10,932	43.15 USD	90.35 USD		In CY 60 TEU per day
Pavlodar	Pavlodar, Tovarnaya 25 (3182) 50-14-03 (3182) 50-14-02 Povlodar_keden@nursat.kz	yes	7,987	17,054	66.01 USD	140.94 USD		In CY 60 TEU per day
Semei	East Kazakhstan region, Semipalatinsk (3222) 38-30-29 Semey_keden@semsk.kz	yes	6,508	11,953	53.79 USD	98.79 USD		In CY 60 TEU per day
Shimkent	Muminov St. Shimkent (3252) 95-36-71 (3252) 52-90-27 Shymkent_keden@nursat.kz	yes	10,999	22,982	90.90 USD	189.93 USD		In CY100 TEU per day
Taldykorgan	33, Privokzalnaya St. Taldykorgan (3282) 24-79-01 (3282) 24-79-01	yes	9,108	15,337	75.27 USD	126.75 USD		In CY 60 TEU per day

Uralsk	Zhilaevo station Uralsk (3112) 23-24-80 (3112) 98-22-34	yes	7,120	13,420	58.84 USD	110.91 USD		In CY 60 TEU per day
Ust-Kamen ogorsk	36, Delegatskaya St. Ust-Kamenogorsk (3232) 40-85-22 (3232) 50-21-37	yes	8,326	17,271	68.81 USD	142.74 USD		In CY 50 TEU per day
Zhambyl	Baizak batyra 247 Zhambil (3262) 46-12-83 (3262) 46-12-83 Taraz_keden@nursat.kz	yes	4,620	11,416	38.18 USD	94.35 USD		In CY 60 TEU per day

Kyrgyzstan

Route description	Mode (rail, road, waterway)	Distance (km)	Frequency of services (per month)	Transit time (days)	Cost per TEU
Nakhodka –Lugovaya – Bishkek	Rail	8297		43	1426.89
Dostyk – Lugovaya – Bishkek	Rail	1462		8	526.89
Sarakhs – Chardzhou – Lugovaya – Bishkek	Rail	1886		12	883.45
Novorossiysk - Bishkek	Rail	4117		22	1099.69
Iliychevsk– Bishkek	Rail	4666		25	1426.89
Astrakhan – Bishkek	Rail	3380		19	1101.06

Tajikistan

Information on routes

Route description	Mode (rail, road, waterway)	Distance (km)	Frequency of services (per month)	Transit time	Cost per TEU
Nakhodka – Lokot – Almaty – Lugovaya –Chengeldy –Sariasiya – Dushanbe	Rail	10100	n/a	55 days	USD 2240.86 +10% freight forward fees = USD 2464.95
Lianyungang – Dostyk – Almaty – Lugovaya – Chengeldy – Sariasiya – Dushanbe	Rail	7300	n/a	37 days	USD 931.70 +10% freight forward fees = USD 1024.87
Bandar-Abbas – Bafq – Meshhed – Sarakhs — Sariasiya – Dushanbe	Rail	2800	n/a	20 days	USD 1271.43 +10% freight forward fees + USD 120 Customs fee at Sarakhs = USD 1518.57
Razi /Kapikoy – Meshhed – Sarakhs –Sariasiya – Dushanbe	Rail	4300	n/a	25-30 days	1263.43 USD +10% freight forward fees + USD 120 Customs fee at Sarakhs = USD 1509.77
Saint Petersburg [or Baltic Sea ports] - Moscow – Iletsk – Aralsk Chengeldy – Sariasiya –Dushanbe	Rail	5000-5500	n/a	25-28 days	1601.54 USD +10% freight forward fees = USD 1761.69
Novorossiysk/Iliychevsk [or other Black Sea ports] – Astrakhan – Beyneu – Tashkent	Rail	3700-4000	n/a	18-20 days	1329.58 USD +10% freight forward fees = USD 1462.54
Dushanbe – Ankara	Road	4000 approx.	n/a	10 days	9000 USD +10% freight forward fees = USD 9900 Note: for 40-foot container

This is additional information on rail sections within Tajikistan that might be useful for estimating frequencies

Rail section within the country	Mode (rail, road, waterway)	Distance (km)	Frequency of services (**PAIRS** per month)	% of total import	% of total export
Kudukli – Dushanbe - Yangibazar	Rail	92.6	91	1.2	2.0
Amuzang – Kok-tyube – Kulyab – Yavan	Rail	352.3	20	1.3	0.9
Bekabad – Kanibadam, Kanibadam - Isfara	Rail	171.1	85	3.2	3.2
Total				1.7	2.6

Name of ICD	Location	Is transshipment generally allowed?	Unit Handling charge (per TEU) Tajik Somoni (US dollar)	Transshipment charge (per TEU) Tajik Somoni (US dollar)	Average time at the ICD Hours	Terminal capacity (TEU)
Khudjand	15 Lakhuti St., Gafurov, Tel. 2-19	Yes	73.08 (21.18)	73.08 (21.18)	14	60-75
Kurgan-Tube	Privokzalnaya St., Kurgan-Tube Tel. 2-49	Yes	73.08 (21.18)	73.08 (21.18)	14	15-20
Dushanbe-2	Chortepa St., Dushanbe Tel.: 2-35-84-20, 2-35-84-35, 2-25	Yes	73.08 (21.18)	73.08 (21.18)	14	60-75
Kanibadam	Kanibadam town	Yes	73.08 (21.18)	73.08 (21.18)	14	15-20
Kulyab	Kulyab town	Yes	73.08 (21.18)	73.08 (21.18)	14	15-20
Dangara	Sargazon village, Dangara region	Yes	73.08 (21.18)	73.08 (21.18)	14	15-20

Uzbekistan（estimates）

Route description	Mode (rail, road, waterway)	Distance (km)	Frequency of services (per month)	Transit time (days)	Cost per TEU	% of total import	% of total export
Nakhodka – Lokot – Almaty – Lugovaya –Chengeldy – Tashkent	Rail	8800		45	2500		
Lianyungang – Dostyk – Almaty – Lugovaya – Chengeldy – Tashkent	Rail	6000		30	2000		
Bandar-Abbas – Bafq – Meshhed – Sarakhs – Chardshou – Tashkent	Rail	2700		15-20	1900		
Mersin – Razi /Kapikoy – Meshhed – Sarakhs – Chardshou – Tashkent	Rail	4200		23	1500		
Saint Petersburg [or Baltic Sea ports] - Moscow – Iletsk – Aralsk – Chengeldy – Tashkent	Rail	3800 - 4300		22	810		

Name of ICD	Location	Is transshipment generally allowed?	Unit Handling charge (per TEU)	Transshipment charge (per TEU)	Average time at the ICD	Terminal capacity (TEU)
Chukursai	Tashkent	Yes	5389 Uzb. sum (5 USD)	5389 Uzb. sum (5 USD)	3,4 days	60
Sergeli						
Tashkent						
Ulugbek	Bukhara	Yes	5389 Uzb. sum (5 USD)	5389 Uzb. sum (5 USD)	3,4 days	60
Bukhara						
Tinchlik						
Nukus	Nukus	Yes	5389 Uzb. sum (5 USD)	5389 Uzb. sum (5 USD)	3,4 days	60
Urgench						
Termez	Termez	Yes	5389 Uzb. sum (5 USD)	5389 Uzb. sum (5 USD)	3,4 days	60
Margelan	Kokand	Yes	5389 Uzb. sum (5 USD)	5389 Uzb. sum (5 USD)	3,4 days	60
Kakir						
Raustan						
Akhtachi						
Karshi	Karshi	Yes	5389 Uzb. sum (5 USD)	5389 Uzb. sum (5 USD)	3,4 days	60